

A taxonomic revision of the genus *Cirsium* Mill. sect. *Cirsium* (Asteraceae: Cardueae) in Turkey

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Abstract: In this study, the members of the genus *Cirsium* Mill. sect. *Cirsium* (Asteraceae: Cardueae) in Turkey are revised. The species *C. eliasianum* Kit Tan & Sorger is regarded as a synonym of *C. frickii* Fisch. & C.A.Mey. The name *C. alatum* subsp. *alatum* was misapplied for *C. elodes* M.Bieb. and *C. elodes* was misapplied in Turkey for *C. subinermis* Fisch. & C.A.Mey. In addition, two new hybrids, *C. × prativagum* Petr. and *C. × woronowii* Petr., are newly recorded for the flora of Turkey. The lectotype of *C. pseudopersonata* Boiss. & Balansa ex Boiss. subsp. *kusnezowianum* (Sommier & Levier) Petr. is designated here. As a result, the genus *Cirsium* is represented by 66 species (78 taxa) in Turkey, of which 17 species (27 taxa) belong to *C. sect. Cirsium*. In addition, an identification key of species, detailed morphological descriptions, color photographs, and images of useful distinguishing characters of all species are given.

Key words: *Cardueae*, *Cirsium* sect. *Cirsium*, Compositae, endemic, morphology, revision, Turkey

1. Introduction

The genus *Cirsium* Mill. is one of the largest genera in Asteraceae (Subfamily: Carduoideae Cass. ex Sweet, tribe: Cardueae Cass., subtribe: Carduinae (Cass.) Dumort) (Kadereit and Jeffrey, 2007). It contains about 250 species spread throughout Europe, North Africa, East Asia, Central Asia, SW Asia, and North and Central America. The species are perennial or biennial, very rarely annual. Native species of *Cirsium* range from sea level to alpine and occur in many habitats including swamps, meadows, forests, prairies, sands, screes, steppes, and deserts (Charadze, 1963; Davis and Parris, 1975; Petrak, 1979; Keil, 2006; Kadereit and Jeffrey, 2007).

The name *Cirsium* originates from the Greek word “khirsos”, which means “swollen vein”, referring to diseases of veins. Tournefort, citing Dioscorides, reported that the roots of this plant were used against diseases of veins. In addition, the use of this plant in varicose disease for pain relief was reported (Tournefort, 1694; Charadze, 1963). The name *Cirsium* was used by botanists in the pre-Linnean period (Bauhin, 1596; Tournefort, 1694). In *Species Plantarum*, the species of the genus *Cirsium* were treated given under the names of the genera of *Serratula* L., *Carduus* L., and *Cnicus* L. by Linnaeus (1753).

The history of the genus *Cirsium* is given below chronologically in terms of taxonomy:

The first comprehensive study was carried out in “Prodramus Sytematis Naturalis” by Candolle (1838). In this study, the genus was represented by 137 species belonging to 6 sections: *C. sect. Lophiolepis* Cass. (4 species), *C. sect. Eriolepis* Cass. (38 species), *C. sect. Orthocentron* Cass. (6 species), *C. sect. Corynotrichum* DC. (3 species), *C. sect. Cephalonoplos* (Necker) DC. (5 species), and *C. sect. Onotrophe* Cass. (81 species).

In *Flora Orientalis*, 74 species belonging to 4 sections, *C. sect. Epitrachys* DC. ex Duby (38 species), *C. sect. Chamaelon* DC. (28 species), *C. sect. Lamyra* Cass. (7 species), and *C. sect. Breea* Less. (1 species), were given by Boissier (1875).

Sommier and Levier (1895) reported 53 species (including the NE of Turkey) without separating them into sections in their work *Cirsium del Caucaso*.

In addition, 111 species belonging to 16 subsections and 7 sections were given by Charadze (1963) in *Flora of the USSR*, 60 species belonging to 3 sections were given by Werner (1976) in *Flora Europaea*, and 36 species belonging to 7 subsections and 5 sections were given by Petrak (1979) in *Flora Iranica*. A comprehensive study about New World

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Cirsium species was presented in *Flora of North America* with 62 species (Keil, 2006). In *Flora of China* 46 and in *Flora of Japan* 55 *Cirsium* species were given (Zoku, 1965; Zhu and Greuter, 2001).

The most recent revisionary study on *Cirsium* species growing in Turkey was carried out by Davis and Parris (1975) for *Flora of Turkey*. According to *Flora of Turkey*, the genus is represented by 57 species (71 taxa) belonging to three sections and 7 species doubtfully recorded or imperfectly known (Davis and Parris, 1975; Davis et al., 1988; Güner et al., 2000). In recent years, additional studies have dealt with the distribution of the genus in Turkey. *C. eriophorum* (L.) Scop. (sect. *Epitrachys*), which is one of the species previously doubtfully recorded, was found at Uludağ, Bursa Province (Daşkın et al., 2006).

There are additional studies other than the taxonomy of the genus.

Cirsium species show a wide range of chromosome numbers. Most of them are diploid $2n = 34$ (ca. 69%) or $2n = 30$ and $2n = 32$ (ca. 5%), or tetraploid $2n = 68$ (ca. 10%). Several chromosome numbers such as $2n = 16, 18, 20, 22, 24, 26, 28, 26, 51,$ and 102 are either very rare or doubtful (Bures et al., 2004). In addition, $2n = 32, 34, 36, 60,$ and 68 chromosome numbers were reported from studies on the Turkish *Cirsium* taxa (Ozcan et al., 2008, 2011; Yüksel et al., 2013). In addition, leaf anatomical characters of 26 Turkish *Cirsium* taxa were determined and their taxonomic significance was evaluated (Ozcan et al., 2015).

According to several molecular phylogenetic studies *Cirsium* and *Carduus* L. are monophyletic genera. *Carduus* is morphologically distinct with the scabrous or barbellate pappus and generally winged stems from *Cirsium*, which has plumose pappus and less-winged stems (Kelch and Baldwin, 2003; Keil, 2006; Slotta et al., 2012). It is reported that the diversity of the *Cirsium* species is the product of a rapid evolutionary diversification based upon a single initial introduction from Eurasia (Kelch and Baldwin, 2003; Keil, 2006). In North America, rDNA evolution of the genus *Cirsium* has been highly conservative or underwent a rapid ecological radiation (Kelch and Baldwin, 2003).

The pollen morphology has been studied in only a few species (Erdtman, 1945). Tricolporate pollen grains that have echinate ornamentation were observed in some Turkish species (Yıldız et al., 2011; Şafak and Özhatay, 2012).

Achene morphology of 21 Turkish *Cirsium* sect. *Cirsium* taxa (14 species) were examined by stereomicroscope and scanning electron microscope. Oblong, obovate, narrowly obovate, and oblanceolate achene shapes were determined (Köstekci and Arabacı, 2011).

This study includes the taxonomic revision of the genus *Cirsium* sect. *Cirsium* species as a part of the revision of Turkish *Cirsium* species. Distribution and/or

taxonomic categories of *C. eliasianum* Kit Tan & Sorger, *C. alatum* (S.G.Gmel.) Bobrov subsp. *alatum* and subsp. *pseudocreticum* P.H.Davis & Parris, and *C. elodes* M.Bieb. in Turkey were rearranged. In addition, an identification key of species and images of useful distinguishing characters are given.

2. Materials and methods

The materials of this study were collected from many field trips made between the years 2006 and 2014. The specimens collected during this study were identified and checked using *Flora of Turkey* (Davis and Parris, 1975) and its supplements (Davis et al., 1988; Güner et al., 2000). Relevant literature was also checked (Gmelin, 1769; Candolle, 1838; Koch, 1851; Tchihatcheff, 1860; Boissier, 1875; Sommier and Levier, 1895; Petrak, 1912, 1979; Charadze, 1963; Werner, 1976; Menitsky, 1996; Govaerts, 1999; Greuter and Raus, 2005; Greuter, 2006, 2008; Yıldız, 2012; <http://www.efloras.org/>; <http://www.ipni.org/>; <http://www.theplantlist.org/>). At the same time, the specimens previously collected from Turkey and neighboring countries and deposited in the ANK, AEF, B, BM, E, EGE, FI, G, G-Boiss, G-DC, GAZI, HUB, INU, ISTE, ISTEf, ISTO, K, L, LE, MA, VANf, W, WIR, and WU herbaria and the digital herbaria of JE, LD, P, and S were examined. Almost all type specimens of species occurring in Turkey were checked. In addition, the specimens collected during the study were compared with *Cirsium* specimens deposited in the herbaria mentioned above. Lastly, throughout the whole study the distributions of Turkish *Cirsium* sect. *Cirsium* species were circumscribed.

The descriptions of the species are expanded on the basis of the descriptions given in *Flora of Turkey* (Davis and Parris, 1975). Phyllaries of species, which are the most useful and constant characters for distinguishing the species, and some basal and median cauline leaves are illustrated (Figures 1A–1F, 2A–2G, 3A–3F, 4A–4G, 5A–5G, 6A–6X, 7A–7X, and 8A–8R). Images of capitula are given (Figures 9A–9S). Images of the habits of species were photographed by the authors during the field studies. In addition, a new identification key of species was prepared on the basis of Davis and Parris (1975). The genus was divided into sections and series in several studies such as *Flora of the USSR* (Charadze, 1963) and *Flora Iranica* (Petrak, 1979). The sequence of sections and species in this study follows the system adopted in *Flora of Turkey* (Davis and Parris, 1975). The voucher specimens are kept in ISTE and in the herbarium of the Balıkesir University Education Faculty in Balıkesir, Turkey. Some duplicates were given as gifts to herbaria ANK, E, EGE, GAZI, and HUB. The list, synonyms, types, descriptions, habitats, and distributions of the species are given in the Appendix.

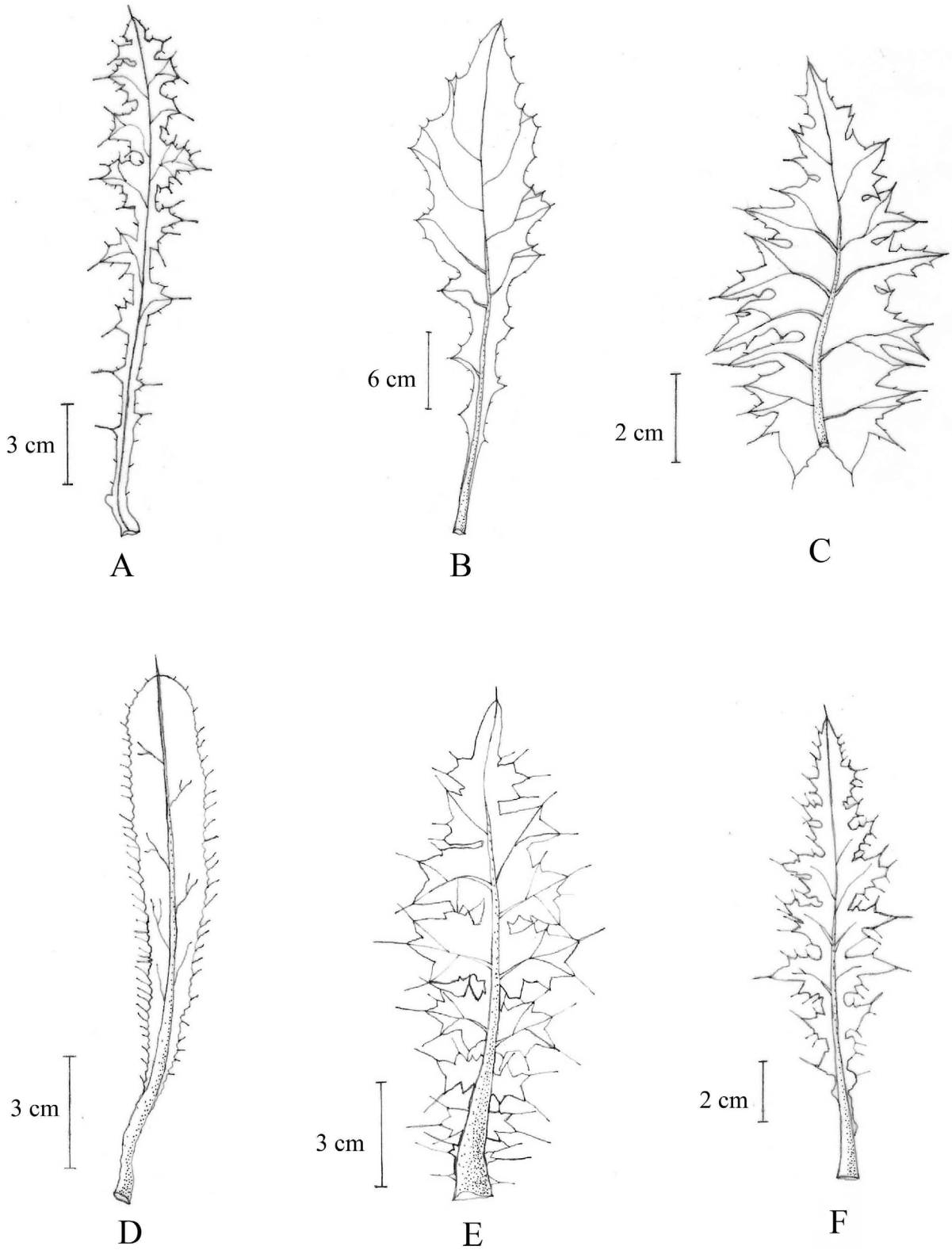


Figure 1. Basal leaves of A- *Cirsium echinus* (Yıldız 16262), B- *C. hypoleucum* (Yıldız 16409), C- *C. obvallatum* (Yıldız 16724), D- *C. simplex* subsp. *armenum* (Yıldız 16658), E- *C. rhizocephalum* subsp. *rhizocephalum* (Yıldız 16339), F- *C. rhizocephalum* subsp. *sinuatum* (Yıldız 16873).

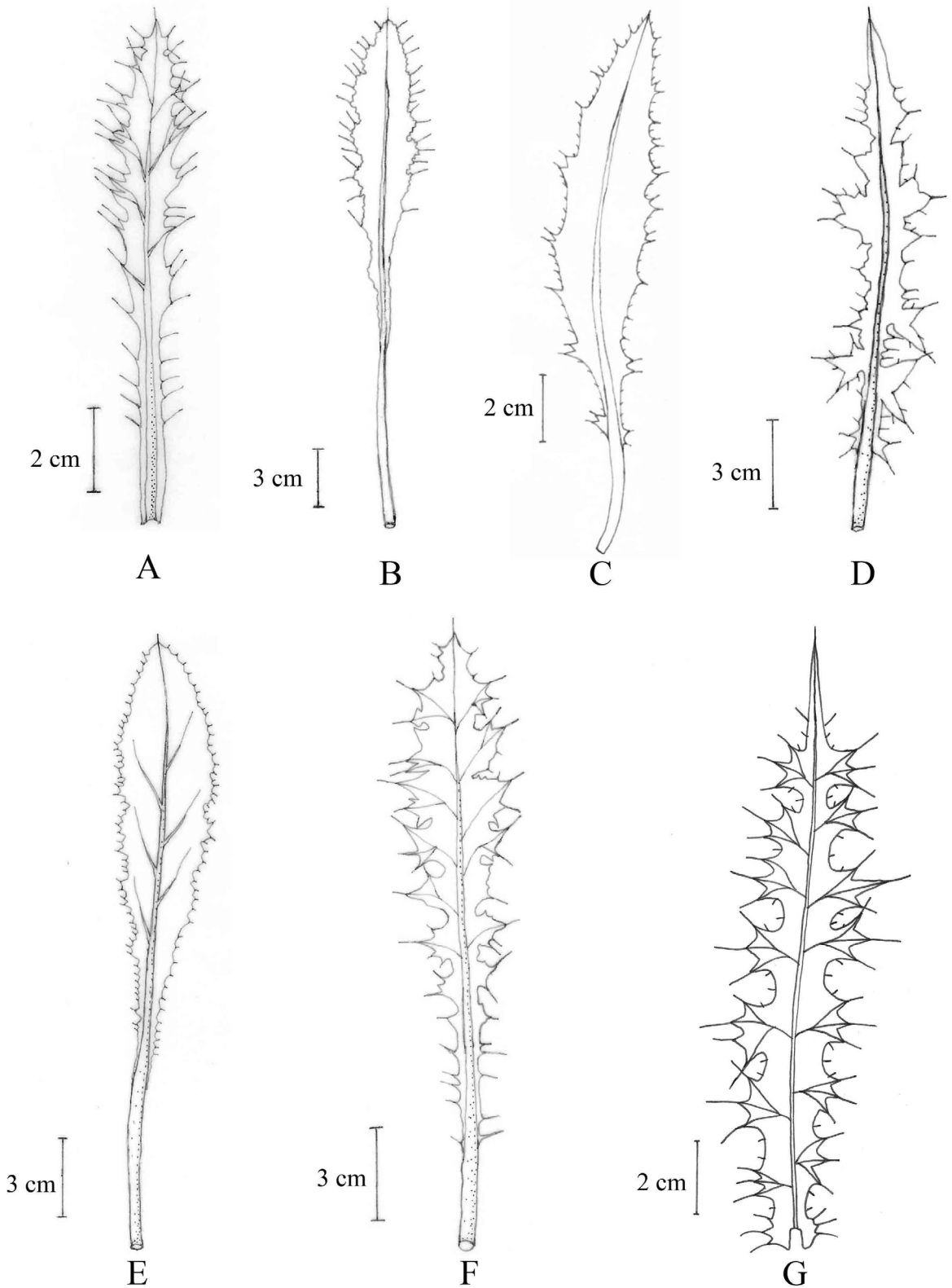


Figure 2. Basal leaves of A- *Cirsium pubigerum* var. *paphlagonicum* (Yıldız 16576), B- *C. creticum* subsp. *creticum* (Yıldız 16454), C- *C. elodes* (Yıldız 17001), D- *C. pseudocreticum* (Yıldız 16617), E- *C. subinermis* (Yıldız 16489), F- *Cirsium leucopsis* (Yıldız 16457), G- *C. cilicicum* (Dirmenci 3447).

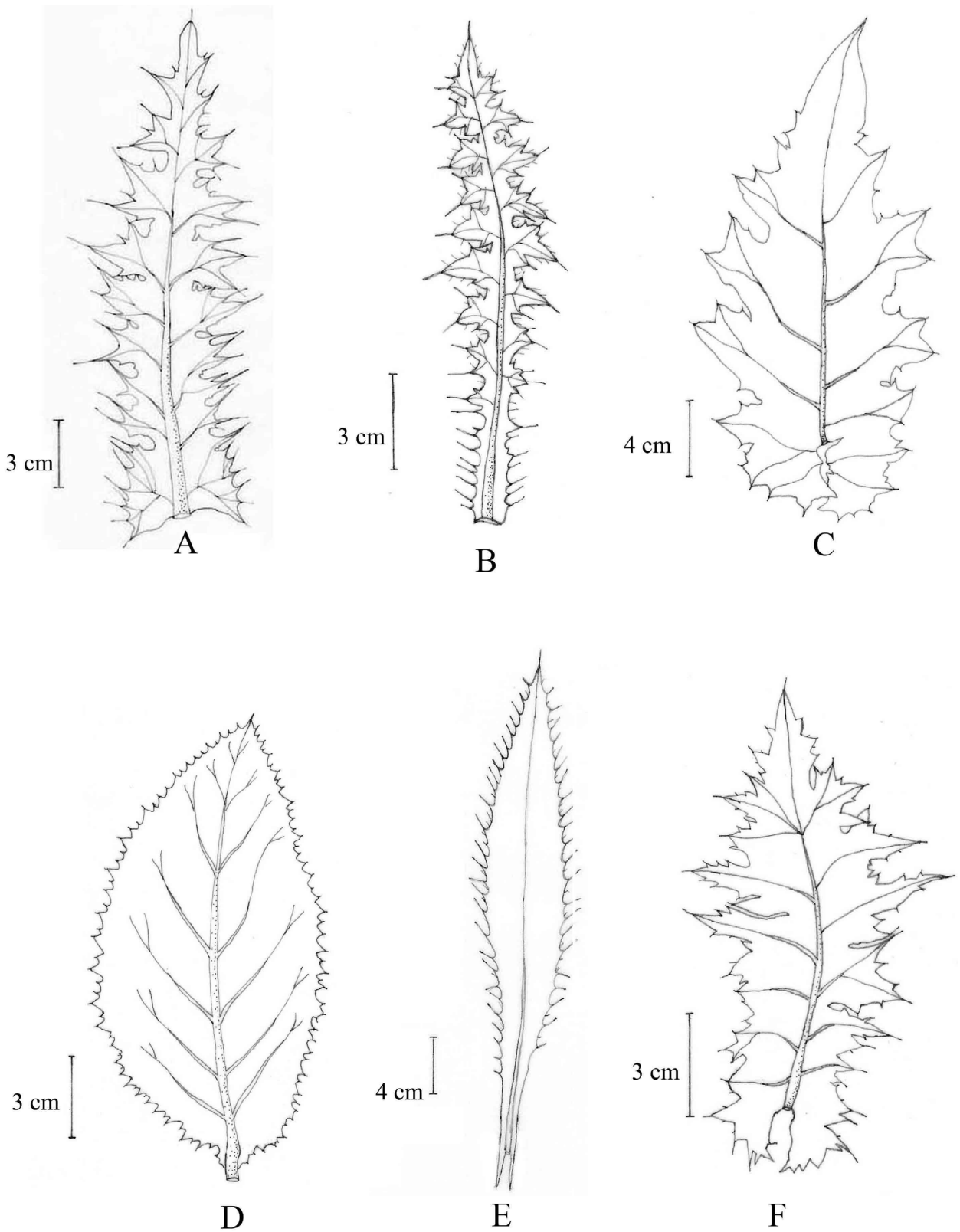


Figure 3. Cauline leaves of A- *Cirsium candelabrum* (Yıldız 16525), B- *Cirsium echinus* (Yıldız 16262), C- *C. hypoleucum* (Yıldız 16409), D- *C. pseudopersonata* subsp. *pseudopersonata* (Yıldız 16375), E- *C. canum* (Dirmenci 3678), F- *C. obvallatum* (Yıldız 16724).

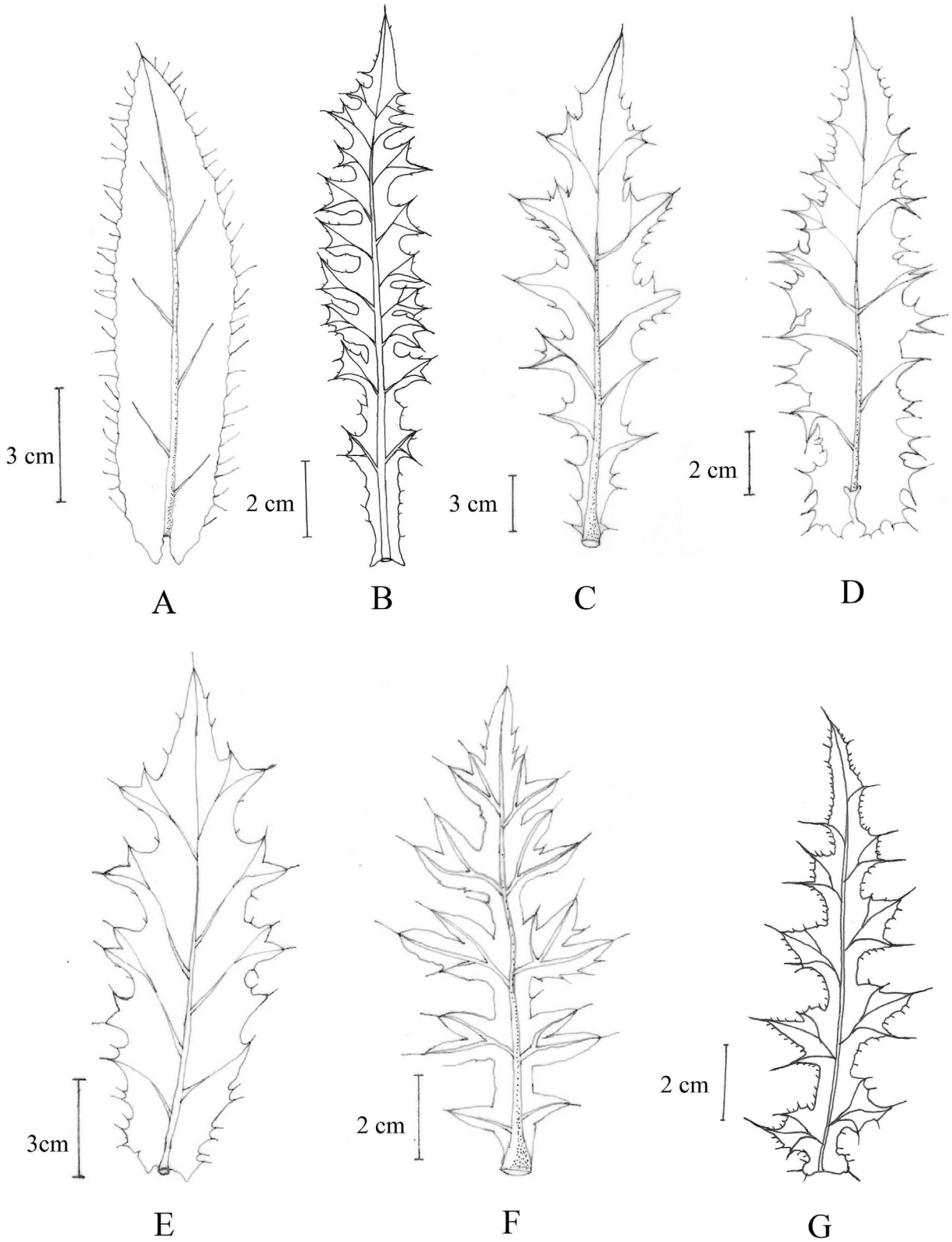


Figure 4. Culine leaves of A- *Cirsium simplex* subsp. *armenum* (Yıldız 16658), B- *C. frickii* (Yıldız 16893), C- *C. pubigerum* var. *glomeratum* (Yıldız 16864), D- *C. pubigerum* var. *caniforme* (Yıldız 16908), E- *C. pubigerum* var. *paphlagonicum* (Yıldız 16576), F- *C. pubigerum* var. *spinosum* (Yıldız 16432), G- *C.* (Yıldız 16934).

