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IRAJ MEHREGAN & JOACHIM W. KADEREIT

Taxonomic revision of *Cousinia* sect. *Cynaroideae (Asteraceae, Cardueae)*

Abstract

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Cousinia sect. *Cynaroideae,* the largest section of *Cousinia* with 110 published species, is characterized by a chromosome number of $2n = 24$, ± decurrent to spiny-winged leaves and appendaged phyllaries. It is distributed in Lebanon, Syria, Turkey, the Caucasus, Iraq, Iran, Turkmenistan, Afghanistan and Pakistan, with centres of specific diversity mainly in W and NW Iran, N Iraq and SE Turkey. A comprehensive treatment of *C.* sect. *Cynaroideae,* mainly based on the study of c. 2250 herbarium specimens, resulted in a reduction of taxa number to somewhat more than one third, precisely to 31 species plus eight subspecies. *C. lordeganensis* is described as a species new to science and the new nomenclatural combinations *C. calocephala* subsp. *astrocephala* and subsp. *behboudiana, C. kotschyi* subsp. *khansarica, C. odontolepis* subsp. *kurdica, C. pergamacea* subsp. *sardashtensis, C. sagittata* subsp. *iranica*, *C. silyboides* subsp. *disfulensis* and subsp. *zardkuhensis* are validated. All species and subspecies treated are typified. Identification keys, descriptions, illustrations and distribution maps for each species are given.

Additional key words: *Compositae, Cynareae,* SW Asia, taxonomy, morphology, chorology

Introduction

The genus *Cousinia* of the tribe *Cardueae* (= *Cynareae)* is in its current circumscription one of the larger genera in the *Asteraceae,* with approximately 600-700 species (Susanna & Garcia-Jacas 2006: 136) distributed in central and western Asia.

According to current understanding, *Cousinia* sect. *Cynaroideae* Bunge is the largest section of the genus with 110 published species (Fig. 1). These are distributed in Iran (75 species; Rechinger 1972, 1979; Attar & Ghahreman 2006, 2007), Iraq (24 species; Huber-Morath in Townsend & Guest, Flora of Iraq, unpublished draft at Kew herbarium), the Caucasus (10 species; Tamanian 1999), Turkey (eight species; Huber-Morath in Davis 1975), Turkmenistan (two species; Tscherneva 1962), Afghanistan and Pakistan (one species; Rechinger 1972; Stewart in

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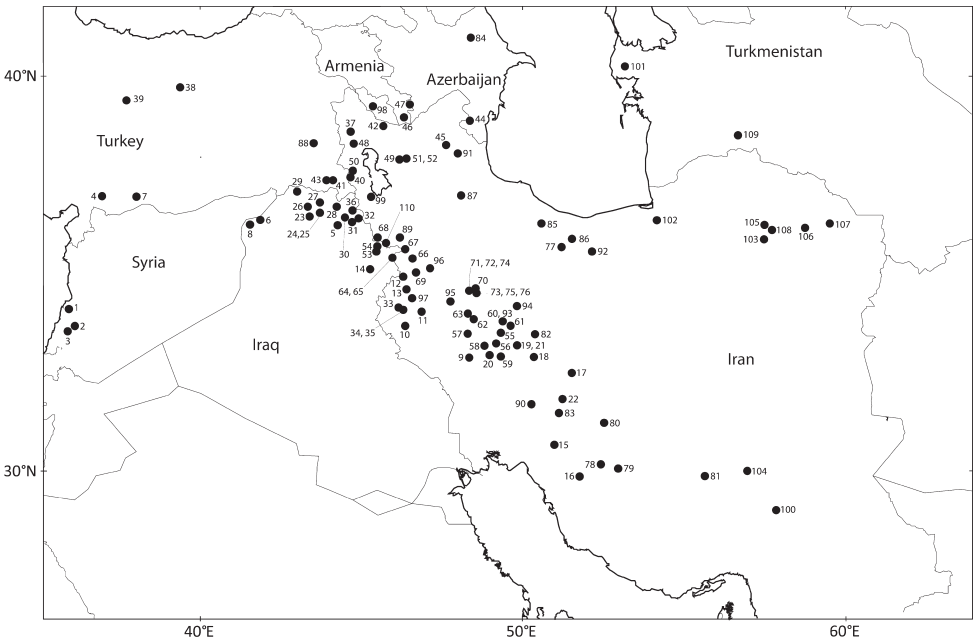

Fig. 1. Type localities of published species of *Cousinia* sect. *Cynaroideae* (each number indicates one species); 1. *C. libanotica;* 2. *C. hermonis;* 3. *C. dayi;* 4. *C. aintabensis;* 5. *C. arbelensis;* 6. *C. handelii;* 7. *C. birecikensis;* 8. *C. sinjarensis;* 9. *C. disfulensis;* 10. *C. jacobsii;* 11. *C. kermanshahensis;* 12. *C. inflata;* 13. *C. anoplophylla;* 14. *C. kopi-karadaghensis;* 15. *C. barbeyi;* 16. *C. mozaffariani;* 17. *C. silyboides;* 18. *C. lactiflora;* 19. *C. kivar;* 20. *C. shulabadensis;* 21. *C. aligudarzensis;* 22. *C. zardkuhensis;* 23. *C. odontolepis;* 24. *C. cymbolepis;* 25. *C. schultziana;* 26. *C. baueri;* 27. *C. leatherdalei;* 28. *C. mazu-shirinensis;* 29. *C. acanthophysa;* 30. *C. kurdica;* 31. *C. carduchorum;* 32. *C. qandilica;* 33. *C. noeana;* 34. *C. kirrindica;* 35. *C. mobayenii;* 36. *C. algurdina;* 37. *C. canescens;* 38. *C. onopordon;* 39. *C. eriocephala;* 40. *C. zagrica;* 41. *C. satdaghensis;* 42. *C. qaradaghensis;* 43. *C. hakkarica;* 44. *C. macrocephala;* 45. *C. gigantolepis;* 46. *C. gabrieljanae;* 47. *C. takhtajanii;* 48. *C. grandis;* 49. *C. wettsteiniana;* 50. *C. grantii;* 51. *C. gilliatii;* 52. *C. shebliensis;* 53. *C. macrolepis;* 54. *C. gigantosphaera;* 55. *C. sagittata;* 56. *C. rhombiformis;* 57. *C. phyllocephala;* 58. *C. koieana;* 59. *C. khorramabadensis;* 60. *C. iranica;* 61. *C. straussii;* 62. *C. chlorosphaera;* 63. *C. hamadanensis;* 64. *C. pergamacea;* 65. *C. wheeler-hainesii;* 66. *C. fursei;* 67. *C. millefontana;* 68. *C. sardashtensis;* 69. *C. concinna;* 70. *C. araneosa;* 71. *C. kornhuberi;* 72. *C. elwendensis;* 73. *C. ecbatanensis;* 74. *C. medorum;* 75. *C. pichleriana;* 76. *C. parsana;* 77. *C. keredjensis;* 78. *C. kotschyi;* 79. *C. farsistanica;* 80. *C. perspolitanus;* 81. *C. pariziana;* 82. *C. khansarica;* 83. *C. lordeganensis;* 84. *C. cynaroides;* 85. *C. calocephala;* 86. *C. squarrosa;* 87. *C. adnata;* 88. *C. vanensis;* 89. *C. stroterolepis;* 90. *C. sefidiana;* 91. *C. sabalanica;* 92. *C. behboudiana;* 93. *C. astrocephala;* 94. *C. nana;* 95. *C. lurorum;* 96. *C. sanandajensis;* 97. *C. dalahuensis;* 98. *C. purpurea;* 99. *C. bobekii;* 100. *C. sarzehensis;* 101. *C. onopordioides;* 102. *C. albicaulis;* 103. *C. grandiceps;* 104. *C. bornmülleri;* 105. *C. sabzevarensis;* 106. *C. verbascifolia;* 107. *C. monocephala;* 108. *C. lyrata;* 109. *C. caesia;* 110. *C. caroli-henrici*.

Nasir & Ali 1972) and Lebanon and Syria (three species; Post 1933). No monographic treatment of *C.* sect. *Cynaroideae* exists and none of the above regional accounts covers all species or the entire distribution area of the section. However, Flora Iranica (Rechinger 1972, 1979) covers the main centres of specific diversity of the section.

Rechinger's (1972, 1979) treatment in Flora Iranica was mainly based on material deposited in European herbaria, his large own collections from the area and some material from two major Iranian herbaria, TARI and IRAN (Rechinger 1972). Large numbers of new collections from Iran were made after 1979, but also since 1979, exchange between Iranian herbaria and herbaria elsewhere has been seriously limited. In consequence, the thousands of herbarium specimens col-

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lected by the staff of TARI and IRAN were not available to scientists outside Iran, and newly described species of *Cousinia* sect. *Cynaroideae* often were based mainly on this new material plus material from TUH (University of Tehran, Iran) without considering other collections.

Taxonomic history of *Cousinia* sect. *Cynaroideae*

Before the end of the 18th century only little material later referred to *Cousinia* was available. The genus *Cousinia* was first described by Cassini (1827). In a first attempt to subdivide the genus, Bunge (1865) grouped its rapidly grown number of species into 23 sections based on characters such as habit, texture of the receptacular bristles and capitulum and flower morphology. *C.* sect. *Cynaroideae* as currently known includes three former sections originally introduced by Bunge. These are (1) *C.* sect. *Macrocephalae* Bunge with smooth receptacular bristles and the only member *C. macrocephala* C. A. Mey., (2) the likewise monotypic *C.* sect. *Grandis* Bunge with rough receptacular bristles, containing *C. grandis* C. A. Mey., and (3) *C.* sect. *Cynaroideae* with rough receptacular bristles containing 18 species by Bunge (1865). *C. cynaroides* (M. Bieb.) C. A. Mey., originally published as *Carthamus cynaroides* M. Bieb. (Bieberstein 1800), provides the type of *C.* sect. *Cynaroideae*. Bunge (1865), followed by Boissier (1875), placed *C. libanotica* DC. along with five more species in *C.* sect. *Alpinae* Bunge. Based on our results, *C. libanotica* should be transferred to *C.* sect. *Cynaroideae* and is therefore treated here.