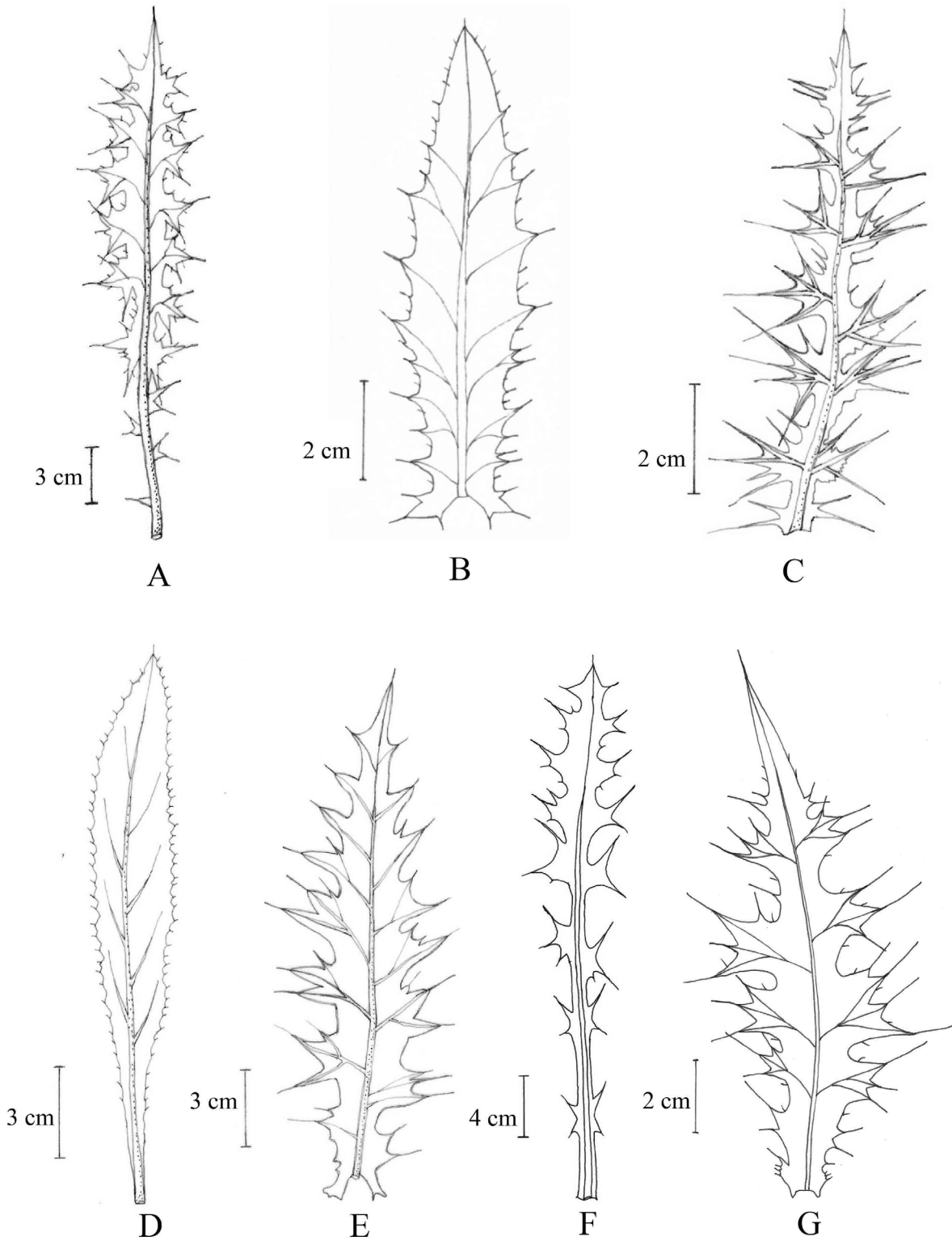


Figure 5. Culine leaves of A- *Cirsium creticum* subsp. *creticum* (Yıldız 16454), B- *C. elodes* (Yıldız 17001), C- *C. pseudocreticum* (Yıldız 16617), D- *C. subinerme* (Yıldız 16489), E- *C. leucopsis* (Yıldız 16457), F- *C. libanoticum* subsp. *lycaonicum* (Yıldız 16454-b), G- *C. cilicicum* (Dirmenci 3447).

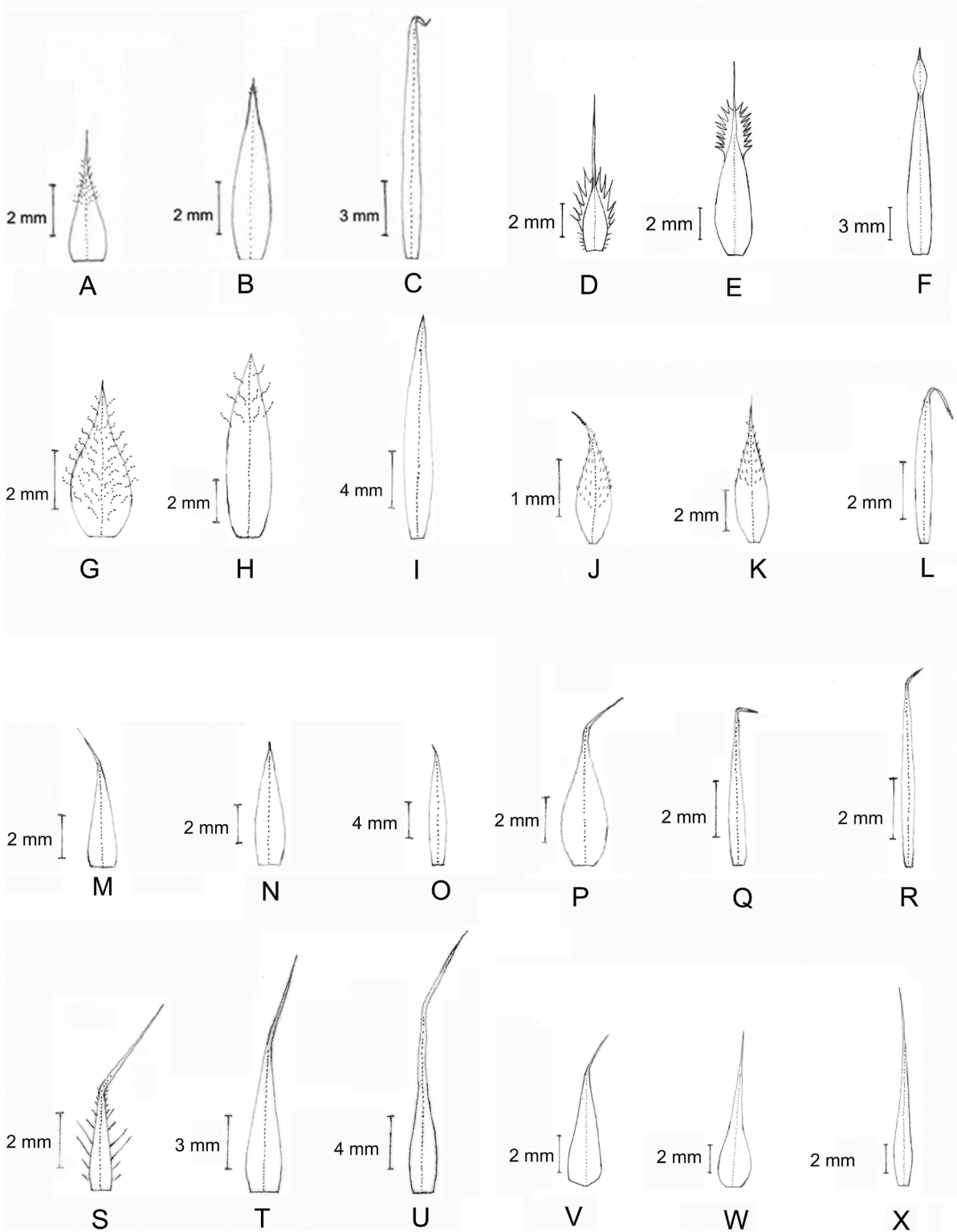


Figure 6. Phyllaries of *Cirsium candelabrum* (Yıldız 16525): A- outer, B- median, C- inner; *C. echinus* (Yıldız 16262): D- outer, E- median, F- inner; *C. hypoleucum* (Yıldız 16409): G- outer, H- median, I- inner; *C. pseudopersonata* subsp. *pseudopersonata* (Yıldız 16375): J- outer, K- median, L- inner; *C. canum* (Dirmenci 3678): M- outer, N- median, O- inner; *C. obvallatum* (Yıldız 16724): P- outer, Q- median, R- inner; *C. simplex* subsp. *simplex* (Yıldız 17170): S- outer, T- median, U- inner; *C. simplex* subsp. *armenum* (Yıldız 16658): V- outer, W- median, X- inner.

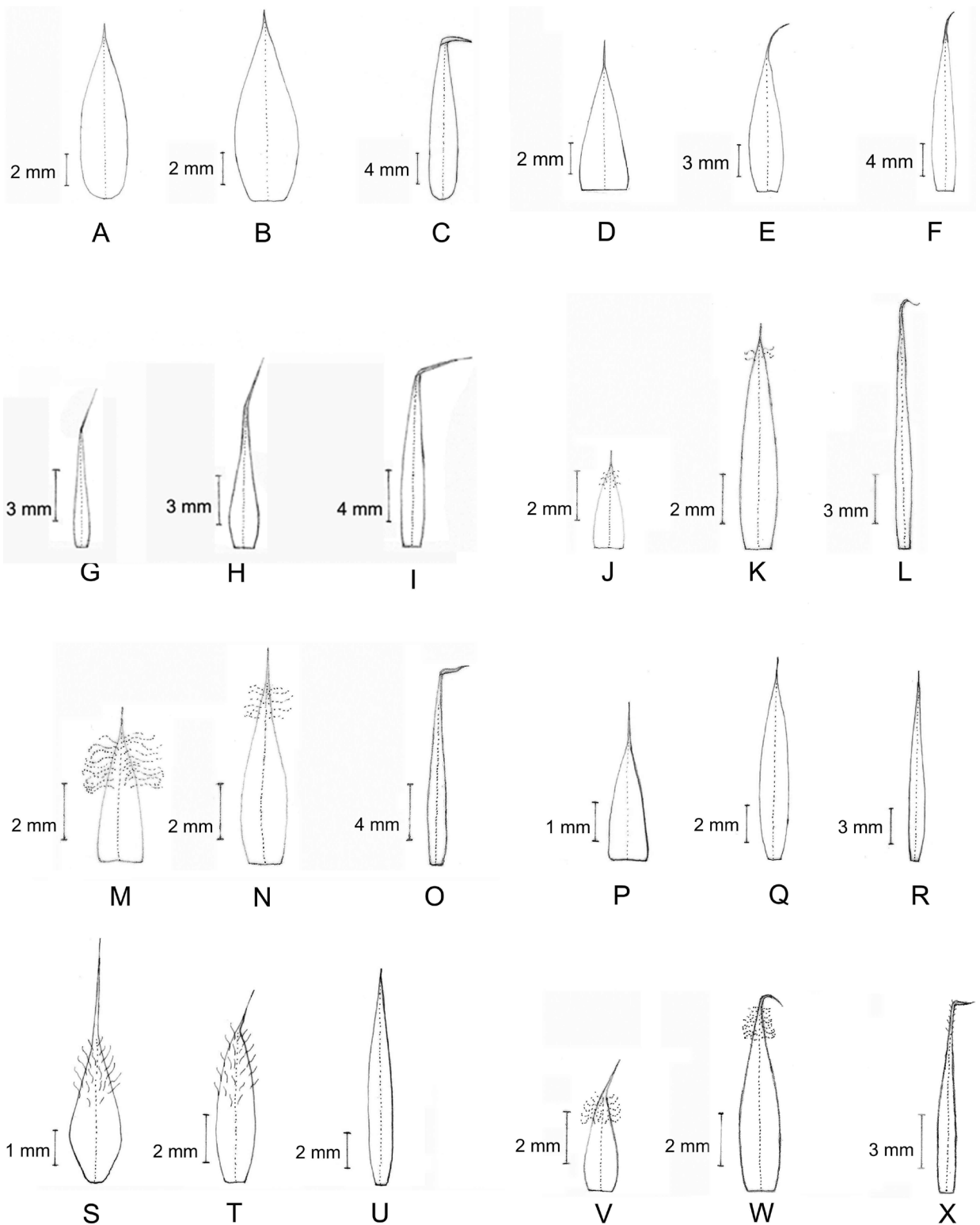


Figure 7. Phyllaries of *Cirsium rhizocephalum* subsp. *rhizocephalum* (Yıldız 16339): A- outer, B- median, C- inner; *C. rhizocephalum* subsp. *sinuatum* (Yıldız 16874): D- outer, E- median, F- inner; *C. frickii* (Yıldız 16893): G- outer, H- median, I- inner; *C. pubigerum* var. *glomeratum* (Yıldız 16291): J- outer, K- median, L- inner; *C. pubigerum* var. *caniforme* (Dirmenci 3412): M- outer, N- median, O- inner; *C. pubigerum* var. *paphlagonicum* (Yıldız 16576): P- outer, Q- median, R- inner; *C. creticum* subsp. *creticum* (Yıldız 16454): S- outer, T- median, U- inner; *C. elodes* (Yıldız 17001): V- outer, W- median, X- inner.

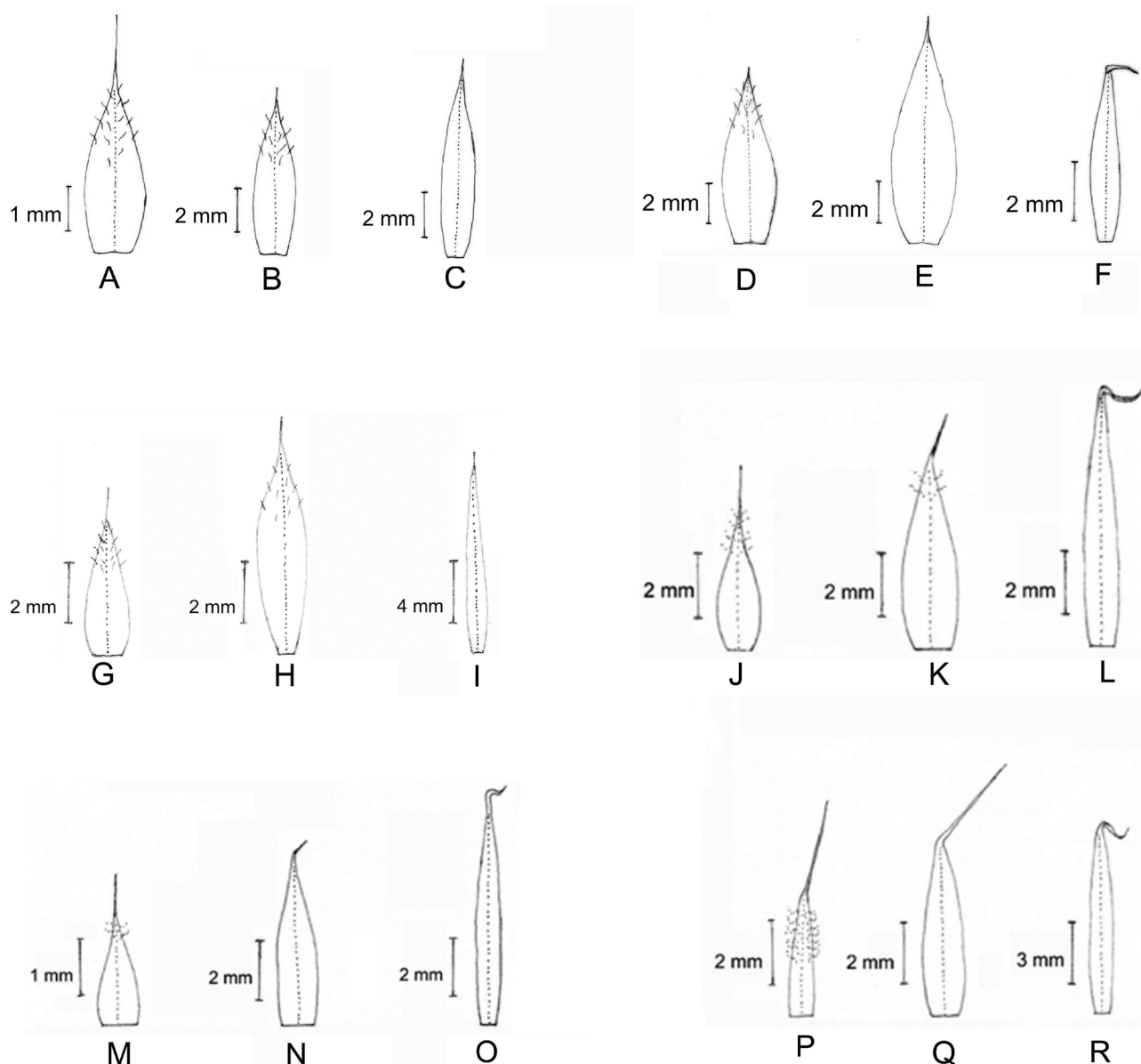


Figure 8. Phyllaries of *Cirsium pseudocreticum* (Yıldız 16617): A- outer, B- median, C- inner; *C. subinerme* (Yıldız 16489): D- outer, E- median, F- inner; *C. leucopsis* (Yıldız 16457): G- outer, H- median, I- inner; *C. libanoticum* subsp. *lycaonicum* (Yıldız 16453): J- outer, K- median, L- inner; *C. libanoticum* subsp. *arachnoideum* (Arabacı 2607): M- outer, N- median, O- inner; *C. cilicicum* (Dirmenci 3447): P- outer, Q- median, R- inner.

3. Results and discussion

CIRSIUM Mill., Gard. Dict. Abr., ed. 4: 334 (1754).

Syn.: = *Ascalea* Hill, Veg. Syst. 4: 14 (1762). = *Cephalonoplos* Necker, Elem. Bot. 1: 98 (1790). = *Echenais* Cass., Bull. Soc. Philom. Paris 33 (1818). = *Orthocentrum* Cass., Dict. Sciences Nat. 36: 480 (1825). = *Onotrophe* Cass., in Dict. Sc. Nat. 36: 145 (1825). = *Lophiolepis* Cass. in Dict. Sc. Nat. 41: 313 (1826). = *Breaa* Less. Syn. Gen. Comp. 9 (1832). = *Spanioptilon* Less. Syn. Gen. Comp. 10 (1832). = *Epitrachys* C. Koch, Linnaea 24: 336 (1851).

Lectotype: *C. heterophyllum* (L.) Hill (*Carduus heterophyllum* L.), according to N.L. Britton & A. Brown, Ill. Fl. N.U.S. ed. 2. 3: 548 (1913).

Perennial, biennial or rarely annual, bisexual or dioecious herbs; stems spiny-winged or unarmed, branched or not. Leaves dentate-pinnatisect, sometimes entire, often semiamplexicaul, spiny, upper surface with or without setae and spinules. Capitula homogamous, discoid, solitary or crowded. Phyllaries pluriseriate, imbricate, adpressed, ±patent in upper part or recurved, with or without a

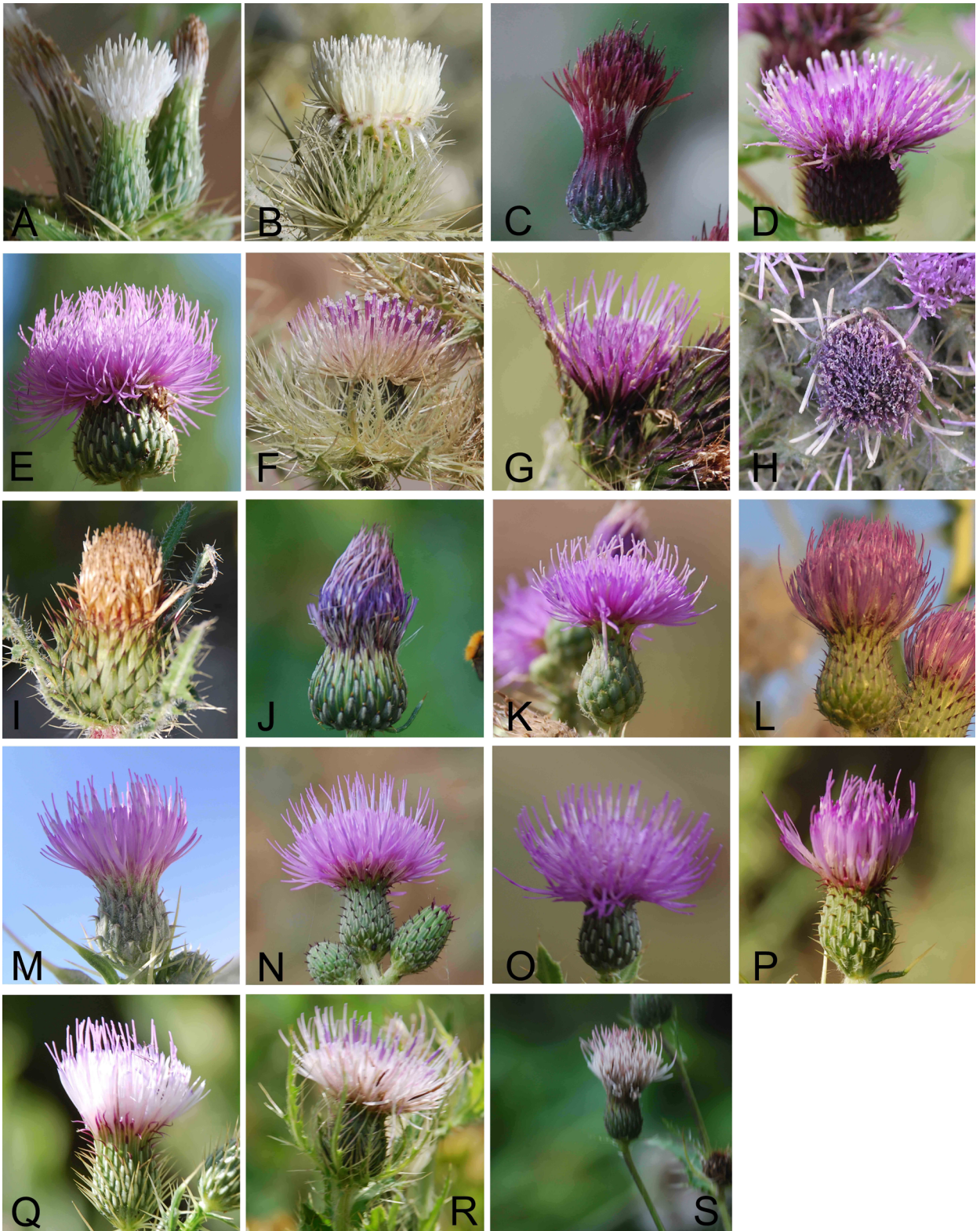


Figure 9. Capitula of A- *Cirsium candelabrum*, B- *C. echinus*, C- *C. hypoleucum*, D- *C. pseudopersonata* subsp. *pseudopersonata*, E- *C. canum*, F- *C. obvallatum*, G- *C. simplex* subsp. *simplex*, H- *C. rhizocephalum* subsp. *rhizocephalum*, I- *C. frickii*, J - *C. pubigerum* var. *paphlagonicum*, K- *C. creticum* subsp. *creticum*, L- *C. elodes*, M- *C. pseudocreticum*, N- *C. subinermis*, O- *C. leucopsis*, P- *C. libanoticum* subsp. *libanoticum*, Q- *C. cilicicum*, R- *C. × prativagum*, S- *C. × woronowii*.

subterminal vitta, sometimes appendaged, usually with a terminal spine, margins entire to spinulose or lacerate. Receptacle with bristles. Flowers hermaphrodite or rarely unisexual, tubular, usually unequally 5-fid, red, purple, pink, rarely yellow or white. Stamen filaments pubescent; anther with short subtire to lacerate basal appendages. Achenes obovoid-oblong, smooth, glabrous, with an apical rim and small obconical caruncle. Pappus pluriseriate, plumose, usually deciduous bristles, outer ones not much shorter than inner. $x = 17$ (Eurasia) and $x = 15$ (North America). Frequent in wet waste grounds; some noxious cosmopolitan weeds (Davis and Parris, 1975; Zhu and Greuter, 2001; Kadereit and Jeffrey, 2007).

Key to the section of genus *Cirsium* in Turkey:

1. Upper leaf surface bearing stiff bristles (setae), rarely absent **Sect. Epitrachys**

1. Upper leaf surface without stiff bristles (setae) or spinules

2. Corolla limb unequally 5-fid to 1/2-way, pappus shorter or slightly longer than corolla **Sect. *Cirsium***

2. Corolla limb 5-fid nearly to base, pappus much longer than corolla **Sect. *Cephalonoplos* (*C. arvense*)**

Sect. *Cirsium*

Roots not far-creeping and bearing adventitious shoots. Upper surface of leaves not setaceous or spinulose, but glabrous or hairy. Phyllaries usually with a subterminal vitta (obscure or absent in *C. echinus*, *C. rhizocephalum*, and *C. creticum*). Flowers hermaphroditic; corolla limb unequally 5-fid to c. 1/2-way, \pm as long as basal tube. Pappus not becoming much longer than corolla in fruit.

Key to the species of *Cirsium* sect. *Cirsium*.

1. Synflorescence candelabriform (Thrace) **1. candelabrum**

1. Synflorescence solitary, corymbose or subracemose, not candelabriform

2. Plants biennial; phyllaries widened into lacerate appendages, corollas white **2. echinus**

2. Perennials; phyllaries narrowed upwards, subtire, corollas white or purplish

3. Stem leafless for a long way (c. 10–30 cm) below capitula (reduced leaflets excepted)

4. Median cauline leaves biserrate, comb-like, glabrous or sparsely hairy; capitula erect, corollas purplish-pink **5. canum**

4. Median cauline leaves pinnatisect to 1/2-1/4, whitish-tomentose beneath; capitula nodding; corollas deep crimson **3. hypoleucum**

3. Stem leafy up to capitula

5. Stem completely or partially winged

6. Outer and median phyllaries obtuse (terminal spine excepted); terminal lobe of cauline leaves 5–10 times the length of lateral lobes; subapical

vitta obscure or apparently absent **11. creticum**
6. Outer and median phyllaries acute-acuminate; terminal lobe of cauline leaves similar to lateral lobes; apical vitta conspicuous, often darkened or humped

7. Plant with fusiform roots

8. Basal leaves oblanceolate to oblong, subtire, apical spine of stem wings and median cauline lobes sparse, weak, to 5(–7) mm; corollas 20–22 mm, pappus 15–17 mm long **12. elodes**

8. Basal leaves lanceolate in outline, pinnatifid to 1/2, apical spine of stem wings and median cauline lobes dense, stout, 5–15 mm; corollas 12–15 mm, pappus 8–12 mm long **13. pseudocreticum**

7. Plants with long or short rhizomes or taproots, not fusiform

9. Median cauline leaves glabrous or sparsely arachnoid, also with short, multicellular hairs

10. Vitta of phyllaries conspicuously carinate, 3–4 mm **10. pubigerum**

10. Vitta of phyllaries weakly carinate or not, 1–2(–3) mm **16. libanoticum**

9. Median cauline leaves tomentose to densely arachnoid beneath or on both surfaces, also with long, unicellular hairs

11. Median cauline leaves subtire to lobed to 2/3, usually densely arachnoid-tomentose on both surfaces, sometimes sparse above, herbaceous; involucre globose, capitula often in dense corymbs

12. Median cauline leaves usually entire, rarely sinuate-lobed to 1/2-way, apical spine of stem wings and median cauline lobes sparse and weak, to 5 mm ... **14. subinerme**

12. Median cauline leaves pinnatilobed to 1/2–3/4, apical spine of stem wings and median cauline lobes dense, stout, 10–15 mm (West Anatolia) **15. leucopsis**

11. Median cauline leaves pinnatifid to 1/2–1/4, usually only sparsely arachnoid below or dense, often \pm coriaceous; involucre obconical-hemispherical, capitula often in a lax inflorescence **16. libanoticum**

5. Stem not winged, or median cauline leaves not decurrent for more than 1 cm

13. Capitula 2–10 per stem, sessile, overtopped by numerous involucre leaves lacerate into conspicuous whitish simple or pinnatisect spines **6. obvallatum**

13. Capitula not as above
14. Plant acaulous to 50 cm, stem usually solitary
15. Plant rosulate, acaulous or rarely stemmed up to 15 cm **8. rhizocephalum**
15. Plant conspicuously stemmed, stems longer than (10–)20 cm
16. Cauline leaves entire or sinuate-lobed, rarely pinnatifid to 3/4 (subsp. *satdaghense*); capitula ±sessile, 2–5 on each branches **7. simplex**
16. Cauline leaves pinnatisect to 1/2–3/4, lobes opposite, fan-shaped; capitula solitary **9. frickii**
14. Plant with stems (70–)100–250 cm tall, usually many-stemmed at base
17. Median cauline leaves entire, bidentate **4. pseudopersonata**
17. Median cauline leaves pinnatifid to pinnatisect
18. Median phyllary apical spines 5–8 mm **17. cilicium**
18. Median phyllary apical spines 0.5–3 mm
19. Median phyllaries acuminate, vitta (2–) 3–4 mm **10. pubigerum**
19. Median phyllaries acute, vitta 1.5–2 mm **16. libanoticum**

3.1. Taxonomic notes on some *Cirsium* species

A revisionary study has been carried out by the authors on Turkish *Cirsium* taxa since the year 2006. In the scope of this revisionary study, seven new species belonging to sect. *Epitrachys* DC. were described: *C. ekimianum* Yıldız & Dirmenci; *C. handaniae* Yıldız, Dirmenci & Arabacı; *C. sivasicum* Yıldız, Arabacı & Dirmenci; *C. peshmenianum* Yıldız, Dirmenci & Arabacı; *C. yildizianum* Arabacı & Dirmenci; *C. balikesirensense* Yıldız, Arabacı & Dirmenci; and *C. nerimaniae* Yıldız, Dirmenci & Arabacı (Yıldız and Dirmenci, 2008; Yıldız et al., 2009a, 2011, 2013; Arabacı and Dirmenci, 2011). In addition, *C. candelabrum* Griseb., which is a common species in the Balkan Peninsula, was recorded from the European part of Turkey (Thrace) for the first time (Yıldız et al., 2009b). The members of the genus were established as 64 species (76 taxa) according to the checklist of Turkish *Cirsium* species given by Yıldız (2012). With the two new species (*C. balikesirensense*, *C. nerimaniae*), the genus *Cirsium* has reached 66 species (78 taxa) belonging to *C.* sect. *Epitrachys* (48 species, 50 taxa), sect. *Cirsium* (17 species, 27 taxa), and *C.* sect. *Cephalonoplos* (Neck.) DC. (1 species, 1 taxon) in Turkey (Yıldız et al., 2013).