Cousinia macrocephala was transferred to *C.* sect. *Cynaroideae* by Boissier (1875), who accepted 28 species in this section. Winkler (1892, 1897) did not accept Bunge's (1865) concept of the section. Instead, he distributed its known members among four sections based on the morphology of the phyllaries. These were (1) *C.* sect. *Constrictae* C. Winkl., including *C. kotschyi* Boiss. and *C. hermonis* Boiss. plus seven other species today classified outside *C.* sect. *Cynaroideae,* (2) *C.* sect. *Appendiculatae* C. Winkl. with 26 species, three of which do not belong to *C.* sect. *Cynaroideae,* (3) *C.* sect. *Foliaceae* C. Winkl. with five species, one of which is now classified in *C.* sect. *Scariosae* Rech. f., and (4) *C.* sect. *Odontocarpae* C. Winkl. including *C. libanotica* and *C. dayi* Post plus 29 other species that have been classified in sections other than *C.* sect. *Cynaroideae*.

The most comprehensive treatment of *Cousinia* sect. *Cynaroideae* is that by Rechinger (1972, 1979). He used characters such as habit, leaf and capitulum morphology to delimitate the section. Rechinger's (1972, 1979) concept of *C.* sect. *Cynaroideae* has been accepted by the major recent regional Floras and publications (Huber-Morath in Davis 1975; Huber-Morath in Townsend & Guest, Flora of Iraq, unpublished draft at Kew herbarium; Tamanian 1999; Attar & Ghahreman 2006).

Monophyly of *Cousinia* sect. *Cynaroideae*

Cousinia as part of the "*Arctium-Cousinia* complex" consists of three subgenera (Tscherneva 1988), i.e., *C.* subg. *Cousinia*, subg. *Cynaroides* Tscherneva and subg. *Hypacanthodes* Tscherneva. *C.* sect. *Cynaroideae* belongs to *C.* subg. *Cousinia* (*Cousinia* s.str.). Several recent studies (Susanna & al. 2003, 2006; Ghaffari & al. 2006; López-Vinyallonga & al. in press) have shown a clear subdivision of the monophyletic "*Arctium-Cousinia* complex" into an arctioid group with *Arctium* L., *C.* subg. *Cynaroides* and subg. *Hypacanthodes, Hypacanthium* Juz., *Schmalhausenia* C. Winkl., and a cousinioid group with only *C.* subg. *Cousinia,* supported by chromosome number, pollen and style morphology. *Cousinia* s.str. as currently understood consists of species with the sweeping hairs scattered on the stylar branches (instead of being arranged in a ring; Susanna & al. 2003), oblong and smooth pollen grains of the '*Cousinia* type' (Susanna & al. 2003) and diverse diploid chromosome numbers ($2n = 2x = 18, 20, 22, 24, 26$; Ghaffari & al. 2006).

In a molecular phylogenetic analysis of 138 species of the "*Arctium-Cousinia* complex" using ITS and *rpS4-trnT-trnL* sequences, very little resolution was obtained for the species of *C.* subg. *Cousinia*. However, all three species of *C.* sect. *Cynaroideae* included in the analysis (*C.*

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araneosa DC., *C. macrocephala, C. purpurea* C. A. Mey.) formed a monophyletic clade with very high posterior probability in a Bayesian analysis of the ITS sequences (López-Vinyallonga & al. in press). In a Bayesian analysis of an enlarged ITS dataset of 216 species, the nine species of *C.* sect. *Cynaroideae* included still formed a monophyletic clade but with clearly lower posterior probability (*C. araneosa, C. canescens* DC., *C. hermonis, C. macrocephala, C. onopordioides* Ledeb., *C. pergamacea* Boiss. & Hausskn., *C. purpurea, C. takhtajanii* Tamanian, *C. zardkuhensis* Attar & Ghahreman; Mehregan & Kadereit 2009 [in press]).

The species of *Cousinia* sect. *Cynaroideae* have capitula with very characteristic phyllaries; they are usually enlarged from an appressed, constricted base into a ± large appendage (appendiculate). The species of *C.* sect. *Cynaroideae* also have uniformly herbaceous to leathery, usually spiny lobed leaves that are ± decurrent and form spiny-winged stems. Moreover, the species are distributed continuously in a relatively large area from Lebanon to Afganistan and Pakistan with centres of species diversity in NE Turkey, N Iraq and W and NW Iran.

We here regard the combination of molecular, morphological and distributional data as evidence for the monophyly of the group. Considering the size of *Cousinia,* however, the possibility of future inclusion or exclusion of species can not be ruled out.

Geographical distribution, biology, chromosome numbers

Cousinia sect. *Cynaroideae* is distributed in SW Asia (Lebanon, Syria, Turkey, Iraq, Caucasus, Iran, Turkmenistan, Afganistan and Pakistan), and most of its species are centred in W Iran and N Iraq. The zonal vegetation of this area, which is part of the Zagros-Makran mountain arch ranging from the Diyala river near the Iraqi-Turkish border to Makran in SE Iran, is "Kurdo-Zagrosian steppe-forest" according to the classification by Zohary (1973). It consists mainly of deciduous, broad-leaved trees or shrubs with a dense cover, dominated by *Quercus* spp. and *Pistacia* spp., or of steppe vegetation. The area has a semi-arid and temperate climate. Annual precipitation ranges from 400-800 mm and mostly falls in winter and spring. Winters are severe and temperatures often fall to -25 °C, while summers are extremely dry (Frey & Probst 1986).

In the northern parts of the Zagros-Makran mountain range, lower altitudes (400-500 m) host communities dominated by, e.g., *Astragalus* spp. and *Salvia* spp., while at higher altitudes from 700-800 m to c. 1700 m forests or forest remnants of *Quercus brantii* and/or *Q. boissieri* occur. Above the timberline (1900-2000 m) a relatively broad zone of sub-alpine vegetation is found. Further south in the mountain range, the forest floor vegetation becomes impoverished and a rich steppe flora develops among the trees. Forest remnants consist primarily of *Q. persica* and, up to an elevation of 2400 m, xerophilous forest of *Quercus* spp., *Crataegus* spp., *Amygdalus* spp., *Celtis* sp. and *Pyrus* spp. predominates. Below 1400 m, the vegetation is steppic, with shrubs predominating (Zohary 1973).

Little is known about pollination in the section. We observed different beetles, including species of the genus *Larinus (Coleoptera, Curculionidae),* which feed and lay eggs on most species of *Cousinia* sect. *Cynaroideae*. It is unknown whether they also act as pollinators. As regards fruit dispersal, capitula remain closed and attached to the plants after maturity, and the entire plants are dispersed by wind as tumbleweeds or by exozoochory, a phenomenon common in part of *Cousinia* (Susanna & al. 2003).

Only seven of the species recognized here have been reported to be involved in hybridisation (Rechinger 1972). These are: *Cousinia chlorosphaera* Bornm., *C. araneosa* Bornm., *C. inflata* Boiss. & Hausskn., *C. algurdina* Rech. f., *C. odontolepis* DC., *C. macrolepis* Boiss. & Hausskn. and *C. sagittata* C. Winkl. & Strauss. This number, however, may well not be accurate at all because of the difficulties of deciding whether intermediate forms indeed are hybrids or part of the variation of taxonomically poorly understood groups.

In the 14 species of the section examined for chromosome number, invariably $2n = 24$ chromosomes were found (Ghaffari & al. 2000).

We here present a revision of all species of *Cousinia* sect. *Cynaroideae* known to us.

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Material and methods

This revision is based on the study of c. 2250 herbarium sheets from ANK, B, BM, E, G, GAZI, IRAN, JE, K, LD, M, P, TARI, TUH, W and WU (abbreviations according to Holmgren & Holmgren 1998-). In addition, 50 specimens from W Iran collected by the first author and deposited in MJG were examined. Measurements were made on the herbarium material. In some areas of W, NW, N, NE and C Iran, field work was carried out.

Distribution maps were created using Adobe® Illustrator® CS2 software (Adobe Systems Incorporated, California, USA).

Results and discussion

Cousinia Cass. in Cuvier, Dict. Sci. Nat. 47: 503. 1827
Type: *Cousinia carduiformis* Cass. in Cuvier, Dict. Sci. Nat. 47: 504. 1827 [= *Cousinia orientalis* (Adams) K. Koch in Linnaea 24: 386. 1851 ≡ *Carduus orientalis* Adams in Beitr. Naturk. 1: 63. 1805].
= *Auchera* DC., Prodr. 6: 557. 1838.
= *Lipskyella* Juz. in Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 323. 1936.
= *Tiarocarpus* Rech. f. in Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 108: 3. 1971.

Note. – Cassini (1827) established the generic name *Cousinia* based on his newly described *C. carduiformis,* this name thus being the generic type of *Cousinia.* In the protologue of that species he indicated the previously published *Carduus orientalis* as a possible synonym, which, however, does not make Cassini's binomial illegitimate (see Code, Art. 52.2, Note 1, McNeil & al. 2006). The synonymy has been confirmed later by Koch (1851), so that the correct name of the species is *C. orientalis*.

Suffruticose or suffrutescent, monocarpic, perennial, biennial or rarely annual, spiny or rarely non-spiny herbs. *Leaves* often leathery and spiny, rarely herbaceous and/or non-spiny, dentate, lobed, pinnatifid to pinnatipartite or rarely entire, decurrent or not deccurent. *Capitula* homogamous, discoid. *Involucre* infundibuliform, cylindrical to globose; phyllaries pluriseriate, rigid, imbricate, with or without an appendage; appendage usually ending in a prickle or spine. Receptacle densely covered with rough and/or smooth bristles. *Flowers* hermaphrodite, white, yellow or pink to purple; anther appendages fringed. *Stigma* and upper part of style covered with scattered short hairs. *Achenes* glabrous, very variable in form and size, compressed or winged, round or truncate at apex. *Bristles of pappus* scabrous, free, caducous.