In this study some changes were associated with certain species. These are given below.

3.1.1. *C. frickii*

In the first supplement of *Flora of Turkey*, a new species, *C. eliasianum*, collected and described from Ardahan Province around Çıldır Lake, and a new record, *C. frickii*, collected from the same locality, were given (Davis et al., 1988). The main differences between these two species are seen in leaf indumentums, which are glabrous to sparsely and crisped araneose in *C. frickii* and grayish-white arachnoid in *C. eliasianum*. Variation in the form of leaf indumentums may occur within one plant and also hairs have no taxonomic value in these species. The outlines of basal leaves are described as narrowly oblong in *C. frickii* (Davis et al., 1988), but even elliptic to lanceolate forms were also observed. Otherwise, the floral characters such as inflorescence, capitulum, phyllaries, corollas, and pappus are similar between these two taxa, which were collected in the same area and same habitat.

These two species grow in the same meadows with another closely related taxon, *C. rhizocephalum* subsp. *sinuatum*, NW of Çıldır Lake. Some plants regenerate and flower again in September. This has caused some abnormal growth and morphological variations in the species. When we compared *C. eliasianum* with the other species of sect. *Cirsium* in terms of field observations and specimen examined in herbaria, we found that the species shows no difference from *C. frickii* with respect to distribution area, habitat preference, and morphological characters. Therefore, *C. eliasianum*, which was originally described by Tan and Sorger (1986) from a single collection, is included as a new synonym of *C. frickii* (Figure 10A).

C. eliasianum was distinguished from *C. simplex* C.A.Mey. in its description (Tan and Sorger, 1986), but we have observed that *C. eliasianum* is related to *C. frickii*. *C. frickii* (incl. *C. eliasianum*) differs from *C. simplex* by its simply branched stem and racemose capitula with 1–6 cm peduncle.

C. frickii is related to *C. rhizocephalum* in general but differs from it with long stem (to 60 cm) and basal leaves (to 30 cm), rigid and long spines, and larger capitula with long peduncles up to 6 cm (Figures 4B, 9H and 9I, and 10A and 10B).

3.1.2. *C. alatum* and *C. elodes*

According to Bobrov (1958), *C. alatum* (S.G.Gmel.) Bobrov was used for the specimens distributed in West Siberian, Middle Asian, and European parts of Russia, while *C. elodes* M.Bieb. represents Caucasian specimens.

Charadze cited Bobrov (1958) in *Flora of the USSR* and treated the southern vicariant races of *C. alatum* as separate species and the Caucasian one as *C. elodes* (Charadze, 1963). Within this concept, Turkish specimens were included under the name *C. elodes*. However, the description of the Caucasian specimens does not correlate with the specimens described as *C. elodes* in *Flora of Turkey* (Davis and Parris, 1975). The type specimens of *C. elodes*,

represented by Caucasian specimens, were investigated in herbarium LE (Figure 10C). The characteristics of this type specimen overlap with the specimens given under the name *C. alatum* in Flora of Turkey. Thus, the specimens named as *C. alatum* in *Flora of Turkey* in fact belong to *C. elodes*, if we follow Charadze in treating them as two distinct species. According to Charadze, *C. elodes* differs from *C. alatum* by its glabrous stems and leaves (not subglabrous or sparsely arachnoid-hairy), glabrous or sparsely arachnoid above phyllaries that narrow to thin small spines (not floccose on margin and terminating in very short spine phyllaries).

In addition, the investigations carried out on the type specimen of *C. subinerme* deposited in herbarium LE show that the specimens given as *C. elodes* in *Flora of Turkey* in fact belong to *C. subinerme* (see also Greuter, 2008). *C. elodes* shows fusiform roots, glabrous stems and leaves, 5–10 × 1.4–2 cm obovate to oblong-elliptic basal leaves, oblong-lanceolate rarely linear-lanceolate cauline leaves 3 with 8 × 0.1–0.3 mm apical spines, 20–22 mm corollas, and 15–17 mm pappus, whereas *C. subinerme* has rhizomatous roots, arachnoid stem, and densely arachnoid-tomentose to sparsely arachnoid leaves, 10.5–13 × 2.2–3.2 cm ovate-oblong basal leaves, ovate to oblong-elliptic cauline leaves

with 1–4(–6) × 0.2–0.3 mm apical spines, involucral leaves, 14–17 mm corollas, and 12–14 mm pappus (Figure 10D).

3.1.3. *C. pseudocreticum*

C. elodes (formerly known in Turkey under the name *C. alatum*) is a widespread species in Anatolia. The specimens from Central Anatolia (especially from Afyonkarahisar, Ankara, Eskişehir, and Konya provinces) growing on drying marshes and meadows in summer and in halophytic habitats were regarded as a new subspecies, subsp. *pseudocreticum*, by Davis and Parris (1975). After detailed field studies and the examinations carried out on the specimens found in related herbaria, significant differences were found between these two taxa. *C. elodes* has broad stem wings (5–20 mm), obovate to oblong-elliptic and 4.5–8 cm petiolate basal leaves with 2–4 × 0.1–0.2 mm apical spines, 1–4-headed corymb on each branch, 1–5 cm peduncles, 20–22 mm corollas, and 15–17 mm pappus. *C. elodes* subsp. *pseudocreticum* differs from *C. elodes* by narrow stem wings (2–5 mm), lanceolate and 2–3 cm petiolate basal leaves with 5–9 × 0.3–0.5 mm apical spines, many-headed corymb or subracemose on elongate branches, subsessile capitula, 12–15 mm corollas and 8–12 mm pappus (Table) (Figures 2C, 2D, 5B, 5C, 7V–7X, 8A–8C, 9L, and 9M). In conclusion, subsp. *pseudocreticum* is

Table. Comparison of diagnostic characters used to distinguish *Cirsium elodes* (Syn. *C. alatum*) and *C. pseudocreticum*.

	<i>C. elodes</i>	<i>C. pseudocreticum</i>
Stem	Unbranched, paniculate above, wings broad (5–20 mm)	Branched from middle to the apex, wings narrow (2–5 mm)
Basal leaves	Obovate to oblong-elliptic, 5–10 × 1.4–2 cm, petiole 4.5–8 cm, entire to sinuate, apical spines 2–4 × 0.1–0.2 mm	Lanceolate, 7–15 × 2–3.5 cm, petiole 2–3 cm, pinnatifid to 1/2, apical spines 5–9 × 0.3–0.5 mm
Median cauline leaves	Subentire, dentate-serrate, shallowly sinuate-lobed apical spines 3–8 × 0.1–0.3 mm	Pinnatisect to 3/4 apical spine 10–15 × 0.4–0.6 mm
Capitula	In 1–4-headed corymbs on each branch	In many-headed corymbs or subracemose on elongate branches
Peduncle	1–5 cm (rarely subsessile)	Subsessile
Outer phyllaries	Narrowly ovate	Ovate to oblong
Median phyllaries	Oblong to lanceolate apical spine 0.5–1 × 0.1 mm, patent or recurved	Oblong apical spine 0.2–0.6 × 0.1 mm, erecto-patent
Inner phyllaries	Apical spine 0.5 × 0.1 mm, flexuous	Apical spine 0.2–0.6 × 0.1 mm, erect
Corolla	20–22 mm	12–15 mm
Achenes	Oblong	Obovate
Pappus	15–17 mm	8–12 mm

regarded as a separate species and was raised to the species level as *C. pseudoreticum* (P.H.Davis & Parris) Yıldız, Dirmenci & Arabacı; it is given in the checklist of Turkish *Cirsium* species (Yıldız, 2012). Detailed descriptions and discussions are given in this study.

C. × prativagum Petr. and *C. × woronowii* Petr. were newly recorded for the flora of Turkey (see Appendix).

At the end of this study, it is established that *Cirsium* sect. *Cirsium* is represented by 17 species (27 taxa), 3 (7 taxa) of which are endemic, and 2 hybrids in Turkey.

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Appendix

The list, synonyms, types, descriptions, habitats, and distribution of the species

1. *Cirsium candelabrum* Griseb., Spic. Fl. Rumel. 2: 251 (1846) (Figures 11A-C, 12).

Syn.: = *C. chelmeum* Orph., Diagn. Pl. Orient. ser. 2. 3: 41-42 (1856). *Type*: Greece: in monte Chelmos, Pelopennese prope Zaruchlam Clukinarum in loco dicto Rizaná, 25.07.1851, *Orphanides* s.n. (iso. WU- Halácsy-Graecum 0076662- not seen)

Type: In Macedonia boreali, gregarie in campis pr. Kalkandele, alt. 1000' (substr. alluv.) (holo. K!)

Biennial. Stem 150-200(-300) cm, 7-8 mm diameter, unwinged erect, greatly branched; axillary branches erecto-patent, glabrous. Basal and rosulate leaves, linear-lanceolate, 20-30 × 5-7 cm, pinnatisect, lobes 5-7-paired, 1-1.5 × 0.8-1.5 cm, apical spines 10-15(-25) × 0.3-0.5 mm, marginals 2-5 mm, glabrous; cauline leaves lanceolate to oblong, 10-21 × 2.8-7 mm, amplexicaule, sinuate to pinnatipartite 1/2, lobes 5-6-paired, triangular, 9-21 × 8.5-16 mm, acuminate, apical spines 5-13 × 0.2-0.5 mm, marginals 2.5-6 mm, glabrous. Involucral leaves longer than involucre. Capitula 14-18 × 6-11 mm, in clusters of 4-12, subsessile at apex of short branches, glomerules nodding. Involucre cylindrical to campanulate, 10-19 × 6-13 mm; phyllaries 6-7-seriate; outer ovate, 3.2-4.5 × 1.2-1.5 mm, apical spine 0.5-3 × 0.1-0.2 mm, erect or erecto-patent; median ovate-oblong, 6-10.5 × 1-1.6 mm, apical spine 0.2-0.6 × 0.1-0.2 mm, erect; inner linear, 13.5-15.5 × 0.5-1.2 mm, apical spine 0.2-1 × 0.1 mm, erecto-patent. Corollas 13-17 × 0.3-0.6 mm, white or yellowish-white, longer lobes 2.5-3.6 mm, shorter lobes 2.2-2.8 mm. Achenes oblong, 3.2-5 × 1-1.5 mm, stramineous to pale brown, umbo 0.2-0.4 mm. Pappus 13-16 mm. *Fl. & Fr.* 8-9.

Habitat: Forest openings, grassland, scrub, stony places; c.300 m.

Distribution: Turkey (Thrace), Balkan peninsula (Albania, Bosnia and Herzegovina, Bulgaria, Greece, Montenegro), S.W. Romania. In Turkey: **A1 (E)** Kırklareli: 15 km from Üsküp to Armutveren, 300 m, mixed forest openings, 02.08.2007, Yıldız 16525 & Dirmenci (EGE!, GAZI!, ISTE 84835!).

C. candelabrum is common in the Balkan Peninsula, and is spread in Albania, Bosnia and Herzegovina, Bulgaria, Greece, Montenegro, and south-west Romania. It was not previously recorded in Turkey. The species is rare and was found in a narrow area in a valley of Istranca Mountain, Kırklareli province.

Although the original description states that this species is close to *C. scleranthum* M.Bieb., *C. candelabrum* is an isolated species with no close allies in Turkey and Europe (Grisebach, 1844).

C. scleranthum is a synonym of *C. echinus* (M.Bieb.) Hand.-Mazz. which is common in Anatolia, Iran, and Afghanistan. The distribution of *C. echinus* in Thrace and the Czech Republic given in the Flora of Turkey (Davis and Parris, 1975) and Flora Europaea (Werner, 1976) is questionable. Moreover, we found no evidence of its existence in Thrace during detailed field studies between 2006 and 2014.

C. candelabrum is clearly different from other Turkish and European species. It can be easily distinguished from other *Cirsium* species by the following features: plants completely glabrous, stems greatly branched nearly from base to synflorescence, capitula in clusters of 4-12 at tips of the lateral branches, branches pendulous due to weight of capitula, corolla 13-17 mm, white or whitish-yellow (Yıldız et al., 2009b).

2. C. echinus (M. Bieb.) Hand.-Mazz., Ann. Nat. Hofmus. Wien 23: 197 (1909) (Figures 12, 13A-B).

Syn.: \equiv *Carlina echinus* M. Bieb., Tabl. Prov. Mer Casp.: 118 (1798). \equiv *C. scleranthum* M. Bieb., Fl. Taur.-Caucas. 3: 559-560 (1819) nom. illeg.

Lectotype: Ex montibus Schirwanicis, 1796, Bieberstein (LE!).

Biennial. Stem 40-80(-100), 4-9 mm diam., usually solitary, erect or many branched ascending, corymbose-paniculate above, forrowed, unwinged, arachnoid. Basal leaves rosulate, oblong, 10-25 x 2.5-5 cm, petiole 2-6 cm, entire to pinnatisect 3/4, lobes 4-5-paired, triangular to oblong-lanceolate, 6-18 x 5-13 mm, acute, apical spines 4-11 x 0.3-0.6 mm, marginals 0.8-4 mm, lamina green and sparsely arachnoid or glabrous above, greyish or white arachnoid-tomentellous below; cauline leaves oblong-lanceolate, 8-19 x 1.8-4 cm, auriculate at base, semiamplexicaul, pinnatisect to 3/4-2/3, lobes 4-7-paired, broadly triangular oblong-lanceolate, 5-20 x 4-15 mm spines ivory, weak, apical spines 4-12 x 0.2-0.6 mm, marginals 1-6 mm, lamina green above, white-tomentellous below. Involucral leaves equal or shorter than involucre. Capitula 2-5, 18-32 x 12-27 mm, corymbosely clustered on densely spiny branches, rarely solitary, sessile or shortly pedunculate to 16 mm, \pm nodding, subtended by numerous spines subequal to involucre. Involucre hemispherical, umbilicate, 10-22 x 12-27 mm. Phyllaries 6-8-seriate; outer ovate or rarely triangular, 3.5-9 x 0.9-2.8 mm, apical spine 1.5-5.5 x 0.1-0.5 mm, erect; median ovate or oblong-lanceolate, 8-17.5 x 1.5-3 mm, widening above into a membranous appendage with centre blackish but not or scarcely vittate, margin membranous, ivory and deeply lacerate, midrib running into a pallid 1-6.5 x 0.1-0.4(-0.6) mm erect apical spine; inner linear, 14-22 x 0.8-2.2 mm, apical spine 0.5-3 x 0.1-0.5 mm, erect. Corollas 13-21(-30) x 0.4-0.7 mm, white, rarely light pink, longer lobes 4-6 mm, shorter lobes 2.5-4 mm. Achenes oblong to oblanceolate, 3.2-5.5

× 1.2-1.7 mm, stramineous, umbo 0.1-0.7 mm. Pappus (12-)14-19(-21) mm. *Fl.* 7-8, *Fr.* 7-9.

Habitat: Rocky slopes, stepe, road and fieldsides; 900-2500 m.

Distribution: Irano-Turanian element; Turkey (N & E. Anatolia), Transcaucasia, N. & N.W. Iran, Afghanistan. In Turkey: **A4** Paphlagonia: vilajet Kastanbuli, Tosia, Kaiseridere, in declivibus, 26.06.1892, *Sintenis* 4500 (K!, W!); Kastamonu: 14 km from Tosya to Kastamonu, N. of Ilgaz Mountain pass, 1250 m, *Huber-Morath* 12867 (G; 4 km S. of Ilgaz, fieldside, 900 m, 40°54'600"N, 033°38'900"E, 23.08.2006, *Yıldız* 16404 & *Dirmenci* (hb. Yıldız)! **A5** Akdağ, between Taşova and Destek, environs of Borabay Lake, 1000 m, 26.06.1977, *K.Alpınar* (ISTE 37 996!). **A6** Tokat: Çamlıbel pass, 1700 m, 19. 8. 1987, *Ş. Civelek* 4225 (CUFH!). Sivas: Şerefiye, Köse mt., between Çamlıkale village and Köse mt., 1600-1700 m, 11.08.1984, *Yıldız* 4818 & *Çelik* (hb. Yıldız)! Suşehri, Aksu village, 1800-2000 m, 24.07.1985, *Yıldız* 6608 (hb. Yıldız)! **A7**. Giresun: Tamdere, Eğribel pass, Hozanlı plateau, 1900 m, 22.08.2006, *Yıldız* 16474 (hb. Yıldız)! **A8** Rize: İkizdere, Başköy (Cimil), Cermanin plataeu, 2400 m, 28.08.1952, *Davis* 21018 & *Dodds* (K!, W!). **A9** Artvin:12-20 km E. of Demirkent, 1600-1800 m, 04.09.1980, *Sorger* 80-50-18 (W!); Kars: Kisir Mountain above Susuz, 2000 m, igneous slope, 03.07.1957, *Davis* 30501 & *Hedge* (BM!, K!); Ardahan: 5 km from Posof to Türközü, 1500 m, roadside, 07.08.2008, *Yıldız* 16888 (hb. Yıldız)! 5 km from Damal to Posof, steppe, 2100 m, 17.08.2006, *Yıldız* 16331 & *Dirmenci* (hb. Yıldız)! **B5** Kayseri: Argaeus (Erciyas Mountain), 1900 m, 10.07.1898, *Siehe* 1898:205 (K!); Erciyasdağ, 2000 m, 28.08.1977, *Sorger* 77-74-2 (W!). **B6** Kayseri: Pınarbaşı, between Malak and Hayriye village, 1700 m, 15.08.1984, *N. Çelik*, 2941 (CUFH!); 18 km S. of Zara, 1500 m, 09.07.1969, *Sorger* 69-37-10 (W!). **B7** Sivas: İmranlı, W. slopes of

Kızıldağ, steppe, 1850 m, 07.08.1984, *Çelik*, 2753 & *Yıldız* (CUFH!). ibid, 11.08.2006, *Yıldız* 16238 & *Dirmenci*(hb. Yıldız)! ibid, Aktaş village, Çağlayan place, 1500-1700 m, 17. 07. 1984, *Yıldız*, 4561, N. *Çelik* (CUFH!). Erzincan: Sipikör, Kainikdere, *Sintenis* 1890:2997 (B!). ibid. 1700 m, 26.09.1994, *Yıldız* 11755 (hb. Yıldız)! Between Erzincan and Kelkit, S. of Pöske pass, 1800-1900 m, 39°52'500"N, 038°05'000"E, 12.08.2006, *Yıldız* 16241 & *Dirmenci* (hb. Yıldız)! **B8** Bayburt: Kop Mountain, above Aşağıkop village, 1800-2000 m, steppe, 40°03'600"N, 040°26'500"E, 12.08.2006, *Yıldız* 16262 & *Dirmenci* (hb. Yıldız)! Erzurum: Between İspir and Pazaryeri, 1900 m, 27.06.2008, *Yıldız* 16807 & *Arabacı* (hb. Yıldız)! Bingöl: 24 km from Bingöl to Karlıova; Sudurağı village, 1850 m, 11.08.2007, *Dirmenci* 3513 & *Arabacı* (hb. Yıldız)! **B9** Iğdır: Ağrı Mountain, Korhan plateau, 2100 m, 13.08.2007, *Dirmenci* 3558 & *Arabacı* (hb. Yıldız)! Van: Başkale, 2500 m, *Davis* 23732 (E!, K!).

C. echinus is common but isolated and handsome species with no close relatives in the sect. *Cirsium*. Lacerat fibria on the apical parts of outer and median phyllaries are characteristic. There is no another species that owns this feature in the section.

A specimen belonging to *Cirsium echinus* in herbarium G was identified as *Alfredia cernua* (L.) Cass. and labelled as lacus Tzetmetche prope Byzantinum (Ecole Imperiale de Medicine de Galata, Serail), 1847, Noe s.n. (G!) that cited by Boissier (1875, p. 540). Other specimens in herbarium W (!) was identified as *Alfredia cernua* and labeled as (Ecole Imperiale de Medicine de Galata, Serail), Rumelialegit, 1846, Noe 48. Nevertheless, there is no collectin from European part of Turkey (Thrace) after this date. In the detailed field studies we carried out, this species was not found in Thrace. *C. echinus* commonly distributed in east and northeast of Turkey. We did not collect

and examine any specimens depositing in herbaria from the west of Turkey. Probably the specimen was labelled incorrectly.

3. *C. hypoleucum* DC., Prodr. 6: 645 (1838) (Figures 14A-B, 15).

Syn.: = *C. hypoleucum* DC. var. *lazicum* K. Koch, Linnaea 24: 409 (1851). *Type*: Turkey: Trabzon: Auf der Nördküste Klein-asiens im Paschalik Trebisond auf Augitporphyr, 1500' höhe. (type not seen) = *C. hypoleucum* var. *ponticum* Sommier & Levier, Nuovo Gior. Bot. Ital. n.s. 2, 1:18 (1895)!. *Syntype*: Turkey: Falaises des environs Rhize, 06.1866, Balansa *s.n.* (FI! JE-photo!) = *C. hypoleucum* subsp. *drymeium* Petr., Trudy Tiflissk. Bot. Sada 12: 43 (1912). *Syntype*: Georgia, Adžaria superior, inter montes Sakulaperdi et Bodyš, in silva abietina, 03.08. G. Woronow 3290 (type not seen), Georgia, Adžaria superior, alta vallis Karadere, 12.08. N.Popow 3289 (type not seen)

Type: [Turkey A2(A) Bursa] in Monte Olympo (Ulu Da.), 1837, Aucher-Eloy 3376 (holo. G-DC.! iso. P-photo).

Perennial. Stem (20)50-200 cm, c. 6 mm diam., solitary, erect, unwinged, usually sparsely paniculate (rarely unbranched), branches/peduncles long, with sparse reduced leaves, sparsely arachnoid. Basal leaves oblong, c. 35 × 9.5 cm, petiol c. 3.5 cm pinnatilobed, lobes 3-4-paired, 11-19 × 17-28 mm, triangular, acute, apical spine 1.8-3.5 × 0.2-0.3 mm, marginals 0.8-1.6 mm; cauline leaves ovate, 6-27 × 3-14 cm, semiamplexicaul, pinnatilobed to 1/4-3/4, lobes 3-4-paired, 20-30 × 16-26 mm, triangular to triangular-lanceolate, dentate to lobulate, acute to acuminate, apical spine weak, 2-4 × 0.1-0.5 mm, marginals 0.5-6 mm, short scattered hairs above, whitish-tomentose beneath. Involucral leaves absent or shorter (when presen) than involucre.

Capitula 17-28 × 8-16 mm, solitary or paired on (4-)8-15 mm peduncles, ± nodding. Involucre hemispherical, 10-20 × 8-16 mm. Phyllaries 6-9-seriate, outer ovate, 4-7 × 1.8-2 mm, apical spine 0.1-0.2 × 0.1-0.2 mm, erect; median ovate-oblong, 9-12 × 1.5-2 mm, papillose and ciliolate, subacute, vittate, often purplish distally and shortly spinose-mucronate, apical spine 0.1-0.2(-0.3) × 0.1 mm, erect; inner linear, 15.5-19 × 1-1.6 mm, apical spine 0.1-0.2 × 0.1 mm, erect. Corollas (15-)17-20 × 0.8-1 mm, longer lobes 4.5-5 mm, shorter lobes 3.5-4 mm, deep crimson. Cypselas narrowly obovate to oblong, 3.2-4.2 × 1.2-1.7 mm, stramineous, umbo 0.1-0.2 mm. Pappus 13-17 mm. *Fl.* 5-9, *Fr.* 6-9.

Habitat: In coniferous or deciduous forests openings, on shady banks and rock ledges; nr s.l.-2000 m.

Distribution: Euxine element; N. of Turkey and Georgia. In Turkey: **A2(E)** Istanbul: Zekerieköy, 29.07.1902, *Aznavour* (G! W!); pres de Therapia, 25.06.1899, *Aznavour* (W!); a cote de Zekeriekeuy, 29.06.1902, *Aznavour* (W!); in agri Bizantini, sylvia Belgradensi, inter pagos Bouyouk dere et Belgrad, 29.05.1889, *Degen* (G!); Belgrat forest, 13.07.1955, *A. & T. Baytop* (ISTE 4392!). **A2(A)** Bursa: Uludağ, 780 m, *Huber-Morath* 15964 (G!); Bithynia, in reg. inferiorie m. olympi, supra Brussa (Bursa), 300 m, 26.05.1899, *Bornmüller* 4695 (K!); Bithynia, in reginferiorie Mt. Olympi, supra Brussa, *Bornmüller* 4698 (G!). In castenatis et pinetis in reg. mont. Olympi Bithyn. (Uludağ), 07.1874, *Pichler* s.n. (FI)! Uludağ, 800 m, 40°08'300"N, 029°01'500"E, 21.08.2007, *Yıldız* 16586 & *Arabacı* (hb. Yıldız)! 15 km from Keles to İnegöl, 1300 m, pine forest, 21.08.2007, *Yıldız* 16593 & *Arabacı* (hb. Yıldız)! Kütahya: Tavşanlı to İnegöl, 40 miles from T. 1200 m, *Fagus orientalis*, 25.06.1962, *Dudley* 36185 (W!); **A3** Bolu: Aladağ, Kartalkaya, 2000 m, *Khan et al.* 460 (K!); Kocaeli: 9 km from Sapanca to

Geyve, 100 m, *Huber-Morath* 15964 (K!); Abant, 1400 m, 01.07.1969, *Sorger* 69-4-22 (W!); side of Abant Lake, 1350 m, 28.08.1975, *A.Baytop* (ISTE 33664!); Zonguldak: 15 km from Zonguldak to Ereğli, 350 m, forest opening, 04.08.2007, *Yıldız* 16537 & *Dirmenci* (hb. Yıldız)! **A4** Paphlagonia Wilajet Kastanbuli, Tossia, Karadere-Devrendi, in herbidis, 09.07.1892, *Sintenis* 4590 (B! FI! K! W!); ibid., Küre-Nahas, 05.09.1892, *Sintenis* 5332 (B!, W!); Kastamonu: 57 km from İnebolu to Abana, forest openings, s.l-100 m, 05.08.2007, *Yıldız* 16560 & *Dirmenci* (hb. Yıldız)! N. slope of Ilgaz Mountain, 1700 m, 08.09.1954, *Davis* 25845 & *O.Polunin* (BM!, K!); Ilgaz: Ilgaz Mountain, N. of pass, forest opening, 1650 m, 41°04'800"N, 033°44'000"E, 23.08.2006, *Yıldız* 16409 & *Dirmenci* (hb. Yıldız)! 10 km W. of Cide, forest openings, 100 m, 04.08.2007, *Yıldız* 16555 & *Dirmenci* (hb. Yıldız)! Bolu: 10 km S. of Bolu, Köroğlu Mountains, wald, 1000 m, 17.08.1983, *Sorger* 83-67-1 (W!); Çankiri: South of Ilgaz Mountain pass, *Jenkins* 2196! Kastamonu: N. of Ilgaz Mountain pass, 1700 m, *Davis* 25045 (E!); Zonguldak: Keltepe above Yenice, 1200 m, 20.07.1962, *Davis* 37785 (E!, K!). **A5** Amasya: Suluova-Ladik, Seyfe village, 1500 m, 27.05.1977, *K.Alpınar*, (ISTE 37151!); Amasya: Sana Mountain, 1400 m, *Bornmüller* 1889-550 (G!). **A6** Amasia: in regione subalpine Akdagh, 1400 m, *Bornmüller* 1889 (G!); Ordu: Ordu, 50 m, *Handel-Mazzetti*; 0-50 m, 02.08.1966, *Crisp* 11 (K!); Sivas: Şuşehri, Ekinözü village, Köse Mountain, mixed shrub, 1600 m, 29.07.1985, *Yıldız* 6693 (hb. Yıldız)! **A7** Giresun: Tamdere to Yavuzkema1, near Karınca, 1500 m, 13.08.1952, *Davis* 20698 (K!, W!); **A8** Rize: İkizdere, 500 m, 13.05.1960, *Stainton* 8403 (W!); Çoruh: Borçka to Hopa, 450 m, 21.06.1957, *Davis* 29845 (K!); İkizdere, 500 m, rock ledges, 13.05.1960, *Stainton* 8403 (W!). **A9** Artvin: Şavşat, between Sahara and Karaköy, *Pinus-Abies* forest openings, 1800 m, 20.09.2007, *Yıldız* 16738 & *Arabacı* (hb. Yıldız)! **B2** Bursa: Tahtaköprü, 850

m, *Davis* 36659 (E!); Tavşanlı to İnegöl, 40 miles from Tavşanlı, 1200 m, 23.06.1942, *Davis* 36185 & *Dudley* (K! W!); Kütahya: d. Simav, Kığır to Akdağ, 1500 m, *Coode & Jones* 2702 (E!); Kütahya: Gediz, Murat Mountain, between Çukurören and Kesiksöğüt plateau, 1620 m, 02.08.1980, *N.Özhatay* (ISTE 45586!). **B3** Eskişehir: Türkmen Mountain, Çavuş stream, 1400 m, 24.7.1976, *T.Ekim* (ISTE 48120!).

C. hypoleucum DC. is a shade plant. There is no relative in Turkish species. Therefore, it is distinguished easily. Leaf blades show great diversity in terms of hairiness and separation of lobes. In addition, coriaceous and densely spiny leaves of the type shows some differences from the Eastern Black Sea and Caucasus specimens. For this reason, the species was divided into two varieties by *Sommier and Levier* (1895), namely var. *hypoleucum* and var. *ponticum* *Somm.et Lev.* In spite of variable leaves, the plant's reproductive organs are homogeneous. Therefore, authors do not accept varietal separation. Leafless or with reduced leaves on peduncule, nodding capitulae, constricted mouth of involucre and deep crimson corolla are typical properties of the species. *C. hypoleucum* is good indicator of the Euxine province. A hybrid between *C. hypoleucum* and *C. echinus*, *C. × rollowii* *Petr. & Woronow*, was cited by *Davis and Parris* (1975) from Çoruh (Artvin) province. We have not seen this specimen or any representatives during the herbarium and the field studies.

4. *C. pseudopersonata* *Boiss. & Balansa ex Boiss., Fl. Orient. 3: 545 (1875)* (Figures 16A-B, 17).

Rhizomatous perennial. Stem 100-250 cm, 3-6 mm diameter, solitary, erect, unwinged, unbranched or laxly branched above bearing terminal corymbs of several ± conferred capitula, sparsely arachnoid. Basal leaves elliptic, 40-50 × 12-20 cm, petiole c.

11 cm, lyrate-pinnatifid, lobes 4-6-paired, triangular, 8-25(-30) × 14-25(-32) mm, acute, apical spines 2-4.5 × 0.1-0.3 mm, marginals 1.4-3 mm; cauline leaves elliptic, 10-30 × 5-16 cm, bidentate, sessile, rounded, semi-amplexicaul or shortly hastate at base, apical spines 1.2-5.5 × 0.1-0.3 mm, marginals 0.5-2.5 mm, upper surface sparsely papillose-hairy, lower surface ± densely floccose-arachnoid with unicellular hairs or with sparse short hairs. Involucral leaves equal or longer than involucre. Capitula 16-30 × 10-22 mm, corymbosely clustered, often subtended by a few reduced linear-lanceolate spinulose leaves peduncle (5-)8-16(-20) mm. Involucre hemispherical, 9-20 × 10-22 mm. Phyllaries 6-8-seriate, minutely subpapillose; outer ovate, 3.5-6 × 1-1.6 mm, apical spine 1-3 × 0.1-0.3 mm, erecto-patent; median ovate to oblong-lanceolate, 7-14 × 1-1.5 mm, apical spine 0.5-3 × 0.1-0.3 mm, erect; inner linear, 11.5-19.5 × 0.5-1.4 mm, apical spine (0.2-)0.5-1.2 × 0.1-0.3 mm, recurved. Corollas 15.5-19.5 × 0.6-1.5 mm, purple, longer lobes (4.5-)6-8 mm, shorter lobes (3.5-)5-6(-6.5) mm. Achenes narrowly obovate-oblong or obovate-oblong, 3-4.5 × 0.8-1.6 mm, stramineous to pale brown, umbo 0.1-0.2. Pappus (11-)13-16 mm. *Fl.* 7-8, *Fr.* 7-9.

Habitat: Forest openings, on shady banks and rock ledges, alpine meadows, watersides; 1000-2500 m.

1. Leaves ± densely floccose-arachnoid below with long unicellular hairs; achenes narrowly obovate-oblong..... subsp. **pseudopersonata**

1. Leaves with short scattered hairs below, or subglabrous; achenes obovate-oblong..... subsp. **kusnezowianum**

subsp. **pseudopersonata**

Type: [Turkey A8 Rize] ad margines rivorum et in fossis humidis vallis Djimil (Cimil) Ponti Lazici, 2000 m, 10.08.1866, *Balansa* (Holo.? iso. P-photo)

Distribution: Euxine element; Endemic to Turkey (N.E. Anatolia). In Turkey: **A7** Giresun: 11 km N. of pass, Yedigözü plateau, 1480 m, *Huber-Morath* 12868 (G!); 10 km N. of Tamdere, 1400 m, 05.07.1958, *Huber-Morath* 15941 (G!); Between Tamdere and Karınca village, 1600 m, 22.08.2006, *Yıldız* 16392 & *Dirmenci* (hb. Yıldız)! Tamdere-Yavuzkema1, 1600 m, 09.08.1952, *Davis* 20683, *Dodds & R.Çetik* (K!, W!); Trabzon: d. Maçka, Sumila, 09.08.1889, *Sintenis* 1889:1799 (G!, W!); Between Uzungöl and Demirkapı, 1100 m, wet forest openings, 16.09.2007, *Yıldız* 16649 & *Arabacı* (hb. Yıldız)! Trabzon: Mesourach Kebir (Mesuraç Mountain), 2290 m, *Balls* 593 (K!); N. slope of Soğanlı Mountain, above Çaykara, 04.08.1957, *Davis* 32193 & *Hedge* (E!, K!, W!); Soğanlı pass, 2100 m, 17.08.1962, *Furse* 4006 (G!, K!). Çaykara, N. of Soğanlı pass, 2100 m, mountain meadow, 40°32'600"N, 040°14'000"E, 20.08.2006, *Yıldız* 16375 & *Arabacı* (hb. Yıldız)! Rize: Hemşin, between Ortaköy and Cat, 1700 m, 02.09.1952, *Davis* 21303 & *Dodds* (E! G!); Güneyce, between İkizdere and Çamlık, 1200 m, 13.07.1958, *Huber-Morath* 15942 (G!); İkizdere-İspir, N. of top of pass, 2000 m, 15.07.1960, *Stainton & Henderson* 6220 (E!, K!); Çamlıhemşin, Yukarı Anlakıt plateau, alpin meadow, granite bedrock, 2300 m, 21.09.1979, *A.Güner* 2200 (HUB!); İkizdere, N. of Ovit pass, 1800 m, waterside, 40°40'500"N, 040°42'500"E, 19.08.2006, *Yıldız* 16360 & *Arabacı* (hb. Yıldız)! 17 km from İkizdere to Cimil, forest openings, 1300 m, 40°45'300"N, 040°42'000"E, 15.09.2007, *Yıldız* 16652 & *Arabacı*! 5-6 km from Başköy to Cermanin Yayla, 2400-2500 m, 01.09.2008, *Dirmenci* 3607 & *Akçiçek* (hb. Yıldız)! **A9** Çoruh: Şavval Hill above Murgul, 1600 m, *Davis* 32241 (E!, K!) (Leaves very sparsely arachnoid below)! Artvin: from Murgul to Şevval (Şoval) Hill, forest opening, 1800 m, 17.09.2007, *Yıldız* 16694 & *Arabacı* (hb. Yıldız)! **B7**

Bayburt: Soğanlı Mountain, N. of pass, 2200 m, steppe, 20.09.2007, *Yıldız* 16754 (hb. Yıldız)!

subsp. **kusnezowianum** (Sommier & Levier) Petr., Mitt. Thüring Bot. Ges. 2(1): 33 (1960) (Figure 18).

Syn.: ≡ *C. kusnezowianum* Sommier & Levier, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 155 (1892)!

Lectotype (designated here): Georgia: Abhasia ad flumen Kliutsch, 1300-1400 m, 26.08.1890, Sommier & Levier (763?) (Hololecto.: FI! isolecto.: FI!).

Distribution: Euxine element; Turkey (N.E. Anatolia), W. Caucasia. In Turkey: **A8** Rize: Fındıklı, Gürcüdüzü, environs of Cehennem stream, 1000 m, 21.07.1985, *A.Güner* 6549 (HUB!). Artvin, between Salalet and Chinzart, *Woronow* 5527; above Schloban, *Woronow* 5526 (*fide* Petrak in Monit. Jard. Bot. Tiflis 24:12, 1912). **A9** Artvin: 34 km from Borçka to Maçahel, forest opening, 1450 m, 41 26 500 N 41 51 300 E, 16.09.2007, *Yıldız* 16682 & *Arabacı* (hb. Yıldız)! Borçka, Karagöl, forest opening, 1300 m, 16.09.2007, *Yıldız* 16683 & *Arabacı* (hb. Yıldız)! Kars: Posof, environs of Kurşunçavuş village, 06.09.1985, *N.Demirkuş* 3308 (HUB!).

C. pseudopersonata Boiss. & Balansa, is a showy species and grows in shady and moist places. A distinctive species of the Colchic sector of the Euxine provence. *C. pseudopersonata* subsp. *kusnezowianum* was described based on two syntype specimens that from Abkhasia and Svanetia libera. These syntypes are deposited in herbarium FI and labeled with the same number (763). Among these syntypes, the specimen labeled “Abhasia ad flumen Kliutsch, 1300-1400 m, 26.viii.1890” is well-preserved and more compatible with its proctolog. So we have designated this specimen as lectotype in this study.

5. *C. canum* (L.) All., Fl. Pedem. 1: 151 (1785) (Figures 19A-B, 20).

Syn.: \equiv *Carduus canus* L., Mant. Pl. 108 (1767). \equiv *Cnicus canus* (L.) Roth. Tent. Fl. Germ. 1:345 (1788). = *Cirsium louisii* J.Thiébaud, Bull. Soc. Bot. France 84: 698 (1937)!. *Type*: Turkey: Hatay, marais e l'Amouk au N. du lac d'Antioche, Juillet-août, Thiébaud & Frère Louis 387 (P-hoto!) = *C. biebersteinii* Kharadze, Zametki Sist. Geogr. Rast. 23: 112 (1963).

Type: Described from Austria.

Tall perennial with rhizome bearing fusiform-cylindrical roots. Stem 70-200 cm, 6-7 mm diameter, unwinged or winged at the base of the leaves, sparsely branched above. Basal leaves oblanceolate, 20-35(-40) x 3-7 cm (inc. petiole), attenuate, 2-serratepectinate into weak unequal spinules; cauline leaves oblong to linear-lanceolate, 26-37 x 4.5-5.5 cm, subsessile, pectinate-margined, apical spines 3.5-6(-7.5) x 0.1-0.2 mm, marginals 1.5-3.5 mm, subglabrous to arachnoid. Involucral leaves absent. Capitula 25-30 x 25-30 mm, solitary, peduncles (5-)15-30 cm, leafless. Involucres hemispherical, 14-20 x 25-35 mm. Phyllaries 7-11-seriate; outer ovate, 5-7 x 1.5-2 mm, apical spine 0.6-1.2(-2.5) x 0.1-0.3 mm, erecto-patent; median narrowly ovate to oblong lanceolate, 11-13.5 x 1.8-2.5 mm, ciliate, acute to shortly acuminate-mucronate to 0.4-0.8 x 0.1-0.3 mm erecto-patent apical spine; inner linear, 16-18 x 0.8-1.50 mm, 0.2-0.6 x 0.1-0.2 mm, recurved. Corollas 18-23 x 0.6-1 mm, purplish-pink, longer lobes 6-8 mm, shorter lobes 4-6(-7) mm. Achenes narrowly ovate to lanceolate, 3.5-5 x 1-1.5 mm, stramineous, umbo 0.2-0.4 mm. Pappus 14-18 mm. *Fl.* 7-8, *Fr.* 7-9.

Habitat: Water meadows, marshy places, springs and ditches; 150-1700 m.

Distribution: Euro-Siberian element; Turkey (Anatolia), Central Europe to N.

Balkans and eastwards to W. Siberia, Caucasia and W. Iran. In Turkey: **A3** Bolu: Abant Lake, 1300 m, 07.09.1957, *Davis* 32888 & *Hedge* (K!); Abant-see, Mischwald, 1400 m, 01.06.1969, *Sorger* 69-4-24, (W!); Abant Lake, 1400 m, water meadows, 11.07.1962, *Davis* 37293 & *Coode* (E!, K!); Abant Lake, 1350 m, 08.09.1970, *A. & T.Baytop* (ISTE 18418!); *ibid.*, 25.09.1950, *A.Baytop* (ISTE 2512!); ca. 26 km West Gerede, 1000 m, 27.07.1976, *Sorger* 76-2-6 (W!); *ibid.*, 110 m, 01.07.1971, *Sorger* 71-64-2 (W!); 25 km from Mudurnu to Göynük, water side, 700 m, 40°28'000"N, 030°60'000"E, 22.08.2007, *Yıldız* 16603 & *Arabacı* (hb. Yıldız)! between Abant Lake and Akçaalan village, water side, 1250 m, 22.08.2007, *Yıldız* 16610 & *Arabacı* (hb. Yıldız)! **A4** Zonguldak: Keltepe, above Yenice, Sorgun plateau, 1300 m, meadow, 04.08.1962, *Davis* 38980 & *Coode* (E!, K!, W!). **A6** Tokat: Niksar, 350 m, 04.09.1954, *Davis* 24845 & *O.Polunin* (K!). **A7** Sivas: Suşehri, 3 km E. of Günışık village, 1400 m, 24.08.2009, *Yıldız* 17103! Niksar, 350 m, 04.09.1954, *Davis* 24845 (K!). **B3** Isparta: Şarkikaraağaç, Kızıldağ National Park, Çatakbaşı hill foots, 1150 m, 08.09.1996, *B.Mutlu* 1794 (HUB!). **B6** Sivas: Hafik, 2 km östlich Hafik, 1320 m, 08.07.1955, *Huber-Morath* 12865 (G!); 30 km West of Gürün, 1620 m, *Huber-Morath* 15949 (G!); between Gürün and Pınarbaşı, 35 km from Gürün, 1700 m, 19.06.1960, *Stainton & Henderson* 5708 (K!). **B9** Muş: Malazgirt, Hasanpaşa village, 3 km NW, meadows, 1750 m, 23.08.2006, *L. Behçet, F. Özgökçe*, (VANF 7412!). **C2** Denizli/Aydın: 09.07.1905, *St. Lager* (W!); Denizli: 4-5 km N.W. of Honaz, stream side, 500 m, 13.06.1973, *E.Tuzlacı* (ISTE 25930!). **C5** Konya: Ereğli, Halkapınar exit, 1500 m, 15.07.1977, *S.Erik* 1974 (HUB!). **C6** Kahramanmaraş: Göksun, Döngel village, Kemaloluk place, water side, 800 m, 20.08.1977, *Yıldız* 1390 (HUB!); Hatay: Amouk, N. of lake Antioch (Amik G.), *Thiebaut & Louis* (P-photo)! (type of *C. louisii*).

C. canum (L.) All., is a common species in the Euro-Siberian phytogeographical region. There are no allies in Turkey, but close to European species *C. pannonicum* (L.fil.) Link. Typical characteristic of the species is 15-30 cm leafless part on the top of stem and branches with single capitulum. Lectotype for *C. canum* can not be designated according to the Linnaean Typification project.

6. *C. obvallatum* (M. Bieb.) Fisch., Cat. Jard. Gorenki ed. 2: 35 (1812) (Figures 20-21).

Syn.: ≡ *Cnicus obvallatus* M.Bieb., Fl. Taur.-Caucas. 2: 279 (1808)! = *Cirsium obvallatum* M.Bieb. var. *iranicum* Bornm., Bull. Herb. Boissier Ser. 2, 7(3): 221 (1907)! *Syntype*: Persia borealis: in valle Lur montium Elburs occid. ad pagum Meidan, 2200 m, 21.06.1902, Bornm. 7283 (B!); = Qazvīn: Montium Elburs in valle Lur, ad pagum Getschesār, 2200 m, 04.07.1902, Bornm. 7284 (B! JE-photo!).

Lectotype: Ex caucaso Cabardinico et Iberico, Bieberstein s.n. (LE!).

Perennial. Stem 25-100(-150) cm, 4.5-7.5 mm diameter, solitary, erect, unwinged, shortly corymbose and few-capitulate above, arachnoid. Basal leaves ovate-oblong, 12-24(-30) × 3.5-10 cm, petiole 2-2.5 cm, lamina pinnatifid, lobes 4-5-paired, triangular to oblong, 11-45 × 10-42 mm, acute to acuminate, apical spine 5-8 × 0.1-0.2 mm, marginals 1.5-3 mm, glabrous above, arachnoid on veins below; cauline leaves ovate-oblong to elliptic, 5-16 × 3-7.5 cm, semiamplexicaul spinose-lobulate, pinnatifid to 1/3, lateral lobes 4-6-paired, triangular to lanceolate, 17-32 × 15-28 mm, acuminate, apical spine 3.5-5 × 0.3-0.5 mm, marginals 1-3 mm, subglabrous. Involucral leaves numerous, longer than involucre, linear-lanceolate and deeply dissected into many very unequal slender whitish simple or pinnatisect spines. Capitula 2-6(-10) per stem, 20-32 × 16-24 mm, sessile. Involucre hemispherical, 12-20 × 16-25 mm, glabrous. Phyllaries

6-7-seriate; outer ovate, 5-6.5 × 1-1.6 mm, apical spine 0.6-1.2 × 0.1-0.2 mm, erecto-patent or recurved; median oblong-lanceolate, 8.5-11 × 1.4-1.8 mm, apical spine 0.5-1.2 × 0.1-0.2 mm, erecto-patent or recurved; inner linear, rarely oblong-elliptic, 12.5-14 × 0.5-1.5 mm, apical spine 0.3-1 × 0.1-0.2 mm, erecto-patent. Corollas 16-18.5 × 0.8-1.5 mm, greenish-white, longer lobes 5.5-7 mm, shorter lobes 4.5-5.5 mm. Achenes oblong to oblanceolate, 3.4-5 × 1.2-1.8 mm, pale brown, umbo 0.2-0.5 mm. Pappus 12-14(-16) mm. *Fl.* 7-9, *Fr.* 8-9.

Habitat: Rocky alpine meadows, granite lands, and igneous slopes near streams, ravines; 2000-2800 m.

Distribution: Euro-Siberian element; Turkey (N.E. Anatolia), Caucasia, N. & N.W. Iran. In Turkey: **A8** Rize: Çamlıhemşin, between Çat and Elevit, wetland meadows, granite land, 1200-1800 m, 31.07.1980 *A.Güner* 2856 (HUB!); Çamlıhemşin, between Hisarcık village and Ortasirt plataeu, meadows, granite land, 1400-2000 m, 20.08.1981, *A.Güner* 4231 (HUB!); Çamlıhemşin, in front of Ortayayla village, 2200 m, meadow, 14.08.1985, *A.Güner* 6821 (HUB!); Artvin: Yusufeli, Öğdem, from Kapreşat quarter to Ziyaret hill, 1800-2500 m, 05.08.1984, *N.Demirkuş* 2457 (HUB!). **A9** Artvin: Ardanuç, Kutul, 13. 7. 1947, *A. Heilbrun, M. Başarman* (ISTF 7370!); Ardanuç, Kordevan Da., 15. 7. 1947, *A. Heilbrun, M. Başarman*, (ISTF 7510!); Şavval Hill, above Murgul, 2700-2800 m, 12.08.1957, *Davis* 32272 & *Hedge* (ANK!, K!, W!); *ibid.*, above Çamurlu plataeu, 2250 m, 41°09'500"N, 041°29'500"E, 17.09.2007, *Yıldız* 16686 & *Arabacı!* Yalnızçam Mountain, near Kutul, 2050 m, 18.08.1957 *Davis* 32444 & *Hedge* (ANK!, BM!, E!, K!); Yalnızçam Mountain, between Artvin and Ardahan, 2400 m, shady rock ledge, 19.08.1957, *Davis* 32536 & *Hedge* (BM!, E!, K!); 20 km E. of Şavşat, Karaköy, 2100 m, 07.08.1981, *Sorger* 81-75-15 (W!); Ardanuç, dried places throughout

the road between Kutul and Bilbilan plateaus, 1800-2100 m, 10.08.1984, *N.Demirkuş*, 2527 (HUB!) Ardanuç, Bilbilan plateau, 2500 m, mountain meadow, 41°03'00"N, 042°17'200"E, 19.09.2007, *Yıldız 16724 & Arabacı!* ibid., 41°03'300"N, 041°17'200"E, 06.08.2008, *Yıldız 16872 & Arabacı* (hb. Yıldız)! Şavşat, Kocabey plateau, 2250 m, mountain meadow, *Yıldız 16736 & Arabacı* (hb. Yıldız)! Ardahan: Posof, from Alabalık village to Boşdere village, dried places throughout the road, 1600-1950 m, 06.08.1982, *N.Demirkuş* 1843 (HUB!); Posof, throughout the forest road from Asmakonak village to Posof, 1700-2000 m, 25.07.1985, *N.Demirkuş* 2913 (HUB!).
Syntype: in herbis subalpinis Caucasi, circa acidulam Narzana, 09. August, Bieberstein s.n. (LE!).

C. obvallatum (M. Bieb.) Fisch. is not widespread in Turkey. In addition, there is no close relative of the species in Turkey, but in N.W. Iran the species varies in the direction of *C. hygrophyllum* Boiss. *C. obvallatum* is easily distinguished from the other species with these features: Capitula 2-6(-10) per stem, overtopped by many involucre leaves, which are quite unequal, whitish, simple or pinnatisect spines. *C. obvallatum* can create hybrids that coexist with other species.

7. *C. simplex* C.A.Mey., Verz. Pfl. Casp. Meer. 70 (1831) (Figures 22-23).

Rhizomatous perennial. Stem 25-50 cm, 2-3 mm diameter, erect, solitary, unbranched, unwinged, glabrous or shortly arachnoid, bearing 1-5(-10) capitula in a conferted terminal head. Basal leaves oblanceolate, 10 × 1.6 cm, petiole 1.5 cm, entire to shallowly sinuate-lobed to 1/3(-1/2), apical spine 5.5-7 × 0.1 mm, marginal pectinate, spine 0.5-10 mm, glabrous, or arachnoid on the main vein below; cauline leaves, oblong to lanceolate 8.5-15 × 1-2(-4) cm, sessile, shortly semi-amplexicaul, entire to shallowly

sinuate-lobed to 1/3(-1/2), rarely pinnatifid to 3/4, apical spine 5-8 × 0.1-0.3, marginals 2-5 mm, glabrous, or arachnoid on the main vein below. Involucral leaves shorter to longer than capitula. Capitula 21-30 × 16-21 mm, peduncule 4-12 mm. Involucres hemispherical-obconical 16-25(-28) × 16-21 mm. Phyllaries 5-6-seriate; outer triangular to ovate, 5-7 × 1-1.8 mm, apical spine 2-3.5 × 0.1-0.2 mm, erecto-patent; median ovate to lanceolate, 9.5-11.5 × 2-3 mm, apical spine 2-4 × 0.1-0.3 mm, erect, rarely erecto-patent; inner linear, rarely ovate-oblong, apical spine 14.5-17.5 × 0.6-2 mm, erect. Corollas 17-20 × 0.6-1.2 mm, dirty white or purple, longer lobes 5.5-7 mm, shorter lobes 4-5.5 mm. Achenes 4-4.5 mm (In subsp. *armenum*: oblanceolate, 3.2-4.5 × 1-1.2 mm, stramineous, umbo 0.1-0.2 mm). Pappus (13-)15-21 mm. *Fl. Fl.* 7-8, *Fr.* 7-9.

Habitat: Streamsides and flushes, rocky and alpine meadows; 2000-2900 m.

1. Basal and median cauline leaves entire to lobed to 1/3, lobes (when present) obscure to triangular and separated by U-shaped sinuses; flowers whitish or purple

2. Flowers purple; leaves entire (except for pectinate margin).. subsp. **simplex**

2. Flowers dirty white; leaves simple to lobed to 1/3(-1/2)... subsp. **armenum**

1. Basal and median cauline leaves pinnatifid to 3/4, lobes lanceolate and lobulate, separated by wide square sinuses; flowers dirty white..... subsp. **satdaghense**

subsp. **simplex**

Type: in pratis alpinis (7000 ped.) huöudis versus montem Elborus, 13 Julii mensis 1829, *C.A.Meyer* 39 (LE!).

Distribution: Euxine element; Turkey (N.E. Anatolia) and Caucasia. In Turkey: **A8** Artvin: District Artvin, above Schloban, *Woronow* 5530; Sachra to Marsuret, Vvedensky, *Woronow* 5320; Mt. Tikma, Sosnovsky; Arsian to Mansuret (all records

from Petrak in Monit. Jard. Bot. Tiflis 24:12, 1912). Ardahan: Posof, Ilgar Highways Commision maintenance and repair station grassland, 2000-2400 m, 04.08.1982, *N.Demirkuş* 1747 (HUB!). Posof, Ulgar pass, 2400 m, alpine meadows, 10.09. 2010, *Yıldız* 17170 & *Dirmenci* (hb. Yıldız)! **A9** Artvin: 10 km W. Yalnızçam, 2200 m, 07.08.1982, *Sorger & Buchner*, 82-111-4 (W!).

subsp. **armenum** (DC.) Petr., Izv. Kavkazsk. Muz 8(1-2): 63 (1914).