Cousinia sect. ***Cynaroideae*** Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 47. 1865 ≡ *C.* sect. *Appendiculatae* C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 264. 1892, nom. illeg. – Type: *C. cynaroides* (M. Bieb.) C. A. Mey.
= *C.* sect. *Macrocephalae* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 41. 1865. – Type: *C. macrocephala* C. A. Mey.
= *C.* sect. *Grandis* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 47. 1865 ≡ *C.* sect. *Foliaceae* C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 279. 1892, nom. illeg. – Type: *C. grandis* C. A. Mey.

Notes. – (1) Although the ending *"-oideae"* is used for names at the rank of subfamily (Code, Art. 61.1, McNeill & al. 2006), the sectional epithet *"Cynaroideae"* as published by Bunge (1865) has to be retained because Art. 19.6 only concerns suprageneric taxa and the epithet does not contradict Art. 21.2, so that Art. 32.7 and 60 do not apply. Therefore, correction to *"Cynaroides"* by Attar & Ghahreman (2006) is invalid; also the resulting epithet would be illegitimate as a later homonym of *Cousinia* subg. *Cynaroides* Tscherneva (1988) (Art. 21.1, Note 1).

(2) *Cousinia* sect. *Appendiculatae* C. Winkl. and *C.* sect. *Foliaceae* C. Winkl. are illegitimate, as they include the type of *C.* sect. *Cynaroideae* and *C.* sect. *Grandis,* respectively. Since no types

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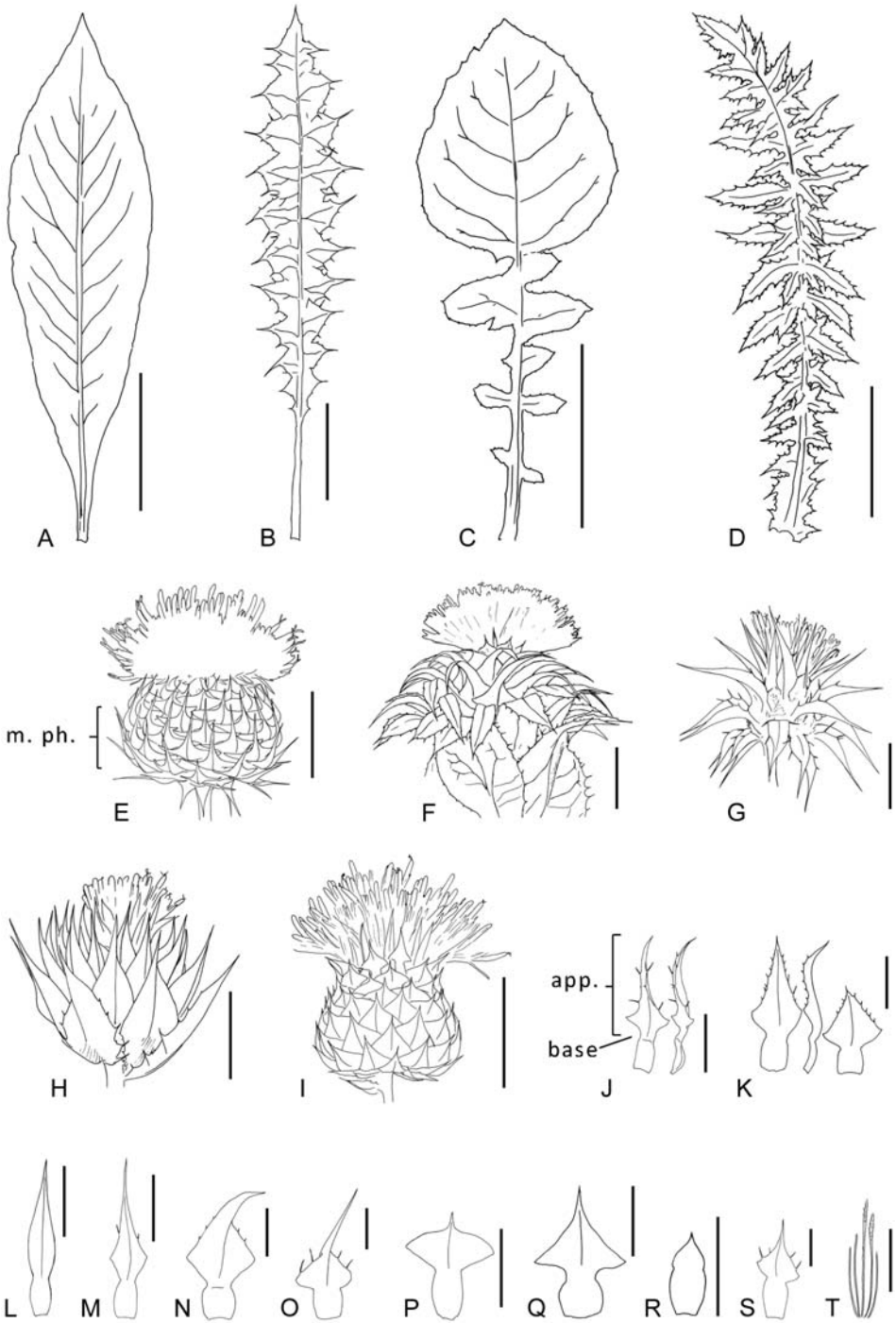

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were designated by Winkler, these names are homotypic synonyms of the respective legitimate names.

Biennials or perennials, monocarpic. *Leaves* herbaceous to leathery, spiny lobed to deeply pinnatisect, ± decurrent to form spiny-winged stems. *Capitula* terminal, 1.5-12 cm broad (including appendages), usually with 50 to more than 200 flowers. *Phyllaries* numerous, usually ± abruptly enlarged from an appressed, constricted base into a ± large appendage. *Anthers* glabrous. *Achenes* obovoid to obpyramidical, 4-8 mm long, often longitudinally ribbed or wrinkled, truncate, emarginate and denticulate or rounded at apex.

Identification of species

Species belonging to *Cousinia* sect. *Cynaroideae* often are morphologically very variable. Accordingly, it is sometimes difficult to identify specimens on the basis of morphological characters alone. Therefore, our key includes in many cases geographical distribution to help the identification. In order to facilitate the use of the key, we here explain and illustrate some of the morphological characters used:

Leaves. – Basal leaves vary from entire to deeply pinnatipartite or lyrate (Fig. 2A-D); they usually differ from rosette leaves formed in the first year of growth, which are usually dentate to lobate. Stem leaves are smaller and less divided towards the apex and vary from dentate to pinnate. In some species upper leaves enclose the involucre at least in its lower part (Fig. 2F).

Capitulum. – Capitulum morphology is most important in identifying species of *Cousinia* sect. *Cynaroideae*. Involucral bracts are multiseriate. The outer sessile or shortly stalked phyllaries usually are gradually transformed into the stalked and appendiculate middle and linear inner phyllaries. Our descriptions and the key are based on the morphology of middle phyllaries (Fig. 2E). The free part of the middle phyllaries is constricted at the base and thus forms a recurved or spreading to upright or imbricate appendage (Fig. 2E-I). Appendages are usually broader than the base of the phyllary and either possess or lack spines or prickles laterally and terminally (Fig. 2J-S). Receptacular bristles are either smooth or rough or a mixture of rough and smooth bristles is present. Our descriptions are based on the texture of the longer bristles (Fig. 2T).

Key to the species of *Cousinia* sect. *Cynaroideae*

1. Phyllaries with appressed and imbricate appendages (at least lower part of appendages; Fig. 2F & I) 2
– Phyllaries with straight, spreading to recurved or inflated-spreading, not imbricate appendages (Fig. 2E, G & H) 13
2. Uppermost leaves usually enclosing the involucre (at least its lower part), appendages recurved at apex (except slightly recurved phyllaries in *C. sagittata* subsp. *iranica* p.p.; Fig. 2F) 3

Fig. 2. Variation of characters in *Cousinia* sect. *Cynaroideae* – A-D: leaves: entire (A, *C. sagittata* p.p.), sinuate-lobate (B, *C. onopordioides*), lyrate (C, *C. verbascifolia*), pinnatisect (D, *C. aintabensis* p.p.) — E-I: capitula: inflated imbricate phyllaries (E, *C. inflata*), appressed and imbricate phyllaries with uppermost leaves enclosing the involucre (F, *C. sagittata* p.p.), spreading-recurved phyllaries (G, *C. cynaroides*), spreading-erect phyllaries (H, *C. grandis*), appressed-imbricate phyllaries (I, *C. pergamacea*) — J-S: middle phyllaries: boat-shaped, lanceolate appendage (J, *C. odontolepis* subsp. *kurdica*), boat-shaped, rhomboid- or sagittate-lanceolate appendage (K, *C. macrolepis*), lanceolate appendage without spines on both sides (L, *C. canescens*), lanceolate appendage with spines on both sides (M, *C. sarzehensis*), rhomboid-lanceolate appendage, recurved at apex (N, *C. sagittata),* deltoid-lanceolate appendage, straight at apex (O, *C. kotschyi* subsp. *khansarica*), flabellate appendage (P, *C. kotschyi* subsp. *khansarica*), deltoid appendage, at least twice as broad as base (Q, *C. pergamacea*), deltoid appendage, as broad as base (R, *C. concinna*), boat-shaped, keeled, deltoid appendages (S, *C. aintabensis*) — T: rough receptacular bristles *(C. aintabensis)*. – Abbreviations: m. ph. = middle phyllaries; app. = appendage; all illustrations by I. Mehregan, 2D simplified from Winkler & Bornmüller (1895: t. 14). – Scale bars: A-D = 5 cm, E-I = 20 mm, J-T = 10 mm.