Syn.: ≡ *C. armenum* DC., Prodr. 6: 647 (1838). ≡ *C. simplex* var. *armenum* (DC.) Boiss., Fl. Orient. 3: 543 (1875).

Type: [Turkey B8 Erzurum] in Armenia prope Erzeroum, 1837, Aucher 3385 (Holo: P-photo! iso. P-photo!, K!, W!).

Distribution: Euxine element; Turkey (E & N.E. Anatolia) and S. Transcaucasia. In Turkey: **A7** Gümüşhane: Karagöl Mountain, in pratis alpinis uliginosis, 06.08.1894, *Sintenis* 7169 (B!, E!, K!, W!, WU!); 7169b (W!). **A8** Gümüşhane: Haldizan Mountain, N. of Bayburt, 2590 m, *Balls* 1879; Rize: above Cimil, 2100 m, *Balansa* (K!); İkizdere, Başköy, Çiçekli plataeu, 2100-2300 m, stony and meadowlands, 15.09.2007, *Yıldız* 16658 & *Arabacı* (hb. Yıldız)! Rize: İkizdere, Cimil, environs of Başköy, İncun place, meadowland, 2200-2600 m, 23.08.1985, *A.Güner* 6918 (HUB!); 5-6 km from Başköy to Cermanin Yayla, 2400-2500 m, *Dirmenci* 3608 & *Akçiçek* (hb. Yıldız)! **A9** Kars: Sarikamiş to Horasan, 2300 m, *Huber-Morath* 15946 (G!). **B7** Erzincan: Üzümlü, Keşiş Da., Yedigöller, alpine meadows, 2500 m, 15.09. 2004, *A.Kandemir* 6789 (hb. Kandemir)! **B8** Erzurum: Erzurum, 28.07.1859, *Kotschy* suppl. 633 (G!); **B9** Iğdır: Tuzluca, Laleli village, through Kızılyazaret, 2300 m, 14.06.2008, *E.Altundağ* (ISTE 85681!); Van: Muradiye, Pirreşit Mountain, 2000 m, 30.06.1998, *M.Ünal* (VANF 3140!); Van Erciş, Sabanbüken village, wet places, 2850 m, 10.08. 2007, *O.Karabacak*

(VANF 12759!); Van: Hoşap-Başkale, Çuh gediği pass, 5 km sudöstlicht der passhöhe, 2670 m, 07.09.1951, *Huber-Morath* 11239 (G!); 30 km from Başkale to Hoşap, South of Güzeldere pass, 2600 m, 03.07.1966, *Davis* 45908 (E!, K!, W!); Hoşap, Kecip Mountain, 2900 m, 30.07.1954, *Davis* 23331 & *O.Polunin* (ANK!, E!, K!). **C10** Hakkari: Cilo Mountain, above Sua, 8000 ft., 10.08.1954, *Davis* 24300 & *O.Polunin* (ANK!, E!, K!).

subsp. **satdaghense** P.H.Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33: 420 (1975).

Type: [Turkey C10 Hakkari] d. Yüksekova, Sat Dağ, wet spring, 2800 m, 27.08.1967, *Duncan & Tait* 52 (holo. E! M-photo).

Distribution: Endemic to Turkey (E. Anatolia).

In The Flora of Turkey, *C. simplex* C. A. Mey. was divided into three subspecies. In the Flora of USSR, *C. simplex* subsp. *armenun* (DC.) Petr. was regarded as separate species (Charadze, 1963). According to results of our study, it was concluded that it is appropriate to have three subspecies.

C. simplex subsp. *simplex* is a rare taxon and found only in Artvin and Ardahan provinces in Turkey. It is different from the other two subspecies with the purple corolla and floral leaves that are longer than capitulum. *C. simplex* subsp. *satdaghense* P.H.Davis & Parris is known only from the type specimens. Sufficient data have not been obtained with regard to the distribution and variation of subspecies in the field studies. Type specimens of this subspecies is different from the others with leaves which are dissected to 3/4.

C. simplex subsp. *armenum* is common in Turkey and Caucasusia. Though sparse, it grows from Eastern Black Sea region to Hakkari province. Although wetlands

species, the leaves become coriaceous and long and stouter spiny from Eastern Black Sea region to Hakkari. It also increases the depth of the leaf lobes. A specimens collected from 9000 ft. of Ağrı mountain (*B.Post* 2145 (E!)) is a transitional form between subsp. *satdaghense* and subsp. *armenum*.

8. C. rhizocephalum C.A. Mey., *Verz. Pfl. Casp. Meer.* 70 (1831) (Figures 24, 25).

Dwarf perennial. Stem usually acaulous, rarely up to 15 cm, wingless. Basal leaves rosulate, oblong-elliptic, 3-18(-25) × 1-4 cm, petiole 1-2 cm, subentire, sinuate-lobed or pinnatilobed to pinnatipartite, lobes 4-6-paired, triangular, 7-19 × 5-17 mm, acute, apical spine 4.5-8.5 × 0.1-0.6 mm, marginals 1-7 (-10) mm, glabrous to sparsely arachnoid; cauline leaves (when present) sparse and pinnately lobed. Involucral leaves absent. Capitula 1-10, 20-35 × 14-26 mm, conferted and subsessile in centre of rosette, rarely subsolitary on a short peduncle. Involucres hemispherical, 13-26 × 14-26 mm, subglabrous. Phyllaries 4-6-seriate; outer ovate-oblong or triangular, 6.5-10.5 × 2-3.5 mm, apical spine (0.8-)1.2-3.5 × 0.1-0.3 mm, erect; median ovate-oblong to lanceolate, 11.5-19.5 × 2.4-3.5 mm, apical spine 0.2-4 × 0.1-0.3 mm, erect or erecto-patent; inner linear to oblong, 17-25 × 0.8-2.8 mm, apical spine 1-3 × 0.1-0.3 mm, erecto-patent. Corollas 18-27 × 0.6-1.5 mm, purple (rarely white), longer lobes 4.5-6.5 mm, shorter lobes 3-4.5 mm. Achenes narrowly obovate to oblong or oblanceolate, 3.5-4.5 × 1.2-1.6 mm, stramineous, umbo 0.1-0.4 mm. Pappus 11-27 mm. *Fl.* 7-9, *Fr.* 8-9.

Habitat: Damp turfs, alpine meadows, stream sides; 1400-3000 m.

1. Leaves pinnatifid to pinnatipartite, (6-)8-18 cm, lobes shortly lobulate and stoutly spined; capitula 30-35 × 22-26 mm, usually 3-10; phyllaries spiny-

mucronate (spine usually less than 1 mm), erect; outer ovate to ovate-oblong;
achenes narrowly obovate to oblong..... subsp. **rhizocephalum**

1. Leaves subentire to simple sinuate-lobed to 1/2-way, 3-8 cm long, lobes
subentire and pectinate-margined with slender spines; capitula 20-30 × 14-26
mm, usually 1-2; phyllaries tapering into a (1-)2-4 mm, often erecto-patent
spine; outer triangular; achenes oblanceolate..... subsp. **sinuatum**

subsp. **rhizocephalum**

Syn.: = *C. esculentum* var *caucasicum* C.A. Mey., Mém. Acad. Sci. Pétersb. sér. 6, sci.
nat. 6: 44 (1849). = *C. esculentum* subsp. *caucasicum* (C. A. Mey.) Petr., Trudy Tiflissk.
Bot. Sada 12(1): 45 (1912).

Lectotype: in alpibus caucasicis Kasbek, Schachdagh et Tufandagh, 2195-2561
m, [31 vii 1830, C.A.Meyer 169] (holo. LE! iso. P-photo!)

Distribution: Irano Turanian element; Turkey (E. Anatolia), Caucasia, Iran and
Afghanistan. In Turkey: **A5** Amasya: Akdağ, near the top, between stones, 2000 m,
02.10.1976, *K.Alpınar* (ISTE 36202!). **A9** Ardahan: on road to Şavşat, Çamlıbel pass,
2500-2650 m, 18.08.2006, *Yıldız* 16339 & *Dirmenci* (hb. Yıldız)! Ardahan: 5 km from
Ardahan to Şavşat, meadowland, 1500 m, 07.08.2008, *Yıldız* 16890 (hb. Yıldız)! **B7**
Erzincan: Sipikör towards Jerbatan, *Sintenis* 1890: 3347 (W!). **B8** Erzurum: between
Tınazlı village and Ömertepe, 01.09.1988, *Ş.Ebrem* (ISTE 60159!); 2-3 km W. of Ilıca,
meadowland, 1750 m, 39°57'500"N, 041°04'000"E, 20.09.2007, *Yıldız* 16744 (hb.
Yıldız)! W. of Dadaş village, meadowland, 1700 m, 39°56'500"N, 041°14'000"E, *Yıldız*
16279 & *Dirmenci* (hb. Yıldız)! **B9** Ağrı: between Diyadin and hot springs, 1830 m,
Hewitt 293 (K!). **B9** Ağrı: between Diyadin and hot springs, 1830 m, *Hewitt* 293 (K!);
Van: Halanduran Mountain, c. 25 km from Başkale to Van, 3000 m, 28.08.1956,

McNeill 651 (K!); Van: beside lake, 10.08.1966, *Tong* 366 (E!); Ereğ Mountain, side of Genişgöl, alpinic meadow, 2550 m, 20.09.1974, *A. & T. Baytop* (ISTE 31043!).

subsp. **sinuatum** (Boiss.) P.H. Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33(3): 430 (1975).

Syn.: \equiv *C. rhizocephalum* C.A. Mey. var. *sinuatum* Boiss., Fl. Orient. 3: 542 (1875).

Type: [Turkey **A7/8**] in Armenia Turcicae alpinis Alischerikhan inter Trapezuntem (Trabzon) et Baibut (Bayburt), 1900 m, 28.07.1859, *Kotschy* suppl. 631. (holo. G!).

Distribution: Turkey (E., N.E. & S. Anatolia) and Caucasia. In Turkey: **A8** Rize: İkizdere, between Ballı village and Koşmer plateau, 2300 m, 02.08.1985, *A. Güner* 6878 (HUB!); İkizdere, Baltaş Hill, 2900 m, 30.08.1952, *Davis* 21115 & *Dodds* (E!, K!); Erzurum: from İspir to Rize, provincial border, steppe, 2150 m, 40°34'900"N, 040°51'300"E, 19.08.2006, *Yıldız* 16355 & *Dirmenci* (hb. Yıldız)! **A9** Artvin: Between Ardanuç and Ardahan, Bilbilan plateau, alpine meadows, 41°03'300"N, 041°17'200"E, 06.08.2008, *Yıldız* 16873 (hb. Yıldız)! Artvin: Yalnızçam Mountain between Ardanuç and Kutul plateau, 1400 m, *Davis* 32479 (K!); Ardahan: Çıldır, Çıldır Lake, N.W. side, mountain meadows, 1900 m, 41°02'500"N, 043°09'700"E, 17.08.2006, *Yıldız* 16325 & *Dirmenci* (hb. Yıldız). **B6** Kahramanmaraş: Göksun, Ericcek village, Müdürler place, meadowland, 1600 m, 22.08.1977, *Yıldız* 1491 (HUB!). **B7** Tunceli: Munzur Mountain, alpine meadows, 2400 m, 15.08.1972, *T. Baytop* (ISTE 23188!). **B9** Iğdır: Tuzluca, Candeviş village, Adalet mezarası, 2158 m, 30.05.2007, *E. Altundağ* (ISTE 85447!). **C5** Niğde: Bulgar Mountain, ad funtes locis madidid caespitosis montis Gisyl Deppe, 2440 m. 30.08.1853, *Kotschy* 293 & 322 (G!, K!, WU!); Bulghar Magara, 09.1895, Siehe 270

(WU!); Konya: Ereğli, Aydos Mountain, Alagöl plataeu, alpinic meadow, 3000 m, 28.08.1977, *S.Erik* 2626 (HUB!). **C6** Kahramanmaraş: Süleymanlı, Berit Mountain, Çimen plataeu, meadowland, 2800 m, 26.10.1980, *Yıldız* 2383 (HUB!). **C10** Hakkari: Sat Mountain, 2600 m, *Duncan & Tait* 134 (K!).

C. rhizocephalum C. A. Meyer and *C. acaule* (L.) Scop which are common in Europe, and *C. esculentum* (Siev.) C.A.Meyer which is common in Asia make up a species complex. Also, they are more varied and are of cosmopolitan nature. Also, Caucasian species *C. frickii* (Fsch. & Mey.) Petrak is close to these species in terms of some features. Because of these reasons, the species mentioned above were evaluated different categories by the authors. In this study, the opinion in The Flora of Turkey was accepted by us.

The leaf lamina of *C. rhizocephalum* vary greatly, ranging from entire to pinnatisect. In terms of the distribution of two subspecies is sympatric in Turkey, there are many intermediate forms. However, subsp. *rhizocephalum* is slightly more homogeneous with shallow lobed long (20- 25 cm, up to 10 cm in subsp. *sinuatum*) and glaucous leaves.

9. *C. frickii* Fisch. & C.A.Mey., *Cirs. ruth.*:7. (1848). Reprint of *Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. vi. 47* (1849) (Figures 26-27).

Syn.: ≡ *C. esculentum* (Siev.) C.A.Mey. subsp. *frickii* (Fisch. & C.A.Mey.) Petr., *Trudy Tiflissk. Bot. Sada* 12(1): 29 (1912). *Cirsium rhizocephalum* subsp. *frickii* (Fisch. & C.A.Mey.) Govaerts, *World Check. Seed Pl.* (3)1: 15 (1999). = *C. eliasianum* Kit Tan & Sorger, *Pl. Syst. Evol.* 154(1-2): 123 (1986). *Type*: Ardahan: (Kars) Çıldır Lake,

alpine meadow near lake, 1950 m, 29.07.1981, *Sorger* 81-58-7 (holo. Hb. Sorger, iso E!).

Type: [Georgia] in Iberiae districtu Trialeti prope Zalka, in pratis montis Jelidagh, *Frick* (holo. LE!, iso. G! P-photo!).

Rhizomatous perennial. Stem 25-60 cm, erect, solitary or simply branched above, furrowed, unwinged, sparsely and crispately arachnoid. Basal leaves narrowly oblong, elliptic to lanceolate, 25-30 × 3-7 cm (including 2-4 cm petiole), pinnatisect to 2/3, lateral lobes 8-10-paired, unequally trifid, oblong to lanceolate, 1.5-5 × 0.3-1 cm, subacute, spines yellow, apical spine 3-5 × 0.1-0.2 mm, marginals 2-10 × 0.1-0.2 mm, glabrous to greyish-white arachnoid; cauline leaves narrowly oblong, elliptic to linear-lanceolate, 10-15 × 1.5-5 cm, semiamplexicaul, pinnatisect to 1/2-3/4, lobes opposite, fan shaped, lateral lobes 8-10-paired, unequally 2-3-partite, oblong, 1-2.5 × 0.4-1 cm, subacute, apical spine 3-5 × 0.1-0.2 mm, marginals 2-4 × 0.1-0.2 mm, glabrous to arachnoid. Involucral leaves linear-lanceolate, 3-5 cm long, longer than involucre. Inflorescence raceme; capitula 25-40 × 20-40 mm, erect, 1-6 on each branch, peduncle 1-6 cm. Involucres, subhemispherical to ovoid, 20-25 × 15-25 mm, subglabrous. Phyllaries 6-8 seriate, adpressed; outer narrowly lanceolate, 8-10 × 1-1.5 mm, apical spine 2-3 × 0.2-0.3 mm, erecto-patent; median lanceolate, 11-13 × 1.5-2 mm, apical spine 2.5-3 × 0.2-0.3 mm, erecto-patent to recurved; inner linear-lanceolate, 15-20 × 1.8-2.2 mm, apical spine 3.5-5 × 0.2-0.3 mm, recurved. Corolla 18-25 mm, dingy white, unequally 5 lobed to 1/4-1/2, longer lobes 4-5 mm, shorter lobes 2-3 mm; style 10-12 mm, 1-2 mm exerted, shortly bilobed; filaments 1-2 mm, hairy, anthers 6-7 mm, acute to acuminate. Achenes oblanceolate, 4-4.8 × 1-1.3 mm, brownish, umbo 0.1-0.5 mm. Pappus 15-18 mm. *Fl. & Fr.* 6-9.

Habitat: Alpine meadows and steppes, pastures, wet places near lakeshore; 1500-2350 m.

Distribution: Hyrcano-Euxine element; Turkey (N.E. Anatolia) and Georgia. In Turkey: **A6** Sivas: Suşehri, 3 km N. of Aksu village, 1700 m, meadows, *Yıldız* 17106 (hb. Yıldız)! **A9** Artvin: Şavşat, Pınarlı village, on the road of Arsiyan Hamlet, under *Abies* Mill. forest, c. 2000 m, 02.09.2008, *Dirmenci* 3647 & *E.Akçiçek* (hb. Yıldız)! Ardahan: (Kars) Çıldır Lake, alpine meadow near lake, 1950 m, 29.07.1981, *Sorger* 81-58-7 (type of *C. elaisianum*) (W!); N.W. banks of Çıldır Lake, 1960 m, 03.08.1982, *Sorger & Buchner* 82-102-3 (W!); near Posof, 1500 m, *Sorger & Buchner* 82-107-2 (W!); Damal-Ulgar pass, 2350 m, wet places, 07.08.2008, *Yıldız* 16877 (hb. Yıldız)! Çıldır, north of Çıldır Lake, Gölebakan village, Toraman Brook, mountain meadows, 2000 m, 41°02'500"N, 043°09'700"E, 08.08.2008, *Yıldız* 16893 (hb. Yıldız)! *ibid.*, 17.08.2006, *Yıldız* 16326! *ibid.*, 02.09.2008, *Dirmenci* 3649 & *Akçiçek* (hb. Yıldız)!

10. C. pubigerum DC., Prodr. 6: 650 (1838) ((Figures 28A-B, 29).

Rhizomatous perennial. Stem 50-150 cm, 6-10 mm diameter, erect, furrowed, shortly winged or unwinged (rarely long-winged), subcorymbose to divaricately paniculate above, subglabrous. Cauline leaves oblong-lanceolate to narrowly ovate 14-25 × 3-10 mm, semiamplexicaul, shallowly sinuate-lobed or toothed to pinnatifid to 3/4, lobes 2-6-paired, lanceolate-triangular to triangular-oblong, 6-30 × 7-24 mm, acute to acuminate, apical spine 2-7(-10) × 0.2-0.5 mm, marginals 1-7(-10) mm, glabrous, ± pubescent or rarely sparsely arachnoid. Involucral leaves (when present) shorter than capitula. Capitula clustered on branch tips, 16-35 × 11-20 mm, mostly pedunculate to 20 cm or sessile, with or without reduced subtending leaf spines. Involucres

hemispherical or obconic, 10-23 × 11-20 mm. Phyllaries 5-7-seriate; outer ovate-lanceolate, 3-6.5 × 1.2-3.2 mm, apical spine 0.2-2.5 × 0.1-0.4 mm, erect; median oblong-lanceolate, 8-13.5 × 1.2-2 mm, apical spine 0.2-2.5 × 0.1-0.2 mm, erecto-patent; inner linear rarely oblong-linear, 10.5-16.5 × 0.5-1.5 mm, apical spine 0.5-1.5 × 0.1-0.2 mm, erect or erecto-patent. Corollas 17-23 × 0.8-1.6 mm, purple (rarely white), longer lobes 5.5-8 mm, shorter lobes 4-7 mm. Achenes narrowly obovate tooblanceolate oblong, 2.5-4.5 × 1-1.5 mm, stramineous or pale to dark brownish, umbo 0.1-0.6 mm. Pappus 15-20 mm. *Fl.* 6-9, *Fr.* 7-9.

Habitat: Stream sides, meadows, rocky places and wet forest openings; 1000-3000 m.

1. Cauline leaves doubly dentate to lobed to ½-way, longer spines 2-3 mm; phyllary spines 0.2-1 mm
2. Leaves divided to 1/2-way into triangular-lanceolate lobes; peduncles 0.2-3 cm; achenes pale brownish.....var. **glomeratum**
2. Leaves shortly and closely sinuate-lobed to doubly dentate; peduncles 2-12 cm; achenes stramineous.....var. **caniforme**
1. Cauline leaves pinnatifid to 1/2-3/4, longer spines 3-7(-10) mm; phyllary spines 1-2 mm
3. Leaf lobes separated by U-shaped sinus; corymb lax, with ascending branches; peduncles (0.2)3-9(-11) cm; phyllary spines 1-2 mm; achenes brownish.....var. **paphlagonicum**
3. Leaf lobes separated by wide square sinus; panicle divaricately branched; peduncles 0.2-3 cm; phyllary spines c. 1 mm; achenes dark brownish.....var. **spinosum**

var. **glomeratum** (Freyn & Sint.) P.H.Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33(3): 430 (1975).

Syn.: = *Cirsium depilatum* Boiss. & Balansa, Fl. Orient. 3: 543 (1875)!. *Type*: Turkey: Rize, in humidis subalpinis Ponti Lazici, prope Djimil (Cimil) Balansa (type not seen) \equiv *C. depilatum* var. *glomeratum* Freyn & Sint., Oesterr. Bot. Z. 42: 235 (1892).

Type: [Turkey B8 Erzincan] Sipikör, ad rivulum in Goeldere, 28.07.1890, *Sintenis* 3292 (holo. LD-photo!, iso. LD-photo! K! W! WU! JE-photo! S-photo!).

Distribution: Turkey (E. & N.E. Anatolia) and Transcaucasia. In Turkey: **A8** Artvin (Çoruh): d. Artvin, between Anagert and Sammschar, *Woronow* (Petrak Fasc. 9, n. 90, cult.); Yusufeli, Sarıgöl (Barhal), Yaylalar village, S. of Kaçkar Mountain, 2000-2200 m, 18.09.2007, *Yıldız* 16707 & *Arabacı* (corolla white) (hb. Yıldız)! İkizdere, Başköy, Çiçekli plataeu, 2100-2300 m, stony and meadowlands, 15.09.2007, *Yıldız* 16661 & *Arabacı* (hb. Yıldız)! Erzurum: 10 km from İspir to Rize, water side, 1800 m, 40°31'500"N, 040°55'300", 19.08.2006, *Yıldız* 16353 & *Dirmenci* (hb. Yıldız)! Tortum, 2 km after Oltu turnout, 1500 m, 40°23'000"N, 041°31'500"E, 16.08.2006, *Yıldız* 16291 & *Dirmenci* (hb. Yıldız)! Olur, on road to Akdağ, water side, 1500 m, 04.08.2008, *Yıldız* 16864 (hb. Yıldız)! **B6** Sivas: Celalli, Aktaş village, Çağlayan place, water side, 1500 m, 17.07.2007, *Yıldız* 16483 (hb. Yıldız)! **B7** Tunceli: Between Pülümür and Mutu, 1 km ob Pülümür, 1450 m, 26.06.1951 *Huber-Morath* 11677 (G!); Munzur Mountain, 2400 m, 15.08.1972, *T.Baytop* (ISTE 23188a!); Erzincan: Spikör Mountain, between Erzincan and Kelkit, 200 m, 18.07.1958, *Huber-Morath* 15945 (G!). **C6**

Kahramanmaraş: Süleymanlı, Sarıgüzel, Berit Mountain, S. slope, 1500 m, 22.08.2008, *Yıldız* 16982 (hb. Yıldız)!

var. **caniforme** Petr., Mitt. Thüring. Bot. Ges. 2(1): 19 (1960).

Syn.: = *C. pubigerum* DC. var. *foliosum* Petr., Mitt. Thüring. Bot. Ges. 2(1): 18 (1960). *Type*: [Turkey B9 Ağrı] zwischen Ağrı (Karaköse) und Horasan, 54 km Östlich von Horasan, zwischen Zidikan und Velibaba, ca. 2500 m, 4-5.09.1957, *Rechinger* 15080 (W!).

Type: [Turkey B9 Ağrı] zwischen Ağrı (Karaköse) und Horasan, 54 km Östlich von Horasan, zwischen Zidikan und Velibaba, c. 2500 m, 4-5.09.1957, *Rechinger* 15081 (holo. W!).

Distribution: Turkey (E. & N.E. Anatolia) and N. Iraq. In Turkey: **A6** Sivas: Doğanşar, between Kurucaova pass and Maraş valley, 1450-1600 m, 26.08.2009, *Yıldız* 17109 & *N.Çelik* (hb. Yıldız)! **A8** Rize: 7-8 km from İkizdere to Cimil, 800 m, wet places in forest, 15.09.2007, *Yıldız* 16651 & *Arabacı* (hb. Yıldız)! Artvin: Yusufeli, 3. km from Sarıgöl to Yaylalar, 1500 m, 18.09.2007, *Yıldız* 16717 & *Arabacı* (hb. Yıldız)! **A9** Artvin: Kutul plateau, 2200 m, 05.08.1966, *Steiner* (W!); **B7** Erzincan: Erzincan to Sivas, 52 km W.N.W. of Refahiye, 2000 m, 07.09.1957, *Rechinger* 15176 (W!); Tunceli: 20 km from Pülümür to Tunceli, wet slopes, 1400 m, *Yıldız* 17097 & *M.Tekin* (hb. Yıldız)! **B8** Bingöl: 26 km from Karlıova to Çat, 1900 m, 39 31 100 N 040 58 600 E, 11.08.2007, *Dirmenci* 3519 & *Arabacı* (hb. Yıldız)! **B9** Ağrı: 54 km E. of Horasan, pass between Zidikan and Velibaba, 2500 m, *Rechinger* 15080 (as var. *foliosum*) (W!); Van: 32 km from Başkale to Hoşap, South of Çuh pass, 2500 m, 38°10'600"N, 043°56'000"E, 14.08.2008, *Yıldız* 16908 & *Dirmenci* (hb. Yıldız)! Bitlis: Tatvan, Kosan stream, 5. km, streamside, 1650 m, 18.09.2005, *T. Çelik*, 1045

(VANF!). **C9** Hakkari: Cilo Mountain, Diz stream, 1430 m, 06.08.1954, *Davis* 23876 (E!, K! W!); **C10** Hakkari: 18 km from Şemdinli to Yüksekova, 1700 m, 05.09.2007, *Dirmenci* 3581 & *M.Fırat* (hb. Yıldız)!

var. **paphlagonicum** Petr., Mitt. Thür. Bot. Ges. 2(1): 17 (1960).

Type: [Turkey A4 Kastamonu] Tossia (Tosya), Kaiseridere, ad rivulum, 26.06.1892, *Sintenis* 4501 (holo. LD-photo! iso. B! K! W! JE-photo! S-photo!).

Distribution: Endemic to Turkey (N. Anatolia). **A4** Kastamonu: Paphlagonia, montis Ilgha-dagh, 1700 m, 12.07.1890, *Bornmüller* 1755 (W!); N. slope of Ilgaz Mountain, 1500 m, 28.08.1962, *Davis* 38298, *Coode & Yaltırık* (E! K!); *ibid.*, 2000 m, *Darrah* 100 (E!); Ilgaz, Ilgaz Mountain, environs of hotels, 2000 m, wet places in forest opening, 23.08.2006, *Yıldız* 16410 & *Dirmenci* (hb. Yıldız)! Ilgaz Mountain, S. of pass, 1650 m, 41°04'500"N, 033°43'800"E, 06.08.2007, *Yıldız* 16576 & *Dirmenci* (hb. Yıldız)i!

var. **spinosum** Petr., Mitt. Thür. Bot. Ges. 2(1): 19 (1960).

Syn.: = *C. iraqense* Petr., in Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 109: 168 (1973). *Type*: Iraq: Erbil, Mount Qandil, ad confines Persiae in declivibus orientalibus supra Pushtashan ad rivulos, 2000 m, 30.07.1957, *Rechinger* 11080 (holo. W! iso G!).

Type: [Iraq] Berg Helgurd in der Nähe der persischen Grenze im Tale oberhalb Nowanda, 2600 m, 10-14 viii 1957, *Rechinger* 11864 (holo. W!).

Distribution: Turkey (S. & S.E. Anatolia), N. Iraq and N.W. Iran. In Turkey: **B6** Kahramanmaraş: d. Çardak, Kandil Hill, 1900 m, 21.07.1952, *Davis* 20238 (E!, K!); Göksun, Berit Mountain, N. of Çavdar pass, meadowland, 1850 m, 38°01'850"N, 036°50'000"E, 26.08.2006, *Yıldız* 16630 (hb. Yıldız)! *ibid.* 03.09.2006, *Yıldız* 16432 &

Dirmenci (hb. Yıldız)! **B7** Sivas: İmranlı, Kızıldağ, W. foot, 2000 m, water side, 20.07.2008, *Yıldız* 17033 & *A.Akpulat* (hb. Yıldız)! Tunceli: Munzur Mountain, alpine meadows, 2400 m, 15.08.1972, *T. Baytop* (E!, ISTE 23188a!). **B9** Van: Halanduran Mountain (Başkale to Van), 3000 m, 31.08.1956, *McNeill* 713 (E!); Bitlis: Tatvan, Kosan stream, 20. km, streamside, 1480 m, 14. 7. 2005, *T. Çelik*, 789 (VANF!). **C10** Hakkari: 2-5 km from Şemdinli to Yüksekova, 1550 m, 16.06.1966, *Davis* 45011 (stem and underside of leaves very sparsely arachnoid) (K!). 9 km from Çukurca to Hakkari, around of Narlı village, 800 m, 37°16'200"N, 043°35'250"E, *Yıldız* 16934, *Dirmenci* & *M.Fırat* (hb. Yıldız)!

C. pubigerum (Desf.) DC. is one of the most polymorphic two species growing in Turkey (the other is *C. libanoticum*). It grows on damp places, brook edges and shady places between 800 to 3000 m. The species can be divided into many varieties. In general, four Turkish varieties are accepted by some authors. Due to numerous intermediate forms between these varieties, it is difficult to delimit them.

11. C. creticum d'Urv., Mém. Soc. Linn. Parris 1: 363 (1822) (Figures 30A-B, 31).

Rhizomatous perennial. Stem 50-100(-150) cm, 2.5-10 mm diameter, narrowly sinuate-winged, the short triangular lobes produced into 2-12 mm slender rigid spines, and bearing long ascending spiny-winged flowering branches, arachnoid. Basal leaves oblong elliptic, 10-20 × 2-4 cm, petiole 6-9 cm, sinuate to pinnatilobate 1/3, lobes 4-6-paired, triangular, 3-7 × 7-15(-21) mm, acute, apical spines 5-7.5 × 0.1-0.4 mm, marginals 2-3.5 mm, subglabrous above, arachnoid-tomentose beneath; cauline leaves oblong-elliptic or linear-lanceolate, 8-26 × 2-4.2 cm, semiamplexicaul, entire to pinnatifid 1/2, lobes 4-5-paired, triangular, ultimate lobe linear-lanceolate, 8-16 × (4.5-

)8-16 mm, acute, apical spine 3-10(-15) × 0.2-0.5 mm, marginals 1-4 mm subglabrous above, arachnoid-tomentose beneath (hairs simple and slender). Involucral leaves absent. Capitula in small terminal clusters or racemose-paniculate on inflorescence branches, 19-26 × 7-15 mm, sessile or shortly pedunculate to 6 mm. Involucres hemispherical-campanulate, 12-18 × 7-15 mm. Phyllaries 6-8-seriate; outer ovate, 4.5-6 × 1.5-2 mm, apical spine 1.5-3.5 × 0.2-0.4 mm, erect; median ovate-oblong, 7-10 × 1.2-1.6 mm, apical spine 0.3-1.5 × 0.1-0.2 mm, erecto-patent, arachnoid-ciliate; inner linear, 11.5-14 × 0.6-1.4 mm, apical spine 0.2-0.5 × 0.1-0.2 mm, erect. Corollas 14-18 × 0.5-1 mm, purple, longer lobes 5.5-6.5 mm, shorter lobes 4.5-5.5 mm. Cypselas 3 mm, pale brown (in subsp. *creticum* oblong, 2.5-3.2 × 1.1-1.4 mm, umbo 0.1-0.4 mm). Pappus 10-14 mm. *Fl.* (6-)7-9(-10), *Fr.* 7-10.

Habitat: forest openings, meadowland, marshy ground, damp places and still watersides; 0-1600 m.

1. Median cauline leaves pinnatilobed to about 1/2-way, lobes mostly 2-3-fid, spines weak to stout, 1-10(-14) mm,subsp. **creticum**

1. Median cauline leaves subentire or shallowly lobed, lobes broad and subentire, spines weak, 1-6 mmsubsp. **gaillardotii**

subsp. **creticum**

Syn.: ≡ *Carduus creticus* Lam., *Encycl.* 1: 701 (1785).

Type: L'île de Candie (Crete), Tournefort. (Hb?)

Distribution: E.Mediterranean element. N.W. Turkey, W. & S. Anatolia, Italy, Balkans. In Turkey: **A1(E)** Kırklareli: Between İğneada and Harbour, roadside, 29.07.1974, *N.Özhatay* (ISTE 30684!); 6-7 km from Dereköy to Bulgaristan, 600 m, forest openings, 02.08.2007, *Yıldız* 16519 & *Dirmenci* (hb. Yıldız)! Between Kırklareli

and Kofçaz, Böcek stream, *Quercus* openings, 500 m, 01.08.2007, *Yıldız* 16510 & *Dirmenci* (hb. Yıldız)! Tekirdağ: Between Saray and Güngörmez, streamside, 22.07.1977, *A.Baytop et al.* (ISTE 38111!). Çanakkale: 1-2 km West of Yenice, streamside, 300 m, 31.07.2007, *Yıldız* 16495 & *Dirmenci* (hb. Yıldız)! ibid., 10.09.2009, *Yıldız* 17130 (hb. Yıldız)! **A1(A)** Çanakkale: Khersonesus, Kaba Tepe Çay, 12.09.1883, *Sintenis* 1883:1136b (G!); Bunarbaschi (Pınarbaşı), *Sintenis* 1883:1136 (G!, K!). **A2(E)** İstanbul: Silivri, near sea level, 12.08.1962, *Davis* 39232 & *Coode* (K!); İstanbul: Silivri, *Davis* 39232 (E!). **A2(A)** Balıkesir: Marmara, between center and Çınarlı village, 90 m, 29.10.1977, *E.Tuzlacı* (ISTE 38804!); **A2** Bursa: Uludağ, 800 m, 40°08'400"N, 029°01'500"E, 21.08.2007, *Yıldız* 16585 & *Arabacı* (hb. Yıldız)! **A3** Bartın: 2 km to Amasra, roadside, 50 m, 04.08.2007; *Yıldız* 16550 & *Dirmenci* (hb. Yıldız)! **A4** Zonguldak: 15 km from Zonguldak to Ereğli, 350 m, 04.08.2007, *Yıldız* 16535 & *Dirmenci* (hb. Yıldız)! Bolu: 25 km from Mudurnu to Göynük, waterside, 700 m, 40°28'000"N, 030°60'000"E, 22.08.2007, *Yıldız* 16602 & *Dirmenci* (hb. Yıldız)! Kastamonu: Between İnegöl and Abana, 50 m, 05.08.2007, *Yıldız* 16561 & *Dirmenci* (hb. Yıldız)! Sinop: Ayancık, environs of Güzelkent, 300 m, 04.08.2007, *Yıldız* 16565 & *Dirmenci* (hb. Yıldız)! **B1** Balıkesir: Kazdağı (İda), Pınarbaschi (Pınarbaşı), Kırk-guez (Kırkgöz), 12.09.1883, *Sintenis* 1136 (K!); **B2** Bursa: 4-5 km from İnegöl to Keles, 600 m, 21.08.2007, *Yıldız* 16596 & *Arabacı* (hb. Yıldız)! Kütahya: Gediz, Murat Mountain, N. foot, streamside, 30.10.1976, *A.Çırpıcı*, (ISTF 30118!); ibid., below Hamam, waterside, 11.08.1977, *A.Çırpıcı* (ISTF 30939!) (Lower leaves up to 20 x 6 cm). **C1** Aydın: Samsun Mountain above Priene, 400 m, *Davis* 18367 (W!); **C2** Denizli: Honaz Mountain, 1250 m, *Sorger* 68-19-6 (W!); Baba Mountain, N. slope, forest opening, 850 m, 01.09.2007, *Yıldız* 16639 (hb. Yıldız)! Acıpayam, Bozdağ, Geyran

Yayla, Kızılsu stream, 27.07.2007, *Dirmenci* 3478 & *Akçiçek* (hb. Yıldız)! Muğla: Fethiye, Kayacık village, Akdağ, Çamalan plateau, waterside, 1600 m, 02.09.2007, *Yıldız* 16645 (hb. Yıldız)! Burdur: Altınyayla, 1 km from Balıklı village to Ören village, 25.07.2007, *Dirmenci* 3469 & *Akçiçek* (hb. Yıldız)! Antalya: Gömbe, Akdağ, 1300 m, *Sorger* 68-25a-8 (W!). **C3** Afyon: Coast of Acıgöl, between Dazkırı and Çardak, 16 km to Çardak, 820 m, 07.10.1980, *A.Baytop* (ISTE 45884!); Isparta: Yalvaç, Bağkonak town, 1150 m, meadowland, 06.08.2006, *Yıldız* 16458 & *Dirmenci* (hb. Yıldız)!
subsp. **gaillardotii** (Boiss.) P.H.Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33(3): 429 (1975).

Syn.: ≡ *C. gaillardotii* Boiss., Diagn. Pl. Orient. ser. 2(3): 42 (1856). ≡ *C. siculum* Spreng. subsp. *gaillardotii* (Boiss.) Petr., Oesterr. Bot. Z. 60: 461 (1910). = *C. pseudogaillardotii* Arènes, Bull. Soc. Bot. Fr. 95: 278 (1958). *Type*: Turkey C6 Hatay: Daphne, Antioche, 09.09.1939, Louis s.n. (P-photo)

Type: [Lebanon] ad rupes infra pagum Djebaa Libani, 27.08.1854, *Gaillardot* 982 (holo. G! iso. JE-photo!).

Distribution: Mediterranean element. Turkey (S. Anatolia, rare) and Lebanon. In Turkey: **C6** Hatay: Kirikhan, *Mouterde*; Daphne (Defne) nr Antioch (Antakya) *Louis* (type of *C. pseudo-gaillardotii*) (P-photo!); Kahramanmaraş: near Kahramanmaraş, 12.07.1865, *Hausknecht* 1320 (G!).

C. creticum subsp. *creticum* is common in Aegean and Marmara regions in west Turkey. Characteristic features of the species are the leaves which are white or grey and hairy on the lower surface, ultimate lobes longer than the laterals, rounded phyllaries apices (except for spines).

The specimens of *C. creticum* subsp. *gaillardotii* collected from Kahramanmaraş and Hatay provinces were examined in herbarium G. This taxon is related to the *C. subinermis*. Despite extensive field studies conducted in localities mentioned above, no individuals were found in the nature. The distribution area of this taxon is restricted by agricultural lands and settlements. The wetlands (e.g. Gavur and Amik Lakes) water is drained and dried. So, the distribution of this taxon is very rare or it is extinct in the land, in Turkey.

12. *C. elodes* M. Bieb., Fl. Taur.-Caucas. 3: 555 (1819) (Figures 32, 33).

Syn. = *Cirsium desertorum* Fisch. ex Link, Enum. Hort. Berol. Alt. 2: 300 (1822). *Type:* in Sibiria (holo. LE! iso. LE!)= *C. setigerum* Ledeb., Icon. Pl. (Ledebour) 1: 9 (1829). *Type:* in humidis subsalsis deserti prope Loktewsk (hb.?) Icon.Pl. 1: tab 35 (1829)!

Type: “*Cnicus palustris* varietas” Circa opp. Schamachy lectus, 1796, Bieberstein s.n. (holo. LE! K-photo!).

Perennial with fusiform roots. Stems 25-100 cm, erect, unbranched, paniculate above, furrowed, continuously winged, wings broad (5-20 mm), subentire or sinuate lobed, bearing 1-12 mm yellowish spines, glabrous or sparsely pilose. Basal leaves obovate to oblong-elliptic, 5-10 × 1.4-2 cm petiole 4.5-8 cm, entire to sinuate, attenuate into petiole, dentate, pectinate-spined, apical spines 2-4 × 0.1-0.2 mm, weak, glabrous; median cauline leaves oblong-lanceolate, rarely linear-lanceolate, 6-15 × 1-5 cm, subsessile, acute, subentire dentate-serrate, shallowly sinuate-lobed, spinulose-ciliate, apical spines 3-8 × 0.1-0.3 mm, weak, coriaceous, bright green, glabrous. Involucral leaves absent. Capitula 1-4-headed corymb on each branch, peduncle 1-5 cm (rarely

subsessile). Involucre hemispherical to broadly campanulate, 13-20 × 15-20 mm; phyllaries 7-9 seriate, adpressed, glabrous or sparsely arachnoid above; outer narrowly ovate, 4-5 × 1-1.5 mm, apical spine 1-1.5 × 0.1-0.3 mm, erecto-patent; median oblong to lanceolate, 7-11 × 1.5-2 mm, apical spine 0.5-1 × 0.1 mm, patent or recurved; inner linear, 10-12 × 0.8-1.4 mm, apical spine 0.5 × 0.1 mm, flexuous. Corolla purple, 20-22 mm, unequally 5 lobed to 1/4-1/3, shorter lobes 5-6 mm, longer lobes 6-7 mm; style 7-8 mm, 2-3 mm exerted, shortly bilobed; filaments 1.5-2 mm, hairy, anthers 6-7 mm, shortly acuminate. Achenes oblong, 3-3.5 × 1.2-1.5 mm, stramineous, umbo 0.1-0.3 mm. Pappus 15-17 mm. *Fl. & Fr.* 7-9.

Habitat: Meadows, streamside, calcereous rocks, steppe, weakly saline marshes and depressions drying up in summer; 900-2000 m.

Distribution: Iran-Turanian element. Turkey (Inner & N.E. Anatolia), Coastal Romania and Bulgaria, Georgia, Armenia, Azerbaijan, N.W. & W. Iran, S. & C. Russia eastwards to C. Asia. In Turkey: **A4** Kırıkkale: Koçubaba town, Ağcuva place, 1250-1300 m, streamside, 28.07.1994, *A.A.Dönmez* 4116, (HUB!). **A8** Erzurum: Ezurum marshy grounds, 1780 m, 15.07.2005, *M.Koyuncu*, 15535 (AEF!). **B4** Konya: Cihanbeyli, Boluk Lake, 1010 m, 04.08.1960, *Khan et al.* 427 (E!, K!); Between Konya and Kayacık, in dryish saline marshes, 06.09.1947, *Davis* 14739 (G!); Niğde: Tuz Lake, N.W. of Aksaray, 900-950 m, 01.09.1957, *Davis* 32828 & *Hadge* (K!, ANK!, BM!). **B5** Kayseri: Yahyalı, Sultansazlığı, 1071 m, marshy grounds, 25.09.1993, *Ş.Yıldırım* 16455 & *M.Öztekin* (HUB!); *ibid.*, Eşmekaya, 950 m, 22.09.1993, *M.Vural*, 7067 (GAZI!); *ibid.*, 900 m, 03.07.1982, *H. Sümbül*, 1466 (HUB!). **B6** Sivas: Between Ulaş and Kovalı, 1350 m, meadows, 18.07.2009, *Yıldız* 17001 & *A.Akpulat* (hb. Yıldız)! **B7** Erzincan: plain E. of Erzincan, 1250 m, 30.07.1957, *Davis* 31849 & *Hadge* (ANK!, K!,

BM!). **B8** Erzurum: Erzurum dryish marshy grounds, 1830 m, 39°57'000"N, 041°16'000"E, 13.08.2006, *Yıldız* 16280 & *Dirmenci* (hb. Yıldız!); ibid., 20.09.2007, 39°58'000"N, 041°18'000"E, *Yıldız* 16742 & *Arabacı* (hb. Yıldız!) **B9** Ağrı: Diyadin, 1800 m, *Hewitt* 256 (E!); Doğubeyazıt, 50 km a Basergan occidentem versus, 2000 m, 05.09.1957, *Rechinger* 14954 (W!); Van: Between Başkale and Hakkari, c. 50 km from Başkale, 1800, 30.08.1956, *McNeill* 688 (E!). **B10** Ağrı: inter Bazirgan et Doğubayazıt, 17.08.1967, *Rechinger*, 37653 (W!). **C3** Konya: Beyşehir, S. side of Beyşehir Lake, 1150 m, 06.08.2006 *Yıldız* 16454a & *Dirmenci* (hb. Yıldız!) **C5** Konya: Ereğli, Mount Aydos, Berendi pass, valley bottom, calcareous rocks, steppe, 1650 m, 28.06.1976, *S.Erik* 1727a (HUB!).

C. elodes is a distinct plant with no allies. Differs from relatives by its glabrous stems and leaves, glabrous or sparsely arachnoid above phyllaries that narrowed to thin small spine.

13. C. pseudocreticum (P.H. Davis & Parris) Yıldız, Dirmenci & Arabacı, in Güner & et al., *Türk. Bitkileri List.*, 144 (2012) (Figures 33, 34).

Syn. (Basionym): ≡ *C. alatum* subsp. *pseudocreticum* P.H. Davis & Parris, *Notes Roy. Bot. Gard. Edinburgh* 33(3): 414 (1975).

Type: [Turkey B3/4 Eskişehir] Polatlı to Sivrihisar, 1250 m, chalk steppe, near roadside, 06.08.1966, *Davis* 47761 (holo. E!, iso. K! W!).

Perennial herb, with fusiform roots. Stem 25-100 cm, 6-6.5 mm diameter, erect or ascending, branched from middle to the apex, furrowed, continuously winged, wings narrow (2-5 mm), sinuate lobed, bearing 5-15 mm yellowish spines, glabrous or with sparsely crisped multicellular hairs. Basal leaves lanceolate, 7-15 × 2-3.5 cm petiole 2-3

cm, pinnatifid to 1/2, lateral lobes 6-8-paired, unequally partite, narrowly ovate to lanceolate, 0.2-1 × 0.2-0.5 cm, acute, apical spines 5-9 × 0.3-0.5 mm, marginals 3-4.5 mm, glabrous or with sparsely crisped multicellular hairs; cauline leaves linear-lanceolate, 3-10 × 1-4 cm, sessile, pinnatisect to 3/4, lateral lobes 4-6-paired, unequally trifid, triangular to lanceolate, 1-2 × 0.2-0.5 cm, acute, apical spine 10-15 × 0.4-0.6 mm, marginals 1.5-4 mm, glabrous or sparsely hairy. Involucral leaves reduced to spines. Capitula 14-20 × 7-14 mm, subsessile, many headed corymb or sub-racemose on elongate branches. Involucre cylindrical to broadly campanulate, 8-15 × 7-14 mm. Phyllaries 7-9 seriate, sparsely arachnoid; outer ovate to oblong, 3-5.5 × 1-2 mm, apical spine 0.5-3 × 0.1-0.2 mm, erecto-patent; median oblong, 6-10 × 1.8-2 mm, apical spine 0.2-0.6 × 0.1 mm, erecto-patent; inner linear, 8-13.5 × 1.5-2 mm, apical spine 0.2-0.6 × 0.1 mm, erect. Corolla purplish, 12-15 × 0.5-1 mm, longer lobes 4-5 mm, shorter lobes 3.5-4 mm. Achenes obovate, 2.8-3.5 × 1-1.5 mm, brownish, umbo 0.1-0.4 mm. Pappus 8-12 mm. *Fl.* 7-8, *Fr.* 7-9.

Habitat: Chalk and salt steppes, dryish saline meadows, gypsum hills, marshy grounds; 670-1300 m.

Distribution: Irano-Turanian element. Endemic to Turkey. In Turkey: **A4** Çankırı: Gypshugel beim, Bahnübergang, 10 km südlich von Çankırı, 670 m, 11.07.1964, *Huber-Morath*, 17317 (G!); Çankırı: On road to Ankara, 20. km, 800 m, 06.08.2007, *Yıldız* 16578 & *Dirmenci* (hb. Yıldız)! **B3** Between Bolvadin and Çay, 4 km to Çay, 930 m, 03.08.1980, *N. Özhatay* (ISTE 45609!); 10 km W. of Afyon, dryish saline meadows, 1300 m, 10.08.2006, *Yıldız* 16222 & *Dirmenci* (hb. Yıldız)! Afyon beltway, 1300 m, 31.08.2006, *Yıldız* 16413 & *Dirmenci* (hb. Yıldız)! Between Afyon and Konya, 10. km, 1300 m, *Yıldız* 16414 & *Dirmenci* (hb. Yıldız)! **B4** Between Eskişehir and

Ankara, 96 km W. of Ankara, 800 m, 10.07.1982, *Nydegger* 17048 (G!); Polatlı, on road to Sivrihisar, around Sakarya Bridge, 850 m, 27.07.1974, *A. Baytop* (ISTE 30620!); 26 km from Gölbaşı to Şereflikoçhisar, steppe, 1000 m, 39°33'000"N, 032°51'500"E, *Yıldız* 16617 & *Arabacı* (hb. Yıldız)! Şereflikoçhisar, N. of Karahamzalı village, 950 m, dryish meadows, 39°13'700"N, 033°01'800"E, 23.08.2007, *Yıldız* 16620 & *Arabacı* (hb. Yıldız)! Cihanbeyli, Bolluk Lake, 900 m, salt steppe, 38°30'200"N, 032°53'100"E, 23.08.2007, *Yıldız* 16622 & *Arabacı* (hb. Yıldız)! **B5** Yozgat, Akdağmadeni, 1200 m, 39°41'510"N, 035°24'000"E, 11.08.2006, *Yıldız* 16228 & *Dirmenci* (hb. Yıldız)! **C4** Konya: Kayacık, in dryish saline marshes, 06.09.1947, *Davis* 14739 (G!).

C. pseudocreticum is close to *C. elodes* but differs from by its narrow stem wings, lanceolate and short petiolate basal leaves with long (5-9 × 0.3-0.5 mm) apical spines, many headed corymb or sub-racemose on elongate branches and sessile capitula. *C. pseudocreticum* is distinguished from *C. creticum* by its coriaceous green leaves, terminal lobe of cauline leaves that similar to lateral lobes (not 5-10 times the length of lateral lobes) and conspicuous apical vitta (not obscure or absent).

14. C. subinerme Fisch. & C.A.Mey., Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6: 55 (1849) (Figures 35-36).

Syn.: = *C. elodes* M. Bieb. var. *indivisum* DC., Prodr. 6: 642 (1838). *Syntype*: ad scaturigines altiorum montium prov. Karabagh, Szowitz, Turkey B8 Erzurum: prope Erzeroum, Aucher, 338. (Type not seen) = *C. elodes* M. Bieb. var. *floccosum* Freyn, Bull. Herb. Boiss. 3: 468 (1895). *Syntypes*: Gümüşhane: in pratis uliginosis ad Stadodopi supra Atra , 14.07.1894, *Sintenis* 6273 (LD-photo!), in tractu Karagöldagh in

vale Böyükdere (Büyükdere) supra Artabir, 08.08.1894, *Sintenis* 7168 (B! BM! G! K! LD-photo! WU! JE-photo! BR-photo!)

Type: Armenia: prope Dilischan (Dilizhan), 08.1845, *Frick* 687 (holo. LE! iso. LE!).

Rhizomatous perennial. Stem 60-180 (-250) cm, 4-8 mm diameter, broadly and continuously winged, sparsely paniculate above, arachnoid. Basal leaves ovate-oblong, 10.5-13 × 2.2-3.2 cm, petiole 6-8 cm, entire to sinuate, apical spines 2.5-3.5 × 0.1-0.2 mm, marginals 1-2 mm; cauline leaves ovate to oblong-elliptic, 10-18 × 2.8-6 cm, semi-amplexicaul, entire to sinuate lobed to less than 1/2-way, apical spines 1-4(-6) × 0.2-0.3 mm, marginals 0.5-1.2 mm, densely arachnoid-tomentose (sometimes floccose) to sparsely arachnoid (hairs unicellular, slender). Involucral leaves shorter than involucre. Capitula clustered near top of stem or branches, 18-23 × 9-13 mm, subsessile or shortly pedunculate to 2-6 mm. Involucre obconic to hemispherical, 10-16 × 9-13 mm. Phyllaries 6-8-seriate, ± arachnoid; outer ovate 2.5-5 × 0.8-1.6 mm, apical spine 0.4-0.8(-1.5) × 0.1-0.2 mm, erect; median ovate-oblong, 6-8.5 × 1.5-1.6 mm, apical spine 0.1-0.5 × 0.1 mm, erect; inner oblong 9-12.5 × 0.8-1.5 mm, apical spine 0.2-0.5 × 0.1 mm, recurved. Corollas 14-17 mm, purplish-pink, longer lobes 4.5-5.5 mm, shorter lobes 3.5-4.5 mm. Achenes oblanceolate to narrowly obovate, 3-3.5 × 1-1.3 mm, pale brown, umbo 0.1-0.4 mm. Pappus 12-14 mm. *Fl.* 6-9, *Fr.* 7-9.

Habitat: Water meadows, wetlands, streamsides and springs; 900-2500 m.