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– Uppermost leaves not enclosing the involucre, appendages straight to slightly recurved at apex 5
3. Phyllary appendages entire or with appressed tiny spines on both sides (Fig. 2N) (CW Iran, provinces Lorestan and Markazi) . . . . . 16a. ***C. sagittata***
– Not with above combination of characters (N Iraq and neighbouring areas) 4
4. Phyllary appendages deltoid, rhomboid- or sagittate-lanceolate, more than 8 mm broad (Fig. 2K) . . . . . 15. ***C. macrolepis***
– Phyllary appendages narrowly lanceolate, less than 8 mm broad (Fig. 2J) . . . . . 7b. ***C. odontolepis*** subsp. ***kurdica***
5. Phyllary appendages deltoid- or sagittate-lanceolate, incurved, carinate, spiny on both sides (N Iraq/Turkey border area) . . . . . 7a. ***C. odontolepis***
– Not with above combination of characters (Iran and neighbouring areas in Iraq, province Sulaymaniyah) 6
6. Phyllaries glabrous, regularly arranged, usually without spines on both sides (Fig. 2I, Q & R) (except *C. pergamacea* subsp. *sardashtensis* with spines on both sides) (provinces Azarbaijan (southern part), Kordestan, Hamadan and Lorestan in Iran and province Sulaymaniyah in Iraq) 7
– Not with above combination of characters 9
7. Phyllary appendages as broad as to less than twice as broad as their base (Fig. 2R), 3-6 mm broad; corolla rose or purple . . . . . 19. ***C. concinna***
– Phyllary appendages at least twice as broad as their base, usually 6-15 mm broad; corolla yellow, rose or purple 8
8. Phyllary appendages deltoid or deltoid-sagittate (Fig. 2Q); corolla yellow . . . . . 18a. ***C. pergamacea***
– Phyllary appendages broadly rhomboid-deltoid or rhomboid-flabellate; corolla rose or purple . . . . . 17. ***C. chlorosphaera***
9. Phyllary appendages 12-20 mm, lateral spines 3 mm or longer (endemic to N Iran, C Elburz, province Tehran, W of Tehran) . . . . . 21. ***C. keredjensis***
– Not with above combination of characters (W to S Iran) 10
10. Phyllary appendages 8 mm broad or broader 11
– Phyllary appendages less than 7 mm broad . . . . . 26. ***C. lurorum*** p.p.
11. Phyllary appendages of middle and upper phyllaries usually covered by arachnoid indumentum; involucre usually horizontally elliptic in outline (endemic to W Iran, province Hamadan (Alvand Mts and neighbouring areas)) . . . . . 20. ***C. araneosa***
– Not with above combination of characters (CW to S Iran, provinces Markazi, Esfahan, Bakhtiari va Chahar Mahall and Fars) 12
12. Phyllary appendages lanceolate . . . . . 6c. ***C. silyboides*** subsp. ***zardkuhensis*** p.p.
– Phyllary appendages rhomboid-, sagittate-lanceolate or flabellate . . . . . 22b. ***C. kotschyi*** subsp. ***khansarica***
13. Phyllary appendages deltoid- to linear-lanceolate, gradually attenuate into a long spine, without spines on the sides (Lebanon and Anti-Lebanon mountains). . . 1. ***C. libanotica***
– Not with above combination of characters (Turkey and further east) 14
14. Involucre cylindrical to conical, phyllaries with ± spreading, concave, keeled, ovate to deltoid-lanceolate appendages (Fig. 2S) (S Turkey, N Iraq, western part of Zagros Mts from W to SW Iran) 15
– Not with above combination of characters 20
15. Phyllary appendages horizontally spreading in lower part, straight to incurved in upper part, deltoid, usually glabrous or glabrescent (Fig. 2E) (Shahu and Oraman mountains in Iran and province Sulaymaniyah in Iraq . . . . . 3. ***C. inflata***
– Not with above combination of characters 16
16. Phyllary appendages usually arachnoid-tomentose on outside, gabrous on inside, sagittate-lanceolate (SW Iran, provinces Boyer Ahmadi va Kohkiluyeh and Fars) . . 5. ***C. barbeyi***

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– Not with above combination of characters 17
17. Plants densely canescent-tomentose (S Turkey and N Iraq) . . . . . 2. ***C. aintabensis***
– Plants ± sparsely arachnoid-tomentose or virescent, ± glabrescent or glabrous (N Iraq, W and CW Iran) 18
18. Phyllary appendages strongly incurved, forming a semicircle (N Iraq) . . . . . 7. ***C. odontolepis*** p.p.
– Phyllary appendages only slightly incurved (Iran) 19
19. Plants from western slopes of Zagros Mts . . . . . 6c. ***C. silyboides*** subsp. ***disfulensis***
– Plants from eastern slopes of Zagros Mts . . . . . 6a. ***C. silyboides*** p.p.
20. Corolla purple to purplish-lilac, longer than 35 mm (NNE, NE to SE Iran, Turkmenistan, Afghanistan and Pakistan) . . . . . 30. ***C. onopordioides***
– Not with above combination of characters 21
21. Phyllary appendages flat, ± horizontal, ± straight, 7-12 mm long, 4-9 mm broad, attenuated into a usually long spine at apex, glabrous or ± glabrescent . . 4. ***C. kopi-karadaghensis***
– Not with above combination of characters 22
22. Leaves white-arachnoid-tomentose beneath, glabrous or glabrescent above; corolla white; anthers rose or purple (SE Turkey, NW Iran) . . . . . 11. ***C. hakkarica***
– Not with above combination of characters 23
23. Phyllary appendages keeled, spreading or slightly recurved, rhomboid-lanceolate, 20-38 mm long, 5-12 mm broad; corolla pale purple (SE Iran, province Kerman, Jebal Barez, Sarzeh Mts) . . . . . 29. ***C. sarzehensis***
– Not with above combination of characters 24
24. Basal leaves lyrate; appendages cordate, ovate to lanceolate, 10-40 mm long, 7-15 mm broad; corolla pink, rose or purple (NE Iran and SW Turkmenistan) . 31. ***C. verbascifolia***
– Not with above combination of characters 25
25. Plants white-arachnoid-tomentose; corolla usually yellow, 28-38 mm long (S Caucasus, NW Iran, province Azarbaijan s.l.) . . . . . 12. ***C. macrocephala***
– Not with above combination of characters 26
26. Lowermost phyllaries leaf-like, similar to uppermost leaves, glandulose-punctate or glabrous, rarely tomentose, middle ones spreading to erect, with cordate, ovate, cordate-lanceolate to lanceolate appendage (Fig. 2H) . . . . . 13. ***C. grandis***
– Not with above combination of characters 27
27. Plants completely arachnoid-tomentose, usually yellowish, especially in upper parts; phyllaries ± spreading; corolla creamy-white or flavescent (alpine regions of the Qnadil range in the provinces Erbil and Sulaymaniyah in Iraq) . . . . . 9. ***C. algurdina***
– Not with above combination of characters 28
28. Plants completely white-arachnoid-tomentose; upper stem leaves sessile, usually oblong or ovate, round to cuneate at base (Turkey and NW Iran) . . . . . 10. ***C. canescens***
– Not with above combination of characters 29
29. Upper phyllaries usually red-tinted, appendages of middle phyllaries usually truncate at base; basal leaves lyrate or deeply pinnatisect (Fig. 2C-D) (N Iraq) . . . 7a. ***C. odontolepis*** p.p.
– Not with above combination of characters (Turkey, Caucasus and Iran) 30
30 Phyllaries with erect appendages, laterally without spines; plants completely white-arachnoid-tomentose (Iran, province Bakhtiari va Chahar Mahall) . . . . 23. ***C. lordeganensis***
– Not with above combination of characters 31
31. Phyllaries usually keeled, slightly recurved or horizontally spreading at apex, appendages ovate to lanceolate, 5-12 mm long, 3-5 mm broad, usually with 2 spines on both sides; corolla purple (Caucasus) . . . . . 27. ***C. purpurea***
– Not with above combination of characters 32
32. Phyllary appendages usually with 2-3 irregular spines in their lower quarter, spines yellow, 4 mm or more; anthers usually milky white (S and SE Iran, provinces Fars, Yazd and Kerman) . . . . . 22a. ***C. kotschyi*** p.p.

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– Not with above combination of characters (C, W, NW, N Iran and SE Turkey) 33
33. Phyllaries spreading to recurved, appendages keeled, straight to recurved, lanceolate to linear-lanceolate, 20-40 mm long, 5-12 mm broad, with 1-4 spines on both sides; corolla rose (endemic to a small area E of Tabriz, "Shebli pass") . . . . . 14. ***C. gilliati***
– Not with above combination of characters 34
34. Plants completely white-arachnoid-tomentose; phyllaries spreading to recurved; corolla and anthers yellow (E Caucasus, NW Iran, provinces Azarbaijan and Ardebil) 24. ***C. cynaroides***
– Not with above combination of characters 35
35. Involucre (without appendages) 2 cm or more in diameter, short-conical, base of appendages visible from the side (appendages not covering each other), appendages usually abruptly expanded just above base, ovate to rhomboid or linear-lanceolate, 4-15 mm broad (Iran, provinces Lorestan, E Esfahan, Bakhtiari va Chahar Mahall) 6a. ***C. silyboides*** p.p.
– Not with above combination of characters 36
36. Middle phyllaries recurved or ± spreading, appendages usually as long as or longer than diameter of involucre, keeled or flat, lanceolate to linear, 12-30 mm long, 3-6 mm broad; corolla and anthers purple or rose (Iran, provinces Ilam and Kermanshah) . . 8. ***C. noeana***
– Not with above combination of characters 37
37. Corolla yellow; anthers purple or pale, stems usually divaricately branched (Iran, C and S of province Azarbaijan-e Gharbi, W and S of lake Urmia) . . . . . 28. ***C. bobekii***
– Not with above combination of characters 38
38. Phyllary appendages keeled, usually ± erect, deltoid to lanceolate, without or with 1(-2) tiny spine(s) on both sides (Iran, provinces Kermanshah, Kordestan and Hamadan) . . . . . 26. ***C. lurorum*** p.p.
– Not with above combination of characters . . . . . 25. ***C. calocephala*** s.l.

Description of taxa

1. *Cousinia libanotica* DC., Prodr. 6: 556. 1838 ≡ *Arctium libanoticum* (DC.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Lebanon, in monte Libano, *Aucher-Eloy 3489* (K!; isolectotypes: G, P!); former second syntype: Syria, 1790, *Labillardière* (G).
= *C. hermonis* Boiss., Diagn. Pl. Orient. Ser. 1: 102. 1849 ≡ *Arctium hermonis* (Boiss.) Kuntze, Revis. Gen. Pl. 1: 307. 1891, **syn. nov.** – Lectotype (designated here): Syria, inter Ainete & Deir el Achmar, 5.-7.1846, *Boissier* (G-BOIS: G-00152018!).
= *C. dayi* Post, Pl. Postianae 2: 13. 189. – Type: Syria, Antilebanon, Asal-ul-Ward, Halimat-ul-Kabu, *Post* (G; isotype: W [fragment]!), **syn. nov.**
= *C. hermonis* var. *cana* Boiss. ex C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 268. 1892. – Holotype: Syria, *Boissier* (G-BOIS: G-00152018 sub "var. *cana*"!).
= *C. hermonis* f. *cana* Bornm. in Österr. Bot. Z. 62: 423. 1912, nom. illeg. (Code, Art. 24.4, Note 2, Art. 53.4, McNeill & al. 2006). – Lectotype (designated here): Syria, in montis Hermon regione subalpina ad alpinam, 1950 m, 25.6.1897, *Bornmüller 943* (B-100157170!; isolectotypes: JE!, K!, W!, WU!).
= *C. hermonis* f. *patens* Bornm. in Österr. Bot. Z. 62: 423. 1912. – Holotype: Syria, in montis Hermon regione subalpina ad alpinam, 1950 m, 25.6.1897, *Bornmüller 943c* (B-100157167!).
= *C. hermonis* f. *glabrescens* Bornm. in Österr. Bot. Z. 62: 423. 1912. – Holotype: Syria, in montis Hermon regione subalpina ad alpinam, 1950 m, 25.6.1897, *Bornmüller 943b* (B-100088408!).

Note. – Material of *Cousinia hermonis* collected by Boissier in Syria deposited in G-BOIS as G-00152018 is mounted on two sheets. The first sheet with a label including the phrase "inter Ainete & Deir el Achmar, Jul. 1846" matches the locality given in the original publication and therefore was designated as lectotype. The second sheet with a label only reading "Syria" and marked with "var. *cana*" as well as other material in JE, K and W collected by Boissier in Syria but without exact locality (only "Syria") is regarded as syntype material here. The sheet in G-BOIS with "var. *cana*" is the holotype of the corresponding variety published by Winkler.

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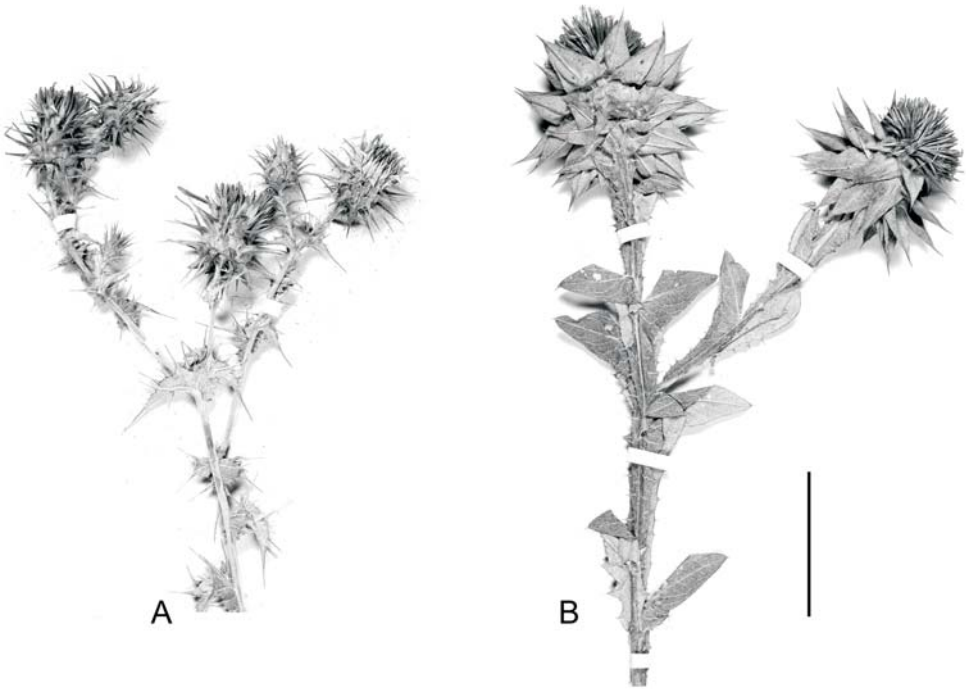

Fig. 3. A: *Cousinia libanotica* (*Bornmüller 944,* B-100157217); B: *C. aintabensis* (*Bornmüller 1403b,* B-100157263). – Scale bar: A-B = 5 cm; photographs by the BGBM.

Illustration. – Fig. 3A.

Plant up to 60 cm high, tomentose. *Stems* branched from the base or higher. *Leaves* leathery, tomentose on both sides; basal leaves up to 15 × 5 cm, lanceolate to linear-lanceolate, pinnatifid to pinnatisect, with spiny-dentate lobes; stem leaves gradually smaller and less divided towards the apex, ovate-lanceolate to lanceolate, spiny-lobed, round to cuneate at base, decurrent for up to 2.5 cm. *Capitula* 2.5-7.5 cm broad with phyllaries, arachnoid-tomentose to glabrescent. *Phyllaries* 25-70; middle ones spreading to spreading-recurved, their free part gradually or sometimes abruptly expanded above into a ± erect, keeled or flat, deltoid-lanceolate to linear-lanceolate appendage; appendage 10-30 mm long, 2.5-7 mm broad, attenuated into a long spine at apex, without spines on the sides. *Receptacular bristles* rough. *Flowers* 40-60; corolla pink or purple, 20-30 mm long; anthers concolourous. *Achenes* 4-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – The "Mount Lebanon" in Lebanon and the "Anti-Lebanon" (including Mt Hermon in E Lebanon and a small part of W Syria) are two parallel mountain ranges in a relatively small area. They are connected in southern Lebanon. Study of all herbarium specimens of *Cousinia libanotica, C. hermonis* (incl. all varities and forms) and *C. dayi* revealed continuous variation in plant size, density of indumentum and shape and size of phyllaries. Plants from "Mount Lebanon" and southern and lower parts of the "Anti-Lebanon" have a relatively dense indumentum, more divided leaves and phyllaries with longer appendages, while material collected from high alpine areas of the "Anti-Lebanon" have a less dense indumentum, less divided leaves and phyllaries with shorter appendages. However, we could not detect any discontinuity in these characters, which had been used to distinguish species. Therefore, we consider *C. hermonis* and *C. dayi* as conspecific with *C. libanotica*.

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Distribution and habitat. – Endemic to Lebanon, W Syria and N Israel (Fig. 6A), on stony slopes.

Further specimens seen. – LEBANON: In rupestribus calcareis supra Eden, 7.1846, *Boissier* (P); Bscherre & circa Cedretum, 5800 ft., 25.6.1855, *Kotschy 321* (P, W); between Bakafra and *Cedrus* forest, above Bscherra, 1500-1800 m, 21.7.1931, *Zohary 3854* (W); in Libani alpini declivitatibus occidentalibus, in monte Dschebel Keneise, 1600-1700 m, 21.6.1910, *Bornmüller 12033* (W); in reg. subalpina jugi Sanin, 1500-1900 m, 21.7.1897, *Bornmüller 945* (B, W); Mt Hermon, Shib'ah to Ain Zbib, 11.8.1929, *Gabrielith 3853* (W).
SYRIA: In territorio montis Hermon, 5000 ft., 28.6.1855, *Kotschy 198* (K, P, W); Hermon, Geröllhalde, 2350 m, 26.6.1936, *Bertschinger 1343* (B); Hermon, 1700 m, 16.9.1924, *Meyers & Dinsmore 1998* (K); Hermon, 12.7.1890, *Post* (K); Anti-Libani, inter Rschidani & Damascus, 1400 m, 27.6.1897, *Bornmüller 944* (B).

2. *Cousinia aintabensis* Boiss. & Hausskn. in Boissier, Fl. Orient. 3: 503. 1875 ≡ *Arctium aintabense* (Boiss. & Hausskn.) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Lectotype (designated by Huber-Morath 1972: 257 [as "holotype"]): Turkey, in monte Tullupbaba prope Aintab, in apric. calc., 22.6.1865, *Haussknecht 962* (G-BOIS: G-00152015!; isolectotype JE!).
= *C. arbelensis* C. Winkl. & Bornm. in Bull. Herb. Boissier 3: 566 & 567, t. 14. 1895, **syn. nov.** – Lectoype (designated here): Iraq, habitat in Kurdistaniae terra Arbela, ad radices montis Kuh-Sefin prope pagum Shaklava, 1200 m, 4.6.1893, *Bornmüller 1403b* (B-100088397!; isolectotypes: B!, G!).
= *C. arbelensis* var. *pinnata* C. Winkl. & Bornm. in Bull. Herb. Boissier 3: 568, t. 14. 1895. – Lectoype (designated here): Iraq, habitat in Kurdistaniae terra Arbela, ad radices montis Kuh-Sefin prope pagum Shaklava, 1000 m, 30.5.1893, *Bornmüller 1403* (B-100088396!; isolectotypes: JE!, K!, P!, W!, WU!).
= *C. handelii* Bornm. in Österr. Bot. Z. 62: 187. 1912, **syn. nov.** – Holotype: Iraq, Mespotamia, in lapidosis (substrato calcareo) montium Dschebel Sindschar supra oppidum Sindschar, c. 600-700 m, 8.6.1910, *Handel-Mazzetti 1359* (W!; isotypes: B!, WU!).
= *C. birecikensis* Hub.-Mor. in Notes Roy. Bot. Gard. Edinburgh 32: 53. 1972, **syn. nov.** – Holotype: Turkey, Urfa, Mesopotamia, Biredjik, in declivibus ad Euphratem, 8.5.1888, *Sintenis 1528* (LD!).
= *C. sinjarensis* Rech. f. in Publ. Cairo Univ. Herb. 7/8: 289. 1977, **syn. nov.** – Holotype: Iraq, west side of Jabal Sinjar, 800 m, rocky slope, ravine, 30.5.1968, *Anders 2172* (W!); paratype: Iraq, west side of Jabal Sinjar, 600-1200 m, 12.5.1969, *Anders 2689* (W!).