Distribution: Iran-Turanian element. Turkey (Inner Anatolia and Anti-Taurus), Georgia, Armenia, Azerbaijan, N.W. & W. Iran, N. Iraq. In Turkey: **A4 Kastamonu:** Paphlagonia vilajet Kastanbuli, Tossia, 23.07.1892, *Sintenis* 4783 (G!) d. Ilgaz, nr Topali, 1300 m, *Huber-Morath* 12866. **A5 Akdağ,** Değirmendere plataeu, wetlands,

1600 m, 18.10.1977, *K.Alpınar* (ISTE 38673!). **A6** Sivas: Suşehri, Değirmentaş village, c, 900 m, 19.07.2007, *Yıldız* 16489 (hb. Yıldız)! Şerefiye, between Çamlıkale and Köseadağı, 1600-1700 m, 11.08.1984, *Yıldız* 4829b & *N.Çelik* (hb. Yıldız)! Doğanşar, between Kurucaova pass and Maraş çukuru, 1450-1600 m, 26.08.2009, *Yıldız* 17110 & *N.Çelik* (hb. Yıldız)! **A8** Gümüşhane: Szandchakh Gumuschkhane, Artabir, Büyükdere, 08.07.1894, *Sintenis* 7168 (B!, BM!, G!, K!) (type of var. *floccosum* Freyn & Sintenis); Erzurum: Kop Mountain pass, 2440 m, 09.08.1962, *Furse* 3753 (K!); 8-10 km from Aşkale to Bayburt, 1650 m, 04.04.2008, *Yıldız* 16849 (hb. Yıldız)! İspir, Pazaryeri junction, 1900 m, 27.06.2008, *Yıldız* 16813 & *Arabacı* (hb. Yıldız)! **A9** Kars: 5-6 km from Sarıkamış to Erzurum, 2000 m, 08.08.2008, *Yıldız* 16897 & *Dirmenci* (hb. Yıldız)! 45 km S. of Posof, 1900 m, 04.08.1982, *Sorger & Buchner* 82-105-3 (W!); Ardahan: 5 km from Damal to Posof, 2100 m, 17.08.2006, *Yıldız* 16332 & *Dirmenci* (hb. Yıldız)! Damal, place of Atatürk silhouette, 2200 m, 06.08.2008, *Yıldız* 16887! **B5** Yozgat: Akdağmadeni, 1 km W. of Oluközü village, meadowland, 1200 m, 39°41'000"N, 035°46'000"E, 11.08.2006, *Yıldız* 16231 & *Dirmenci* (hb. Yıldız)! **B6** Sivas: Gürün, Gökpınar, see-ufer, 1600 m, 07.09.1977, *Sorger* 77-101-9 (W!); Gemerek, Sızır, road to Yeni çubuk, 2-5 km, end of the road, 1300-1600 m, 18.07.1980, *T.Ekim & A.Düzenli* 4330 (ANK!); Gürün, Gökpınari 1350 m, water side, 20.07.2009. *Yıldız* 17039 & *A.Akpulat* (hb. Yıldız)! Kahramanmaraş: Çardak, Berit Mountain, in valley above ericek, 1500 m, by stream, 27.07.1952, *Davis* 20386, *Dodds & R.Çetik* (BM!, E!, K!, W!); Binboğa Mountain on Işık Mountain, 1900 m, 16.07.1952, *Davis* 20092 (E!, K!); Göksun, Taşkesen village, water side, 1500 m, 38°00'750"N, 036°42'800"E 26.08.2007, *Yıldız* 16623 (hb. Yıldız)! **B7** Erzincan: Spikor, goel-dere, ad ripas. 26.07.1890, *Sintenis* 3289 (W!); Tunceli: d. Hozat, foot of Munzur Mountain, 1500 m, 21.07.1957, *Davis*

31461 (BM!, E!, K!). **B8** Erzurum: Erzurum, *Aucher* 3389 (K!); 29 km from Horasan to Eleşkirt, 1850 m, 12.08.2007, *Dirmenci* 3542 & *Arabacı* (hb. Yıldız)! Bingöl: 2 km from Karlıova to Bingöl, ca. 2000 m, 39°16'800"N, 040°59'850"E 11.08.2007, *Dirmenci* 3518 & *Arabacı* (hb. Yıldız)! 43 km from Karlıova to Çat, North of Çirişli village, ca. 2000 m, 39 31 736 N 040 59 850 *Dirmenci* 3523 & *Arabacı* (hb. Yıldız)! **B9** Van: Çatak, Kavuşşahap Mountain, 22.07.1954, *Davis* 22997 & *O.Polunin* (ANK!, BM!, K!); 60 km N. of Van, 1650 m, 05.07.1982, *Sorger* 82-41-5 & *Buchner* (W!); 5 km S. of Başkale, 2300 m, 02.08.1952, *Davis* 23789 (BM!, K!). **C6** Kahramanmaraş: Göksun, W. of Taşkesen village, water side, 1500 m, 26.08.2007, *Yıldız* 16623 (hb. Yıldız)! **C9** Van: 78 km S. of Gürpınar, Bachrand, 2500 m, 23.08.1984, *Sorger* 84-81-1 (W!). **C10** Van/Hakkari: c. 50 km from Başkale to Hakkari, 1800 m, *McNeill* 688 (E! K!).

C. subinerme is allied to *C. elodes* but differs from by its rhizomatous roots, arachnoid stem and densely arachnoid-tomentose to sparsely arachnoid leaves, ovate-oblong basal and ovate to oblong-elliptic cauline leaves with long apical spines (Figures 10C-D). Varieties are given in previous studies but, we prefer to combine them under the species level.

15. *C. leucopsis* DC., Prodr. 6: 644 (1838) (Figures 36-37).

Type: [Turkey **A2(A)** Bursa] in Olympe Bithynico (Uludağ), *Aucher* 3377 (holo. G-DC! iso. K! P-photo!).

Perennial. Stem 60-100 cm, 4-4.5 mm diameter, continuously sinuate-winged, short to very long spiny, laxly paniculate above, arachnoid. Basal leaves oblong, 11.5 × 2.5 cm, petiole c. 4 cm, sinuate to pinnatilobate 1/3, lobes 3-4-paired, triangular

to broadly lanceolate, 5-9 × 6-10 mm, acute, apical spines 6.5-8 × 0.2-0.5 mm, marginals 2.5-4.5 mm; cauline leaves oblong, 8-18 × 2-8 cm, semi-amplexicaul, pinnatilobate to 1/3, lobes 4-6-paired, triangular to broadly lanceolate, 7-17.5 × 7-13 mm, acuminate, apical spines 5-12.5 × 0.3-0.6 mm, marginals 2-4 mm, densely arachnoid-tomentose on both surfaces or sometimes sparsely arachnoid. Involucral leaves absent. Capitula 15-24 × 8-11 mm, clustered on stem apex or lateral branches, subtended by reduced, long-spined (but not involucre) leaves, subsessile or pedunculate to 2-7 mm. Involucres hemispherical to obconic, 14-18 mm, weakly arachnoid. Phyllaries 6-7-seriate; outer ovate, 3.5-4.5 × 1-1.5 mm, apical spine 0.6-1.2 mm, erect; median ovate-oblong, 7-9 × 1-1.5(-2.5) mm, apical spine 0.2-0.8 × 0.1 mm, erect; inner linear, rarely narrowly, 10.5-14 × 0.6-1 mm, apical spine 0.2-0.5 × 0.1 mm, erect. Corollas 15-21 × 0.5-0.8 mm, purplish, longer lobes 5-6.5 mm, shorter lobes 4-5 mm. Achenes oblanceolate, 3-3.5 × 0.9-1.2 mm, stramineous to brownish, umbo 0.1-0.4. Pappus 10-17 mm. *Fl. & Fr.* 7-9.

Habitat: Beside mountain streams, alpine meadows, waterside in *Pinus nigra* forest; 1350-2000 m.

Distribution: Mediterranean element. Endemic to Turkey (Outer & C. Anatolia). **A2(A)** Bursa: Olympus Bithynus (Uludağ), 07.1842, *Boissier* 1846 (K!); Bursa: Ad margines rivulorum in olympi Bithynus (Uludağ), 08.1874, *Pichler* 122 (K!, W!, WU!); *ibid.*, regione alpina, 10.10.1867, *Ball* s.n. (K!); *ibid.*, *Aucher-Eloy* 3377 (K!); *ibid.*, alpine meadows, 1900-2000 m. 09.09.2009. *B.Yıldız* 17123 (hb. Yıldız)! **B2** Kütahya: Gediz, Murat Mountain, Kesiksöğüt plataeu, 1650 m, 02.08.1980, *N. Özhatay* (ISTE 45594!). **B3** Konya: Sultan Mountain above Akşehir, N. of pass, 1600 m, *Huber-Morath* 8655 (G!); Akşehir-Örkenez, 1600 m, 10.07.1978, *Sorger* 78-21-4 (W!). **C3**

Isparta: Kurucaova, Dedegöl Mountain, waterside in *Pinus nigra* forest, 1350 m, 37°37'600"N, 031°24'400"E, 06.09.2006, *Yıldız* 16457 & *Dirmenci* (hb. Yıldız)!
Dedegöl Mountain, 1400 m, *Sorger* 68-43-17 (W!) (very sparsely arachnoid). C4
Konya: Akşehir, Sultan Mountain, environs of pass, 1650 m, 06.09.2006, *Yıldız* 16459 & *Dirmenci* (hb. Yıldız)!

C. leucopsis is related to *C. subinerme* but differs from its cauline leaves pinnatifid to 1/3 (not entire to sinuate lobed to less than 1/2-way) and long apical spines 5-12.5 mm (not 1-4(-6) mm). A collection from Bozdağ (Balansa 276 G! W!) was examined and similar specimens were collecting during the field studies in the same locality. These species are similar to *C. leucopsis* with their leaves and capitulae characteristics but differ by their long apical spines to 15-20 mm.

16. *C. libanoticum* DC., Prodr. 6: 647 (1838) (Figures 38, 39).

Perennial. Stem 100-150 cm, 8-9 mm diameter, continuously or interruptedly sinuate-winged, lobes triangular, produced into stout 3-10 mm spines, ± widely branched above into a stiff panicle, sparsely arachnoid. Basal leaves oblong to oblanceolate, 10-15 × 1-4.5, petiole 5-10 cm, entire, sinuate to pinnatilobate, lobes 5-6-paired, triangular, apical spine 4-7 × 0.1-0.2 mm, marginals 1-3 mm, glabrous above, glabrous to sparsely arachnoid below; cauline leaves oblong, 6-30 × 2.5-5 cm, pinnatifid to 1/2-3/4, lateral lobes 3-6-paired, triangular to lanceolate, 9-22 × 9-22 mm, acuminate, apical spines 2-12 × 0.1-0.5 mm, marginals 1-3 mm, glabrous, or ± arachnoid below. Involucral leaves absent. Capitula solitary or clustered on branch tips, 12-18 × 7-15 mm, pedunculate or sessile, often subtended by reduced leaves or spines. Involucres hemispherical or subconical, 7-20 × 7-15 mm, Phyllaries 6-9-seriate; outer ovate, 3-

5 × 1.2-1.6 mm, apical spine 0.8-3 × 0.1-0.2 mm, erecto-patent; median oblong-lanceolate, 5.5-8.5 × 1-1.5 mm, apical spine 0.4-3 × 0.1-0.2 mm, erecto-patent; inner oblong 8-11 × 0.6-1.2 mm, apical spine 0.2-0.8 × 0.1-0.2 mm, erect. Corollas 15-19 × 0.4-0.6 mm, purple (rarely white), longer lobes 5-5.5 mm, shorter lobes 4-5 mm. Achenes obovate or oblong, 2.4-3.5 × 0.8-1.4 mm, pale brown or stramineous, umbo 0.1-0.4 mm. Pappus 11-14 mm. *Fl. & Fr.* 7-9.

1. Leaves glabrous or sparsely arachnoid below with multicellular hairs; involucre hemispherical; median phyllaries with 1-3 mm apical spines

2. Stem wings long, 10-12 mm, spines 10-20 mm;subsp. **libanoticum**

2. Stem wings short, 6-10 mm; spines 6-10 mm;subsp. **lycaonicum**

1. Leaves weakly arachnoid to tomentose below with slender unicellular hairs; involucre hemispherical-obconical (less rounded at base than subsp. lycaonicum and subsp. libanoticum); median phyllaries with 0.4-1 mm apical spines.....subsp. **arachnoideum**

subsp. **libanoticum**

Type: In monte Libano legit cl. 1837, *Aucher-Eloy* 3382 (holo. G-BOISS.! iso. P-photo!).

Habitat: Mountain, plateau, waterside; 1600-2000 m.

Distribution: Mediterranean element. Turkey (S. Anatolia), Syria, Lebanon. In Turkey: **C2** Muğla: Sandras Mountain at Köklüce, *Davis* 13627 (E!, K!); Sandras Mountain, Köklüce, 22.07.1947, *Davis* 13621 (E!, K!); Between Belyayla and Dağev, 1800 m, *Davis* 13799 (E!). Köyceğiz, Sandras Mountain, plateau, 1700 m, waterside, 12.08.2008, *Yıldız* 16902 (hb. Yıldız)! *ibid.*, Ağlak village, Köklüce place, 1600-1700 m, 12.08.2008, *Yıldız* 16900 (hb. Yıldız)!

subsp. **lycaonicum** (Boiss. & Heldr.) P.H. Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33(3): 430 (1975).

Syn.: ≡ *C. lycaonicum* Boiss. & Heldr., in Boissier Diagn. Pl. Orient. 1(10): 90 (1849). ≡ *C. libanoticum* var. *lycaonicum* (Boiss. & Heldr.) Boiss., Fl. Orient. 3: 549 (1875).

Type: [Turkey C3 Isparta] inter lapides deciduos in locis irriguis regionis superioris montis Anemas Lycaoniae, 1830 m, 08.1845, *Heldreich* (Holo. P-photo!)

Habitat : By mountain streams and springs, roadsides, watersides, field margins,; (750-)1000-2000 m.

Distribution: East Mediterranean element. Endemic to Turkey (S. & S.W. Anatolia). **A2(E)** İstanbul: Kilyos, besides graveyard, roadside, 10.10.1970, *A.Baytop*, (ISTE 18555!). **C2** Denizli: Honaz Mountain, side of Baymanlı stream, 1475 m, 23.09.1972, *E.Tuzlacı* (ISTE 23508!); Köklüce, Belyayla, 1800 m, 06.08.1947, *Davis* 13799 (E!); Antalya: Akdağ, 1300 m, *Sorger* 67-22-65. **C3** Konya: Beyşehir, S. bank of Beyşehir Lake, 1150 m, watersides, 06.09.2006, *B.Yıldız* 16454-b & *T.Dirmenci* (hb. Yıldız)! **C5** Niğde: in the Aladağlar, on Demirkazık, 02.09.1965, *Findlay* 235 (E!); Adana: Karanfil, 2000 m, 10.08.1966, *Bisby* C41 (E!); Ulukışla, Bulgardagh, environs of Biridglek, 1100-1200 m, 21.08.1931, *A.Eig* & *M.Zohary* (E!).

subsp. **arachnoideum** P.H. Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33(3): 419 (1975).

Syn.: = *Cirsium apiculatum* DC in Prodramus 6:642 (1837). *Type*: Iran: in Persia, 1825, Belanger 655 (P-photo!). *C. apiculatum* var. *spinosum* Petr. in Repert. Spec. Nov. Regni Veg. 48 (9): 150 (1940-05-20). *Type*: Iran: Mazanderan: In valle fluvii Talar inter jugum Gaduk et Abbasabad, ca. 2000m, 04.08.1937, *Rechinger* 1963 (holo. W!, iso. JE-

Photo!). *C. kotschyianum* Boiss. in Diagn. Pl. Orient. Ser 1(6): 103 (1845). *Type*: Iran: Circa fontes laterum in sept. Spectantium in monte Kuh-Daena, 13.07.1842, Kotschy 636 (holo. Photo-P, iso FI! K! JE-photo! HAL-photo! S-photo!, C-photo! MO-photo! GOET-photo! M-photo! S-photo!).

Type: [Turkey B6 Maraş] d. Elbistan, Kapidere (Istasyon), 31.07.1952, *Davis* 20424, *Dodds & R.Çetik* (holo. E! iso. BM! K! W!).

Habitat : By streams, in woods, wetlands; 1100-2200 m.

Distribution: Irano-Turanian element. Turkey (S. & E. Anatolia), N. Iraq, Syria (Damascus), W. Iran. In Turkey: **B6** Malatya: d. Doğanşehir, Eskiköy, environs of Kurnoz mezrası, c. 2000 m, *H.Peşmen* 2444 & *M.Şahin* (E!, EGE!); Doğanşehir, Beğreli village, 1200 m, 13.09.2007, *Yıldız* 2607 & *Arabacı* (hb. Yıldız)! Doğanşehir, 2 km from Doğanşehir to Malatya, wetlands, 1100 m, 13.09.2007, *Yıldız* 2606 & *Arabacı* (hb. Yıldız)! **B7** Sivas: 2 km N.E. of Mursal (Yama Mountains), 1650 m, 01.08.1976, *Sorger* 76-12-8 (W!). **C4** Konya: Ermenek, Tekeçatı, 1600 m, 22.07.1977, *M.Vural* 396 (ANK!). **C6** Kahramanmaraş: Elbistan, Kapidere, by stream, 31.07.1951, *Davis* 20424, *Dodds & R.Çetik* (BM!, E!, K!, W!).

This species differs from allies with its indumentum, shape and size of median cauline leaves, involucre, phyllaries apex and vitta.

17. C. cilicicum P.H. Davis & Parris, Notes Roy. Bot. Gard. Edinburgh 33(3): 416 (1975) (Figures 36, 40).

Type: [Turkey C5 İçel] ad inclitas angustias Güllek Boghas in regione montana, 3800 ped., 1853, *Kotschy*. Iter Cilicium in Tauri alpes Bulghar Dag (holo. W! photo E!).

Perennial. Stem 50-100 cm, 8-12 diameter, unwinged except for shortly decurrent leaves bearing a dense terminal c. 5-10-headed corymb 6-10 cm across, with or without solitary capitula on short axillary branches below corymb, glabrous. Basal leaves linear-lanceolate, 15-25 × 4-7 cm, pinnatisect to 1/2, lobes 7-9-paired, triangular, apical spine 10-15 × 0.5-1 mm, marginals 3-7 mm, glabrous; cauline leaves oblong, 8-15 × 4-6 cm, pinnatilobed to 1/2, rounded-amplexicaul, spinose and often shortly decurrent for 0.5-1.5 cm, lateral lobes 4-6-paired, 2-4-fid into triangular to broadly lanceolate lobules, apical spine 10-12 × 0.5-0.8 mm, marginals 4-6 mm, glabrous. Involucral leaves longer than involucre. Capitula 10-15 × 20-25 mm, pedunculate to 1 cm or sessile. Involucre hemispherical, 10-15 × 10-15 mm. Phyllaries 5-7-seriate, horny, minutely papillose, sparsely arachnoid; outer ovate, 5.2-6.5 × 1.8-2 mm, apical spine 0.8-3 × 0.1-0.2 mm, erecto-patent; median ovate-oblong, 8-10 × 1.8-2 mm, apical spine 3-4 × 0.5-0.8 mm, erecto-patent; inner linear 10-12 × 1.5-1.8 mm, apical spine 0.2-0.5 × 0.1-0.2 mm, flexuous. Corollas 16-18 × 0.4-0.6 mm, white or pinkish above, longer lobes 5-5.5 mm, shorter lobes 4-4.5 mm. Achenes 3 mm. Pappus 13-15 mm.

Fl.7.

Habitat: Streambed, waterside; 1000-1500(-2000) m.

Distribution: East Mediterranean element. Endemic to Turkey (S. Anatolia). **C5**
Niğde: Ulukışla, Maden village, Koçak meadow, 1500 m, streambed, 37°27'00"N, 034°38'00"E, 22.07.2008, *Yıldız* 16835, *Dirmenci & Arabacı* (hb. Yıldız)! *ibid.*, between Alihoca and Maden, waterside, 1500 m, 37°27'700"N, 034°39'100"E, 22.07.2008, *Yıldız* 16836, *Dirmenci & Arabacı* (hb. Yıldız)! *ibid.*, *Dirmenci* 3447 & *Akçiçek* (hb. Yıldız)! İçel: Arslanköy, Cocakdere, streambed, ca. 2000 m, July 2013, obs. *Dirmenci*!

C. cilicicum is related to *C. libanoticum* but differs by phyllaries that have long apical spines. There are many intermediate forms between these two species.

Species doubtfully recorded or imperfectly known

C. angustifolium DC., Prodr. (DC.) 6: 648 (1838).

This species was given by Tchihatcheff (1860) as “*elatioribus montium Ponti, 1600-3248 m, C. Koch*”, but no representatives have been observed during the field studies.

C. uliginosum (M. Bieb.) Fisch., Cat. Jard. Gorenki, ed. 2: 35 (1812).

Syn.: \equiv *Cnicus uliginosus* M.Bieb., Fl. Taur.-Caucas. 2: 274 (1808).

Tchihatcheff (1860) cited this species from “[A8 Erzurum] vale Tchabanz [nr. İspir], 1780 m, *C. Koch*”. Despite detailed field studies conducted in this province, no specimen belong to this species was found. *C. pubigerum* var. *glomeratum* has distribution in the locality given above. So, this specimen probably belongs to *C. pubigerum* var. *glomeratum*.

Hybrids

C. × prativagum Petr. Věstn., Tiflissk. Bot. Sada 19: 22 (1911) (Figures 41A-B, 42).

(*Cirsium obvallatum* M.Bieb. × *C. pseudopersonata* Boiss. & Balansa subsp. *kusnezovianum* (Sommier & Levier) Petr.

Type: Adzaria superior: circa stat. “Kanlinskaja” in prato sylvatico, 06.08.1910, G.Woronow 3296 & N.Popow (Herb.?)

Habitat: Under *Populus tremula*, 2400m.

Distribution: **A9** Artvin: Şavsat, 10 km from Pınarlı village to Arsiyan hamlet, 2400 m, 02.09.2008, *Dirmenci 2646 & Akçiçek* (hb. Yıldız).

C. × woronowii Petr., Věstn. Tiflissk. Bot. Sada 19: 19 (1911) (Figures 42, 43A-B).
(*Cirsium hypoleucum* DC × *C. obvallatum* M.Bieb)

Type: Adzaria: supra Otingo, ad rupes, regio sylvatica superior. 17.08.1910, *G.Woronow 3312* (Herb. ?)

Habitat: *Abies* openings, 1800 m.

Distribution: **A9** Artvin: Şavsat, between Sahara and Karaköy, 1800 m, 20.09.2007, *Yıldız 16739 & Arabacı* (hb. Yıldız).



Figure 11. *Cirsium candelabrum* (from Kırklareli province) A- Habit. B- Leaves, C- Capitula.

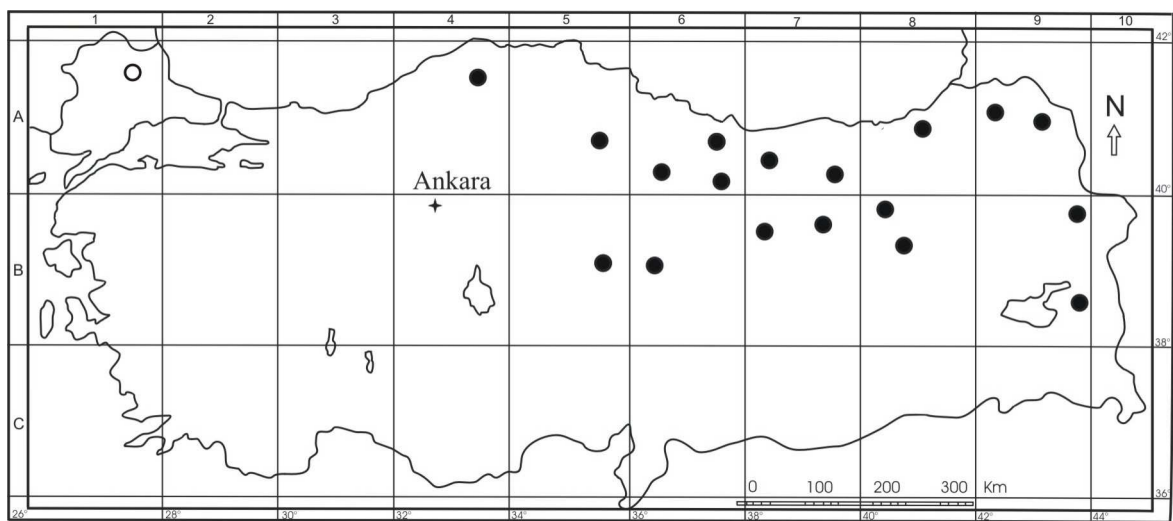


Figure 12. Distribution map of *Cirsium candelabrum* (○) and *C. echinus* (●) in Turkey.



Figure 13. *Cirsium echinus* (from Korhan plateau, Iğdır province) A- Habit. B- Capitula.

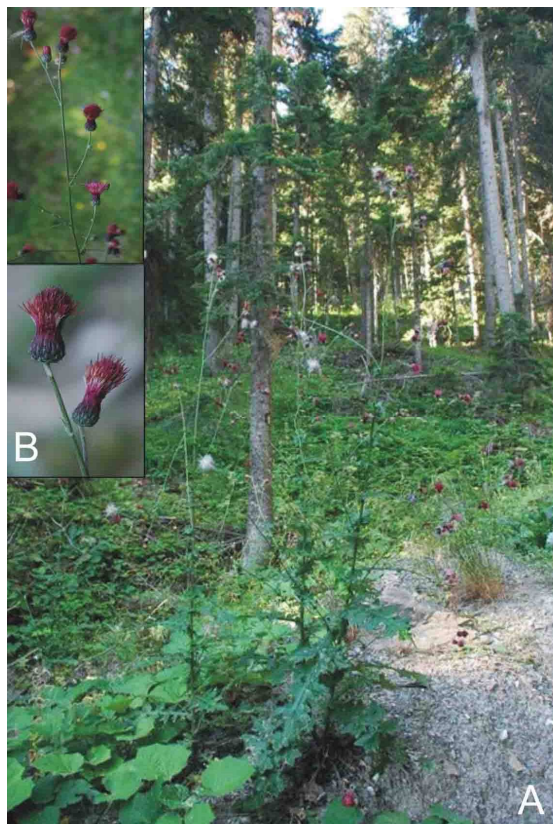


Figure 14. *Cirsium hypoleucum* (from Ilgaz mountain, Kastamonu province) A- Habit. B- Capitula.

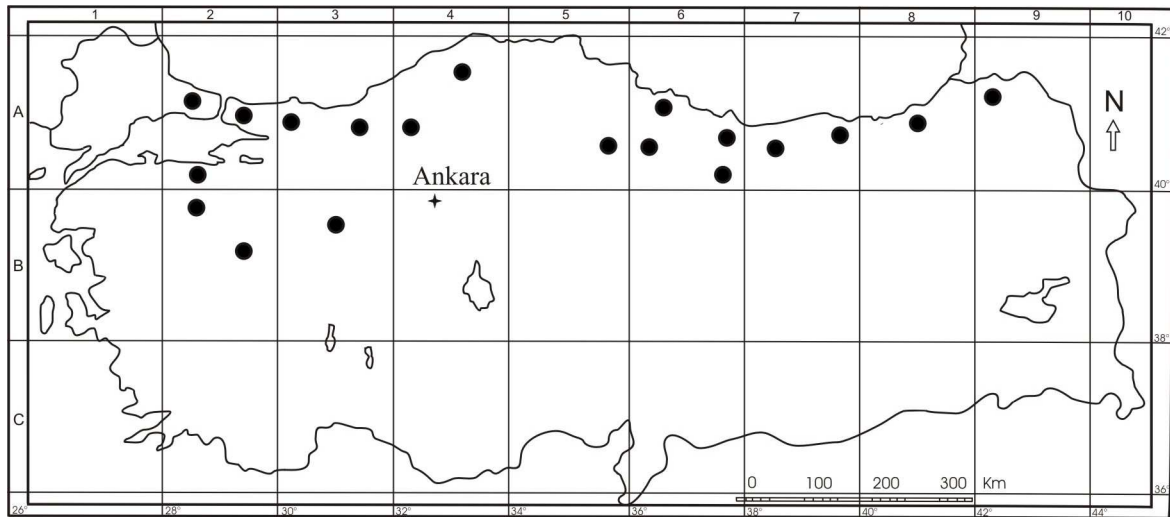


Figure 15. Distribution map of *Cirsium hypoleucum* (●) in Turkey.



Figure 16. *Cirsium pseudopersonata* subsp. *pseudopersonata* (from Rize province) A- Habit. B- Capitula.