Note. – *Cousinia arbelensis* and *C. arbelensis* var. *pinnata* were originally published with detailed illustrations. Specimens in B that completely match the original illustrations of *C. arbelensis* and *C. arbelensis* var. *pinnata* were selected as lectotypes of these names.

Illustration. – Fig. 3B.

Plant up to 60 cm high, arachnoid- or canescent-tomentose to glabrous. *Stems* branched from the base. *Leaves* herbaceous or leathery, arachnoid- or canescent-tomentose on both surfaces, ± glabrescent above or rarely glabrescent on both sides; basal leaves up to 25 × 10 cm, lyrate, pinnatisect or pinnately oblong-lanceolate, spiny-lobed or with spiny-dentate margin; stem leaves gradually smaller and less divided towards the apex, ovate, ovate-lanceolate to linear-lanceolate, spiny-lobed to -dentate, usually long-decurrent to form winged stems. *Capitula* 3-7 cm broad with appendages, arachnoid-tomentose, ± glabrescent or glabrous. *Phyllaries* 40-100; middle ones ± spreading to spreading-incurved or rarely bent downward, their free part abruptly expanded above into usually concave, keeled, ovate, long-deltoid, deltoid- or rhomboid-lanceolate appendage; appendage 15-30 mm long, 7-15 mm broad, usually attenuated into a long or short spine at apex, with 2-5 or rarely more tiny spines or prickles on both sides. *Receptacular bristles* rough or smooth. *Flowers* (30-)50-100; corolla rose, pink, purple or straw-coloured, 18-30 mm long; anthers rose, pink, purple or pale. *Achenes* 4-5 mm long.

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Flowering period. – May to July.

Taxonomic remarks. – *Cousinia aintabensis, C. arbelensis, C. handelii, C. birecikensis* and *C. sinjarensis* from the transitional area between the Anatolian plateau and adjacent Iraqi and Syrian lowlands with a desert climate all have usually lyrate basal leaves, cylindrical to conical involucres with ± spreading, concave, keeled and ovate to deltoid-lanceolate appendages. We observed continuous variation among all material of these taxa in all qualitative and quantitative characters and were not able to circumscribe them as separate species. *C. handelii* and *C. sinjarensis* are based on material from the same locality ("Jabal Sinjar" or "Dschebel Sindschar"). *C. birecikensis* is based on material with unopened capitula from a locality within the distribution range of *C. aintabensis*.

Distribution and habitat. – *Cousinia aintabensis* is discontinuously distributed in the mountainous area between the southern Anatolian plateau and the neighbouring lowlands of southern Turkey and northern Iraq (and northern Syria?) (Fig. 6B), on stony slopes and in oak forests.

Further specimens seen. – Turkey: Mardin: In declivibus montinum, 1.7.1888, *Sintenis 1276* (B, E, JE, K, M, P, WU); 19 km N of Mardin, 930 m, 23.5.1956, *Birand 86* (ANK); Mardin kalesi, 24.7.1974, *Baytop 18224* (E). — Siirt: Mirga mira, über Scharanak (Siranak), 24.7.1910, *Nabelek s.n.* (B). — Bitlis: Baykan-Bitlis, arid *Quercus* slope, 1300 m, 25.6.1954, *Davis 22163* (ANK, E, K).
Iraq: Mosul: Atrush-Rabetki, 1400 m, 28.5.1947, *Chapman 9338* (K); between Atrush village and pine woodland, 850 m, 9.6.1978, *Hossain 4268* (E, K, P); 30 km from Mosul to Aqra, 320 m, 4.6.1978, *Keisi 49718* (K). — Arbil (Erbil): Shaqlawa, *Haines 2049* (E), 18.6.1961, *Agnew & al. W2049* (K); Jabal Saffen, 6.7.1971, *Sakira 38252* (K); Safin Dagh (Jabal Saffen), 1300 m, 19.6.1947, *Rawi 9078* (K); Shaikh Adi prope Ayn Sifni, 13.6.1934, *Field & Lazar 712* (B, G, K, W); Pirmum Dagh, 900 m, 8.5.1947, *Gillet 8024* (K).

3. *Cousinia inflata* Boiss. & Hausskn. in Boissier, Fl. Orient. 3: 512. 1875 ≡ *Arctium inflatum* (Boiss. & Hausskn.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iran, in montium Avroman & Schahu Kurdistaniae Persicae, 5-8000', 6.-7.1867, *Haussknecht 568* (G-BOIS: G-00152013!; isolectotypes: G-BOIS!, JE!, K!, P!, W!).
= *C. anoplophylla* Rech. f., Fl. Iranica 139a: 140. 1979, **syn. nov.** – Holotype: Iran, Kermanshah, Shalane to Dalahu, 1020-1800 m, 25.7.1967, *Iranshahr & Terme 34012-E* (W!; isotype: IRAN!).

Note. – Type material of *Cousinia inflata* deposited in G-BOIS is mounted on three sheets. The sheet G-00152013 with a handwritten label by Boissier ("*Cousinia inflata* Boiss. & Hausskn.") was selected as lectotype.

Illustration(s). – Fig. 4A.

Plant up to 50 cm high, arachnoid-tomentose, ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery or ± herbaceous, arachnoid-tomentose on both surfaces or ± glabrescent above; basal leaves up to 25 × 10 cm including spines, broadly oblanceolate, oblong, lanceolate or lyrate, dentate to deeply pinnatisect; stem leaves sessile, abruptly or gradually smaller and less divided towards the apex, obovate, ovate to lanceolate, pinnatifid or spiny-lobed to spiny-dentate, usually long-decurrent to form interrupted winged stems. *Capitula* 2-4 cm broad with appendages, glabrous. *Phyllaries* 60-160, ± inflated, imbricate; outer ones usually bent downwards; middle ones inflated, spreading-erect, their free part abruptly expanded above into a usually keeled, concave appendage; appendage horizontal in lower part, straight to incurved in upper part, deltoid, 8-15 mm long, 8-17 mm broad, attenuate into a spine at apex, usually with black glands, glabrous, ± glabrescent or arachnoid-tomentose, without or rarely with 1-2 tiny prickles on both sides. *Receptacular bristles* rough. *Flowers* 60-140; corolla purple, rose, white or yellow, 20-30 mm long; anthers purple. *Achenes* 4-6 mm long.

Flowering period. – June to July.

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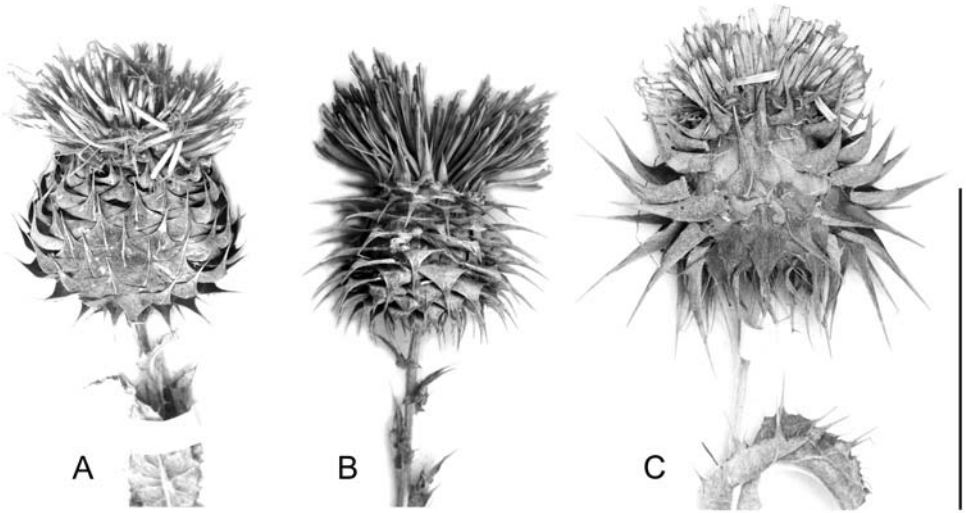

Fig. 4. A: *Cousinia inflata* (*Assadi 84977,* TARI); B: *C. kopi-karadaghensis* (*Makki 525,* W); C: *C. barbeyi* (*Terme 13435E,* W). – Scale bar: A-C = 5 cm; photographs by I. Mehregan.

Taxonomic remarks. – *Cousinia inflata* is a narrow endemic characteristic in having an involucre of distinctly inflated imbricate phyllaries. The species is very variable in the morphology of its leaves. Even within a single population plants with almost entire to dentate leaves can be found together with plants with deeply pinnatisect leaves. *C. anoplophylla* also has capitula with distinctly inflated imbricate phyllaries similar to those of *C. inflata* and almost entire basal leaves. It clearly is part of the morphological variation of *C. inflata* and cannot be delimited as a separate species.

Distribution and habitat. – Endemic to NE Iraq and W Iran (Fig. 6D). On rocky slopes or in the upper zone of oak forests.

Further specimens seen. – Iraq: Sulaymaniyah: Montes Avroman ad confines persiae, in ditione pagi Tawilla, 1300 m, 15.-18.6.1957, *Rechinger 10215* (E, K, M, W); in ditione pagi Tawilla, in saxosis calc., 2100 m, 15.6.1957, *Rechinger 12358* (B, W); Tawela, 1360 m, 16.6.1957, *Al Rawi 21947* (K); Pir Omar Gudrun, 4000 ft., 6.1867, *Haussknecht s.n.* (P); Hawara Baya Mt, 1800 m, 24.6.1960, *Al Rawi & al. 29507* (K); Kamarspa (on road between Halabja & Tawela), 1840-2000 m, 18.6.1957, *Al Rawi 22179* (K); Mollah Khort Mt, 1700 m, 22.6.1960, *Al Rawi & al. 29467* (K).
Iran: Kermanshah: In monte Schahü, 28.5.1905, *Strauss s.n.* (B, JE); Mt Shahu, NE of Mansour-Aghayee village, 34°57.894'N, 46°27.876'E, 2170 m, 4.7.2005, *Mehregan & Assadi 29* (MJG); Shahu, W of Shamshir village, 34°58.454'N, 46°27.986'E, 2540 m, 4.7.2005, *Mehregan & Assadi 31* (MJG); 14 km from Paveh to Bayangan, 1800 m, 11.7.1997, *Ghahreman & al. 20561* (TUH); 14 km N of Kerend, 1800-2000 m, 21.6.1987, *Assadi 60889* (TARI); 44 km N of Kerend Gharb, Dalahu, Kuh-e Ghalelan, 1940-2100 m, 21.6.1987, *Hamzehee & Hatami 1383* (TARI); 45 km [from Marivan to Sanandaj], after Dezli, 2400 m, 17.6.1997, *Ghahreman & Attar 22480* (TUH); 5 km after Paveh to Nosud, 1500 m, 3.6.1999, *Ghahreman & Attar 22375* (TUH); 6 km after Paveh to Ravansar, 1600-1700 m, 7.7.1994, *Chehregani & Zarre 17829* (IRAN, TUH); 60 km from Paveh on the road to Kermanshah, 1390 m, 11.7.1997, *Ghahreman, Attar & Ghahremaninezhad 20573* (TUH); Paveh, mountains above Paveh, 1700 m, 18.6.1987, *Assadi 60705* (TARI); Paveh, mountains above the village Shemshir, base of Kuh-e Shahu, 1700-1900 m, 18.6.1987, *Assadi 60744* (TARI); Paveh, the hill above Sarab Houli, 1500-1800 m, 18.6.1987, *Hamzehee 1221* (TARI); road of Paveh, Palanganeh, 1510 m, 3.7.1996, *Attar & Mirtajadini*

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19872 (TUH); Rijab, 19.6.1968, *Iranshahr 13163E* (IRAN, W). — Kordestan: 45 km after Dezli, 2400 m, 17.6.1999, *Attar & Mehdigholi* 22483 (TUH); c. 30 km S Marivan, after Dezli, on the road from Hezbolah, 32°10'N, 46°08'E, 1800 m, 24.6.2003, *Assadi 84977* (TARI); Marivan to Paveh, Gardaneh Tate, between Dezli and Hanigarmaleh, 1800-2600 m, 9.7.1995, *Mozaffarian 74698* (TARI), *Ghahreman & Mozaffarian 18331* (TUH); Nosoud to Marivan, between Nosoud and Gardaneh Tateh, around Dezaveh and Hanigarmaleh, 2000 m, 27.7.1995, *Mozaffarian 74816* (TARI).

4. *Cousinia kopi-karadaghensis* Rech. f., Fl. Iranica 90: 249. 1972. – Holotype: Iraq, Sulaymaniyeh, Kopi Qaradagh, rocky slope, 1500 m, 17.6.1959, *Wheeler-Haines 1545* (E!; isotypes: K!, W!).

Illustration. – Fig. 4B.

Biennial or perennial, monocarpic, up to 60 cm high, finely appressed-tomentose, soon glabrescent. *Stems* divaricately branched from the base or higher. *Leaves* ± herbaceous, tomentose beneath and ± glabrescent above; basal leaves up to 10 × 5 cm including spines, lyrate or deeply pinnatisect with large terminal lobe; lower leaves attenuated at base, stem leaves sessile, leaves usually abruptly smaller and less divided towards the apex, ovate to lanceolate, pinnatifid or spiny-lobed to spiny-dentate, long-decurrent to form interrupted winged stems. *Capitula* 2-4 cm broad with appendages, arachnoid, ± glabrescent. *Phyllaries* 120-130; middle ones ± horizontally spreading, their free part constricted at base, abruptly expanded above into a usually flat, ± horizontal, ± straight appendage; appendage 7-12 mm long, 4-9 mm broad, attenuated into a usually long spine at apex, glabrous or ± glabrescent, without or rarely with 1 tiny prickle on both sides. *Receptacular bristles* rough. *Flowers* 50-90; corolla purple, 20-22 mm long; anthers concolourous. *Achenes* c. 4 mm long.

Flowering period. – May to June.

Taxonomic remarks. – *Cousinia kopi-karadaghensis* is a distinct species with horizontally spreading phyllary appendages. It probably is related to *C. inflata*.

Distribution and habitat. – Endemic to NE Iraq, Mt Qara-Dagh (Fig. 6E), in oak forests.

Further specimens seen. – Iraq: Sulaymaniyah: 16 km NW of Darbandikhan, 700 m, 21.6. 1960, *Al Rawi & al. 29443* (K); Darbandikhan, 2000 ft, 21.3.1960, *Wheeler Haines 1635* (E, K); Kopi Qaradagh, 5 km SW of Kanitacht, 1440 m, 12.9.1933, *Kig & Feinbrun 507* (W); Kopi Qaradagh, rocky slope, 14.7.1961, *Wheeler Haines s.n.* (E, K, W); Qaradagh Mt, 18.7.1964, *Makki 525* (W).

5. *Cousinia barbeyi* C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 274. 1892. – Lectotype (designated here): Iran, in monte Kuh-Gelu, monte Savers, 8000', 7.1868, *Haussknecht s.n.* (G-BOIS: G-00034922!; isolectotypes: B!, G-BOIS!, JE!, K!, W!).
= *C. mozaffariani* Attar, Ghahreman & Assadi in Pakistan J. Bot. 32: 293. 2000, **syn. nov.** – Holotype: Iran; Fars, Nurabad, between Nurabad and Karkan, 1600 m, 10.6.1992, *Mozaffarian 71266* (TARI).

Notes. – (1) Type material of *Cousinia barbeyi* is mounted on two sheets. The sheet labelled "G-00034922" is selected as lectotype.

(2) The original publication of *Cousinia mozaffariani* provides contradictory data for all three diagnostic characters given to distinguish it from *C. barbeyi*. These are the number of flowers ("± 85" in the Latin diagnosis, "± 140" in the English description), the number of phyllaries ("± 70" in the Latin diagnosis, "± 100" in the English description) and corolla length ("± 15 mm" in the Latin diagnosis, "± 24 mm" in the English description). Our search for the holotype of *C. mozaffariani* in TARI was without success. Instead, we found a specimen of the same collector from an area near the type locality (*Mozaffarian 71392,* TARI) that matches the original illustration of *C. mozaffariani*.

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Illustration. – Fig. 4C.

Biennial or perennial, monocarpic, up to 60 cm high, arachnoid-tomentose or ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery, tomentose on both sides or ± glabrescent; basal leaves up to 20 × 6 cm including spines, oblong-lanceolate to lyrate, coarsely dentate to completely pinnatisect, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed, cordate to broadly cuneate at base, decurrent or sometimes long-decurrent to form winged stems. *Capitula* 4-7 cm broad with appendages, arachnoid-tomentose, glabrescence or glabrous. *Phyllaries* 50-80; middle ones incurved or spreading-incurved, their free part constricted at base, expanded above into a usually keeled, concave, deltoid to deltoid-lanceolate appendage; appendage 14-27 mm long, 7-16 mm broad, attenuate into a long spine at apex, usually tomentose outside, glabrous inside, with 0-2(-4) usually fine spines on both sides. *Receptacular bristles* rough or smooth. *Flowers* 60-110; corolla purple or rose, 17-28 mm long; anthers concolourous. *Achenes* 3-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia barbeyi* is a distinct species endemic to SW Iran. The original illustration of *C. mozaffariani* as well as material collected near its type locality along with material belonging to *C. barbeyi* show that *C. mozaffariani* forms part of the morphological variation of *C. barbeyi* and cannot be segregated as a separate species.

Distribution and habitat. – Endemic to SW Iran (Fig. 6C), on stony slopes and mainly in oak forests.

Further specimens seen. – Iran: Boyer Ahmadi va Kohkiluyeh: Sisakht to Kuh Daena, Gardaneh Bizhan, 20.6.1969, *Terme 13435E* (W); Gardaneh Bizhan, 2400-2600 m, 4.8.1978, *Assadi & Mozaffarian 31300* (TARI); Tut-Nadeh to Pataveh, 3.6.1973, *Iranshahr & Moussavi 33925E* (W); 10-30 km from Yasouj to Sisakht, 2000 m, 24.6.1998, *Mozaffarian & Massoumi 77990* (TARI); 30 km from Yasouj to Sisakht, 1550 m, 1.7.1999, *Ghahreman & Attar 22494* (TUH); between Yasouj and Dehdasht, Dilegoon, Kuh-e Saverz, 2200-3200 m, 19.7.1983, *Assadi & Abouhamzeh 46423* (TARI); between Yasouj and Dehdasht, near Sadat, 2300 m, 20.7.1983, *Assadi & Abouhamzeh 46457* (TARI); Yasouj to Dehdasht, Mt Saverz, 2000 m, 16.7.2000, *Ghahreman, Attar & Mehdigholi 26304* (TUH); Yasouj, near Abshar, 2200-2500 m, 17.7.1983, *Assadi & Abouhamzeh 46249* (TARI). — Fars: Fahlian to Hossein-Abad, 1100-2100 m, 1.6.1973, *Iranshahr & Moussavi 33921E* (W); Nurabad, Doshman Ziary region, Darreh Gorg to Korekan, 2400 m, 11.6.1992, *Mozaffarian 71392* (TARI); pass between Yasuj and Babamaydan, 2300 m, 18.6. 1977, *Edmondson & Bokhari 2060* (E).