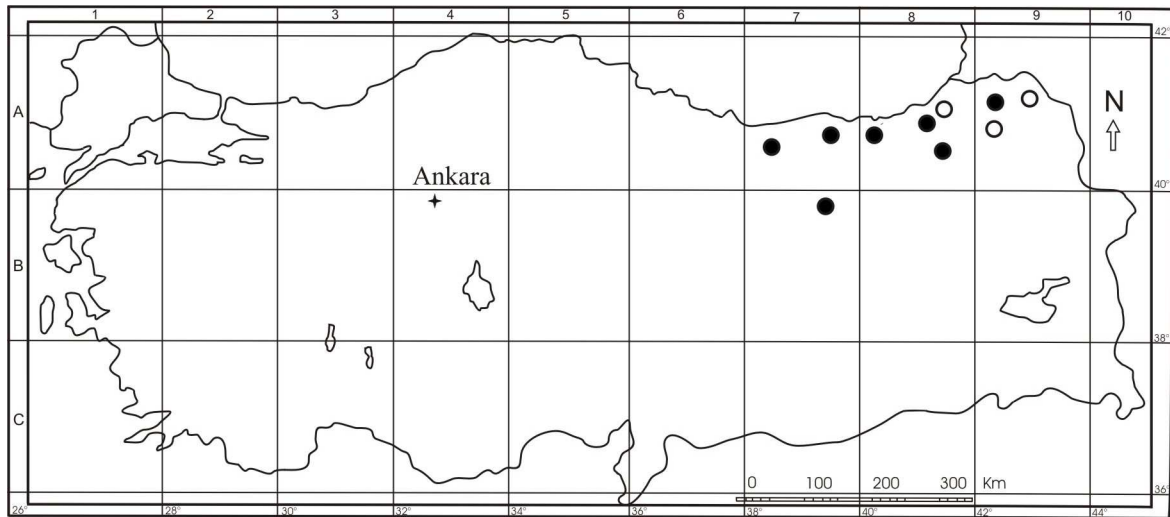


Figure 17. Distribution map of *Cirsium pseudopersonata* subsp. *pseudopersonata* (●) and subsp. *kusnezowianum* (○) in Turkey.

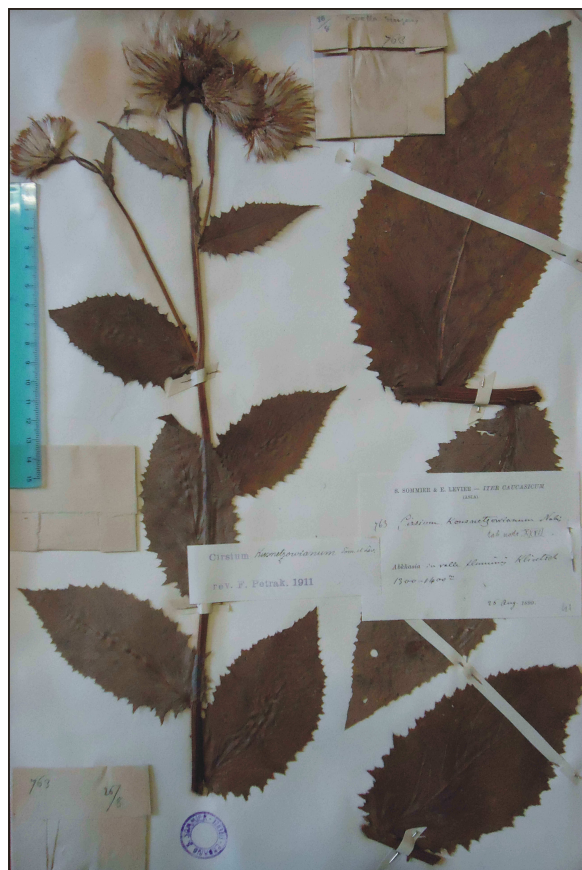


Figure 18. Lectotype of *Cirsium pseudopersonata* subsp. *kusnezowianum* (Sommier & Levier 763, FI).



Figure 19. *Cirsium canum* (from Göksun, Kahramanmaraş province) A- Habit. B- Capitula.

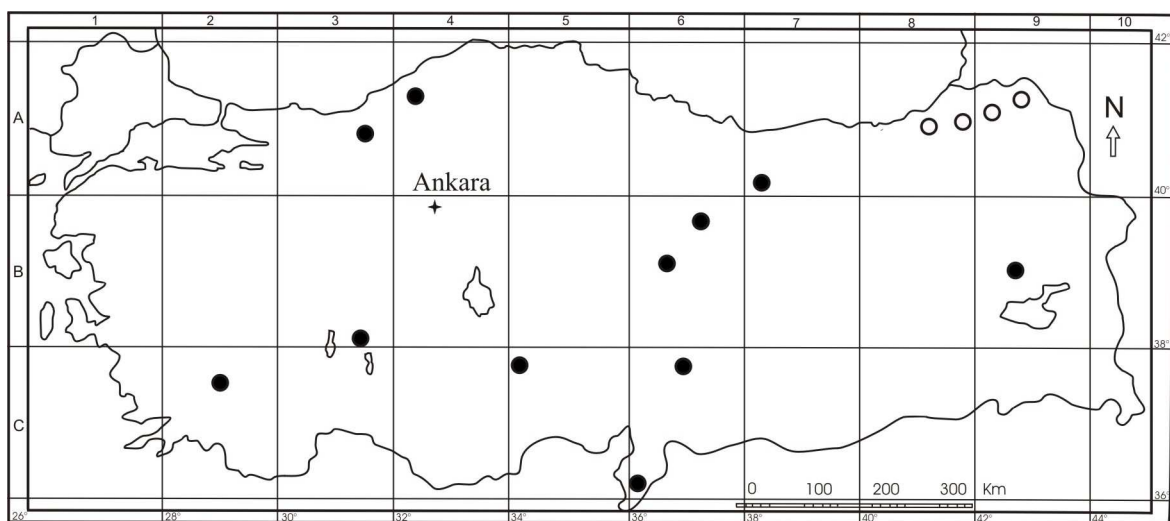


Figure 20. Distribution map of *Cirsium canum* (●) and *C. obvallatum* (○) in Turkey.



Figure 21. Habit of *Cirsium obvallatum* (between Artvin and Ardahan provinces).



Figure 22. Habit of *Cirsium simplex* subsp. *armenum* (from Rize province).

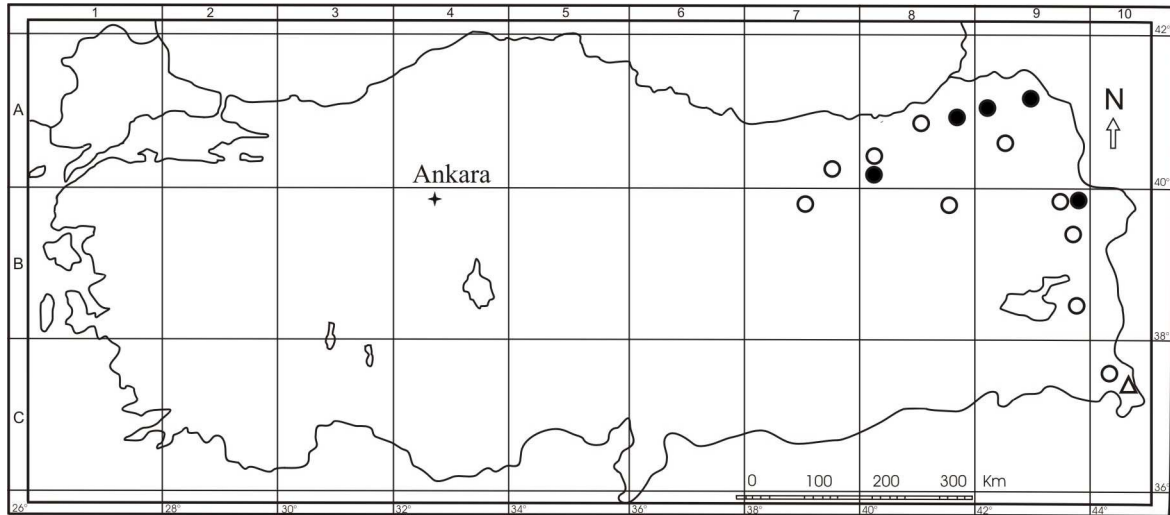


Figure 23. Distribution map of *Cirsium simplex* subsp. *simplex* (●), subsp. *armenum* (○) and subsp. *satdaghense* (Δ) in Turkey.



Figure 24. Habit of *Cirsium rhizocephalum* subsp. *rhizocephalum* (from Erzurum province).

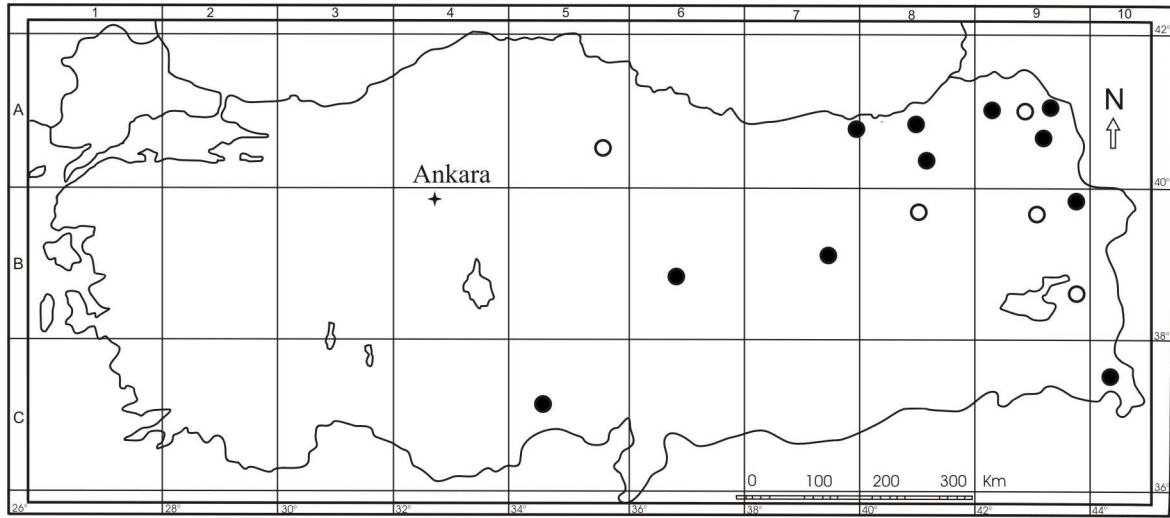


Figure 25. Distribution map of *Cirsium rhizocephalum* subsp. *rhizocephalum* (○) and subsp. *sinuatum* (●) in Turkey.



Figure 26. Habit of *Cirsium frickii* (around Çıldır Lake, Ardahan province).

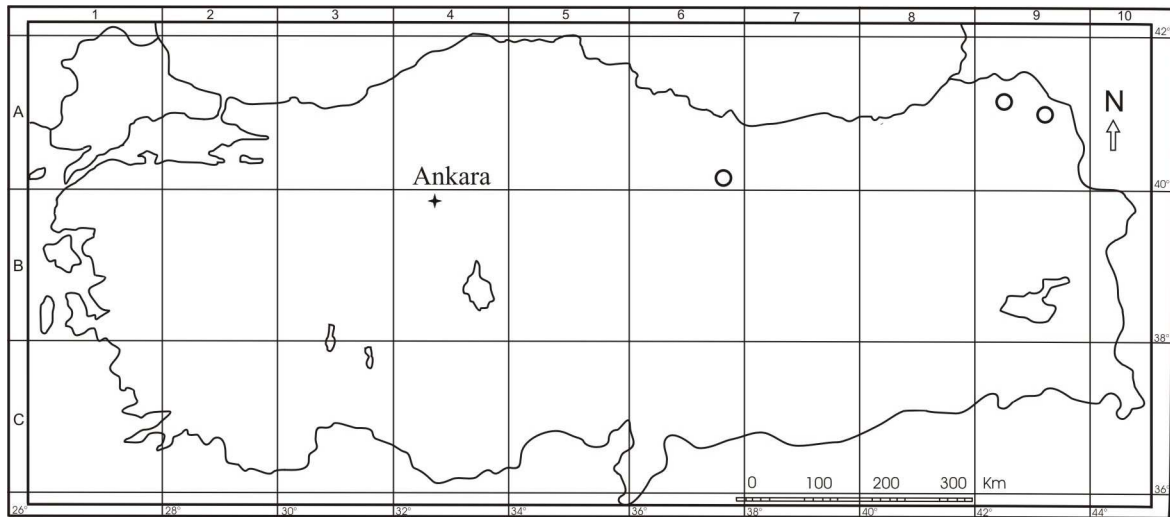


Figure 27. Distribution map of *Cirsiium frickii* (o) in Turkey.

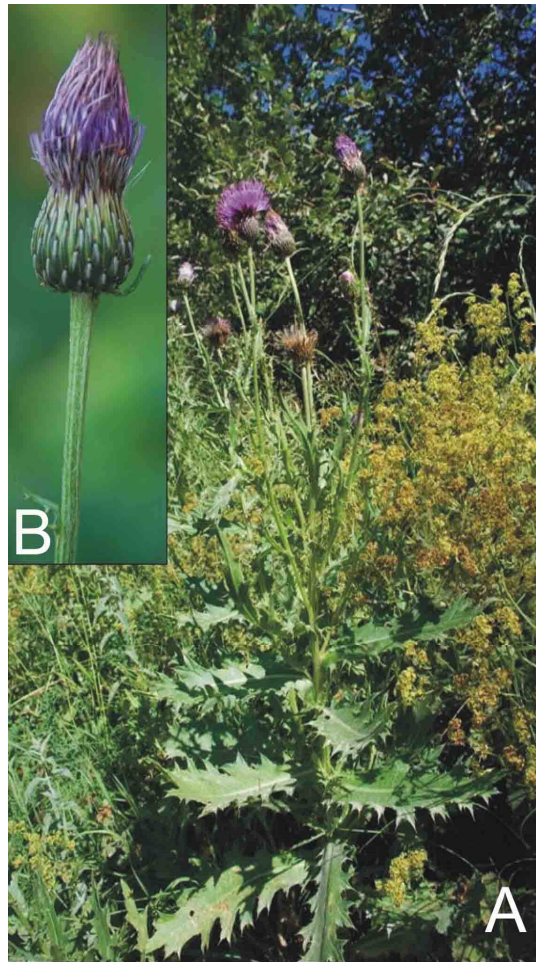


Figure 28. *Cirsiium pubigerum* var. *paphlagonicum* (from Ilgaz mountain, Kastamonu province) A- Habit. B- Capitula.

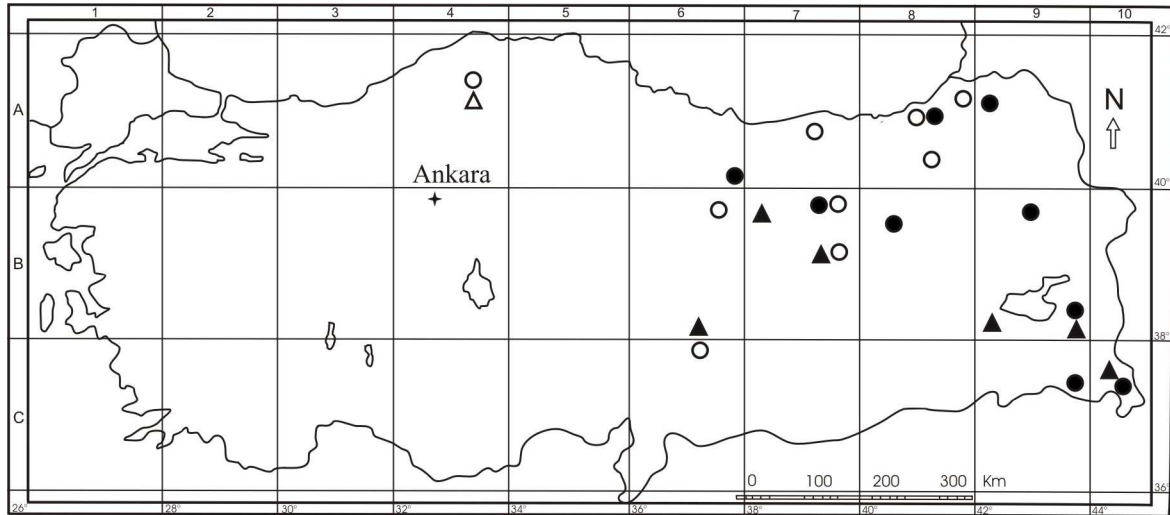


Figure 29. Distribution map of *Cirsium pubigerum* var. *glomeratum* (○), var. *caniforme* (●), var. *paphlagonicum* (Δ) and var. *spinosum* (▲) in Turkey.



Figure 30. *Cirsium creticum* subsp. *creticum* (from Kalkım, Çanakkale province) A- Habit. B- Capitula.

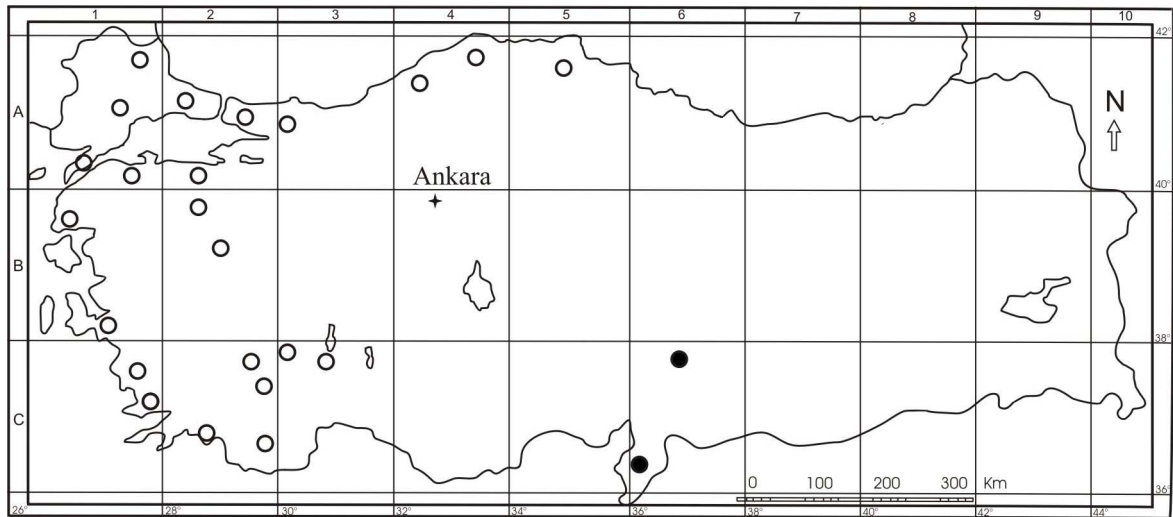


Figure 31. Distribution map of *Cirsium creticum* subsp. *creticum* (○) and subsp. *gaillardotii* (●) in Turkey.



Figure 32. Habit of *Cirsium elodes* (from Erzurum province).

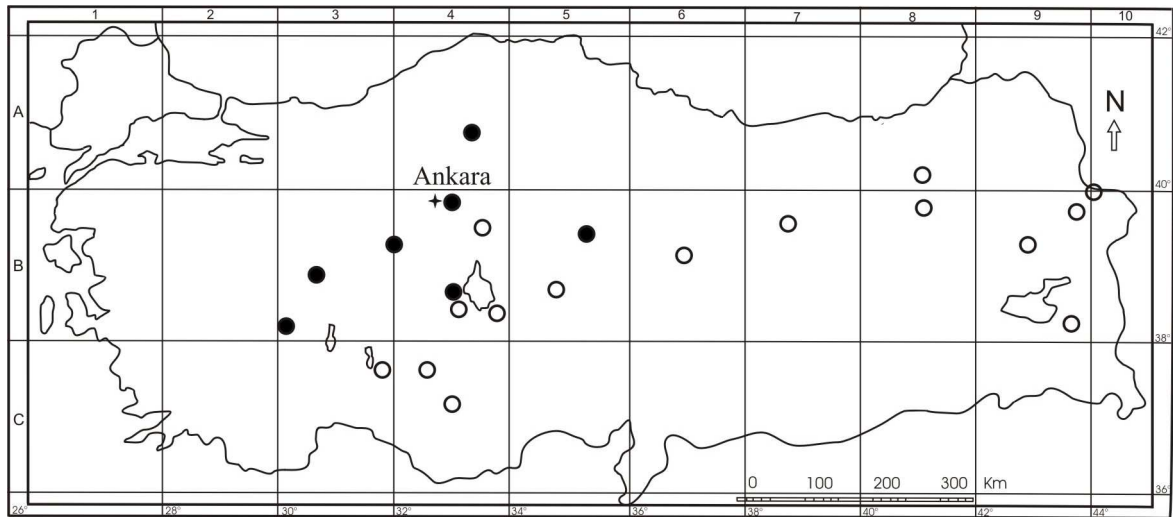


Figure 33. Distribution map of *Cirsium elodes* (○) and *C. pseudocreticum* (●) in Turkey.



Figure 34. Habit of *Cirsium pseudocreticum* (from Sivrihisar, Eskişehir province, type locality).



Figure 35. Habit of *Cirsium subinerme* (from Doğubayazıt, Ağrı province).

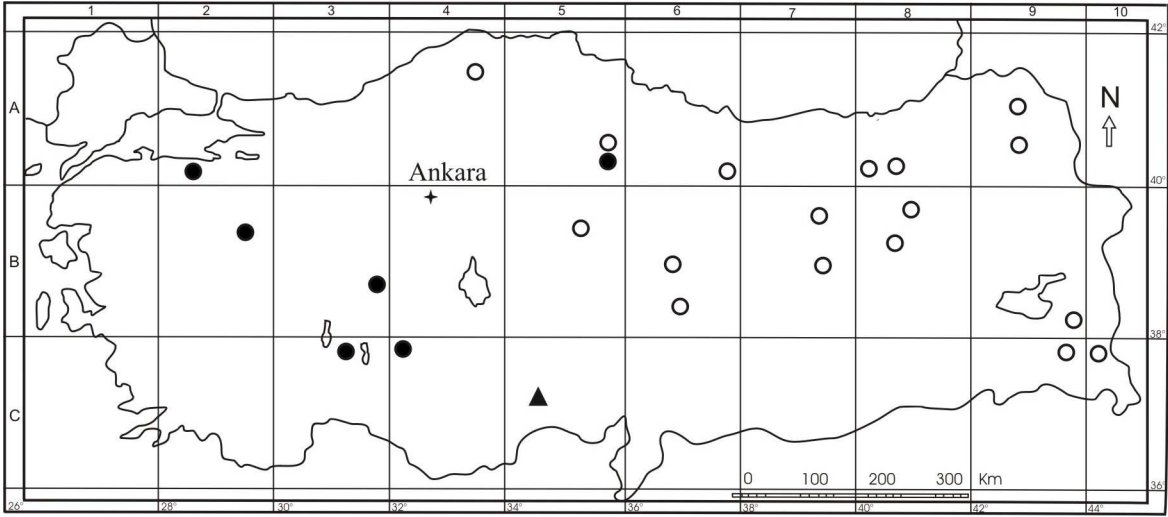


Figure 36. Distribution map of *Cirsium subinerme* (○), *C. leucopsis* (●) and *C. cilicicum* (▲) in Turkey.



Figure 37. *Cirsium leucopsis* (from Beyşehir, Konya province) A- Habit. B- Leaves, C- Capitula.



Figure 38. Habit of *Cirsium libanoticum* subsp. *lycaonicum* (from Hadim, Karaman province).

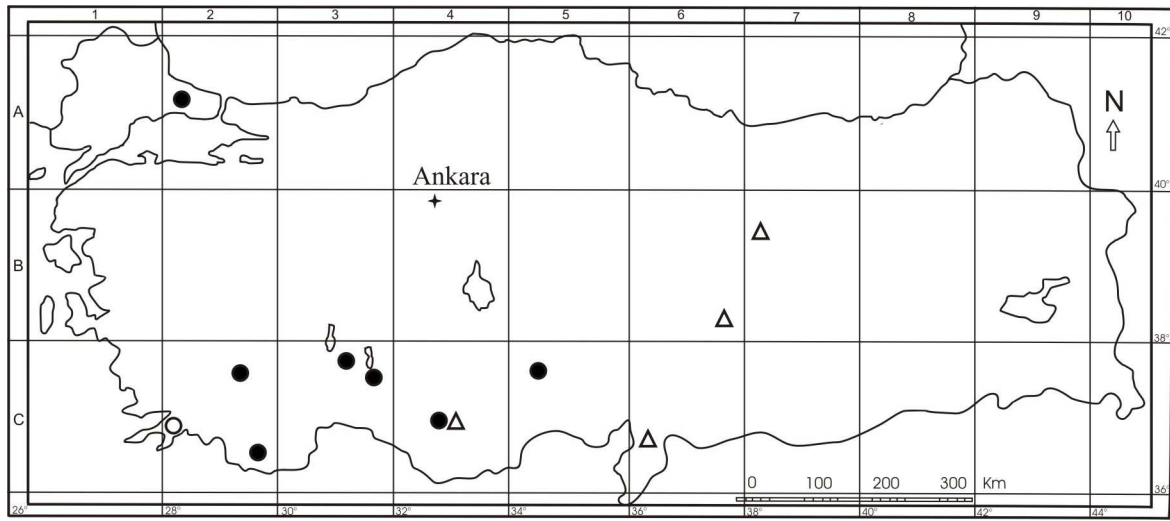


Figure 39. Distribution map of *Cirsium libanoticum* subsp. *libanoticum* (○), subsp. *lycaonicum* (●) and subsp. *arachnoideum* (Δ) in Turkey.



Figure 40. Habit of *Cirsium cilicicum* (from Ulukışla, Niğde province, type locality).



Figure 41. *C. x prativagum* Petr. (from Şavşat, Artvin province) A- Habit. B- Capitula.

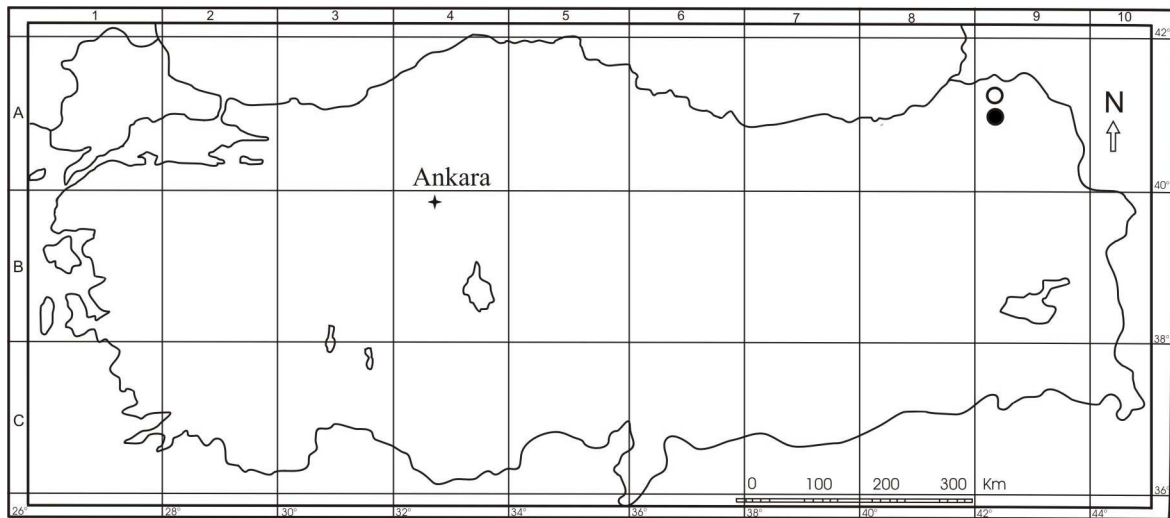


Figure 42. Distribution map of *C. x prativagum* (○) and *C. x woronowii* (●) in Turkey.



Figure 43. *C. x woronowii* Petr. (from Şavşat, Artvin province) A- Habit. B- Capitula.