6. *Cousinia silyboides* Jaub. & Spach, Ill. Pl. Orient. 2: 94, t. 176. 1846 ≡ *Arctium silyboides* (Jaub. & Spach) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Holotype: Iran, prope Ispahan (Esfahan), *Aucher-Eloy 4804* (P!).

Plant up to 40 cm high, canescent- or arachnoid-tomentose or glabrescent. *Stems* usually branched from the base or higher. *Leaves* leathery or leathery-herbaceous, ± arachnoid-tomentose on both surfaces, ± glabrescent or glabrous; basal leaves up to 20 × 5 cm including spines, oblong to lanceolate or oblanceolate, dentate, sinuate-lobate to deeply pinnatisect, with spiny-dentate lobes; stem leaves sessile, usually abruptly smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed or -dentate, long-decurrent to form winged stems. *Capitula* 5-8 cm broad with appendages, arachnoid-tomentose, glabrescent or glabrous. *Phyllaries* 70-100; middle ones ± spreading to spreading-incurved or spreading-erect, rarely imbricate, with a prominent midrib, their free part usually abruptly expanded above into a keeled, ovate to rhomboid- or linear-lanceolate, ± straight appendage; appendage sometimes bent inwards or slightly backwards, 15-28 mm long, 4-5 mm broad, gradually attenuate into a long spine at apex, canescent- or arachnoid-tomentose, glabrescent or glabrous, usually with 2-3 spines on both sides. *Receptacular bristles* smooth

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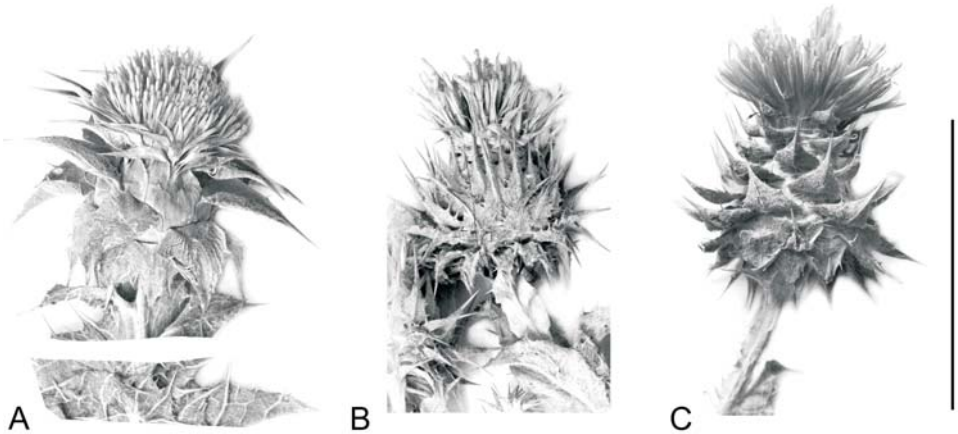

Fig. 5. A: *Cousinia silyboides* subsp. *silyboides* (*Djavadi & Ghanbari 29546/3,* IRAN); B: *C. silyboides* subsp. *zardkuhensis* (*Mozaffarian 62126,* TARI); C: *C. silyboides* subsp. *disfulensis* (*Ghahreman & al. 22370,* TARI). – Scale bar: A-C = 5 cm; photographs by I. Mehregan.

or rough. *Flowers* 40-150; corolla pink, purple, straw-coloured or milky white, 16-30 mm long; anthers pink, purple or white. *Achenes* c. 5 mm long.

Key to the subspecies of *Cousinia silyboides*

1. Basal leaves lyrate (western Zagros Mts) . . . . . subsp. *disfulensis*
– Basal leaves not lyrate (eastern Zagros Mts and C Iran) 2
2. Leaves and phyllaries usually densely canescent-tomentose; the spreading-erect to erect phyllary appendages covering the rest of the involucre . . . . . subsp. *zardkuhensis*
– Leaves and phyllaries usually sparsely arachnoid-tomentose, ± glabrescent or glabrous; phyllary bases ± visible from the side; appendages usually ± spreading . . . subsp. *silyboides*

6a. *Cousinia silyboides* subsp. ***silyboides***
= *C. lactiflora* Rech. f., Fl. Iranica 139a: 143. 1979, **syn. nov.** – Holotype: Iran, Esfahan, prope Daran, 2350 m, 7.6.1974, *Iranshahr 34024-E* (W!; isotype: IRAN!).
= *C. kivar* Parsa, Fl. Iran 10: 124. 1980, **syn. nov.** – Lectotype (designated here, see note, below): Iran, Luristan, Aligoudarz, Ovdodareh, 17.8.1957, *Houshang Pey 10032* (K!).
= *C. shulabadensis* Attar & Ghahreman in Iran. J. Bot. 9: 162. 2002, **syn. nov.** – Holotype: Iran, Luristan, Darreh Takht to Shulabad, 20 km to Shulabad, 2600 m, 29.6.1998, *Ghahreman & Attar 21874* (TUH!; isotype: TUH!); paratype: Iran, Lorestan, Khorram-Abad, Shulabad to Aligoudarz, after Sarab-e Firuz Abad, 2500 m, 24.7.2001, *Ghahreman, Attar & Mehdigholi 27593* (TUH!).
= *C. aligudarzensis* Attar & Ghahreman in Novon 17: 145. 2007, **syn. nov.** – Holotype: Iran, Luristan, [Aligoudarz], 10 km on rd. to Khomeyn City from 3-way intersection at Aligudarz, c. 1500 m, 21.7.2001, *Attar & A. Ghahreman 27613* (TUH; isotype: TUH); paratype: same locality, 16.6.2002, *Attar & Ghahreman 25000A* (TUH).

Note. – The holotype of the synonym *Cousinia kivar* was deposited in the former herbarium of the Tehran Museum. According to a personal communication dated 30.4.1994 between A. Parsa and A. Ghahreman (University of Tehran), all type material by A. Parsa in "hb. Mus. Tehran" was destroyed during transfer between the institutions. We found an isotype of this name in K. This specimen is selected as a lectotype.

Illustration. – Fig. 5A.

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Leaves and *phyllaries* usually sparsely arachnoid-tomentose, ± glabrescent or glabrous; phyllary bases ± visible from the side, appendages usually ± spreading.

Flowering period. – June to August.

Taxonomic remarks. – Because of some morphological similarity, *Cousinia silyboides* was regarded as a synonym of *C. kotschyi* by Boissier (1875). The holotype of *C. silyboides* was collected by Aucher-Eloy near Esfahan (prope "Ispahan") c. 350 km N of the type locality of *C. kotschyi*. We studied material from both areas and found that both are not conspecific. Instead, Aucher-Eloy's material represents part of the continuous variation of a taxon widely distributed in C Iran and matches the description and material of *C. lactiflora, C. kivar, C. shulabadensis* and *C. aligudarzensis*. None of these species can be maintained as separate.

Distribution and habitat. – Endemic to C and CW Iran (Fig. 6F), on stony slopes and in open areas.

Further specimens seen. – Iran: Lorestan: Aligoudarz, Shulabad, Ghali-Kuh, 2200-3500 m, 20.8.1982, *Mozaffarian & Sardabi 42514* (TARI); 58 km on road from Aligoudarz to Shoulabad, the pass N of Ghali Kuh, 2900 m, 29.6.1977, *Runemark & Lazari 26181* (TARI); Veisian, Chaleh-Ahmad mountains, Tang-e Tir, 1600 m, *Veiskarami 22599* (TUH); Shulabad to Aligoudarz, after Sarab-e Firuz Abad, 2500 m, 24.7.2001, *Ghahreman, Attar & Mehdigholi 27589* (TUH); between Aligoudarz and Khomian, 1950 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29546* (IRAN). — Esfahan: Bei Gülpaigan (Golpayegan), 8.1899, *Strauss s.n.* (B); Golpayegan, Golpayegan dam, 31.5.-4.6.2000, *Djavadi & Ghanbari 29544* (IRAN); Golpayegan, Hendeh village, 2100-2250 m, 5.7.1983, *Mowrouzi & Ashtari 3055* (TARI); Khansar, 2400 m, 27.6.1997, *Ghahreman & Attar 20037* (TUH); Boin, Tang-Doozan, Kuh-e Hashtad, S slopes, 2700-3000 m, 13.7.1981, *Etemadi 1270* (TARI); Ghaleh Musa, 75 km W Esfahan, Steinwüste, 2100 m, 10.7.1953, *Aellen 19* (W); Ghameshloo protected area, 2400-2600 m, 19.6.1996, *Assadi & Khatamsaz 76457* (TARI); Ghameshloo, 2200 m, 4.6.1996, *Youssefi 1366* (TARI); Hazarmani versus Hossein Abad, 2000 m, 26.6.1996, *Youssefi 1822* (TARI); Esfahan, 1600 m, 22.7.1971, *Asefi 24407* (TARI, W); Shahreza to Semirom, 35 km to Semirom, Alijough (Dasht), 2500 m, 10.7.1990, *Delghani & Tehrani 15182* (IRAN); Kuh-e Alijough, 2600-3250 m, 11.7.1990, *Delghani & Tehrani 15183* (IRAN); in jugo 10 km a Kohruyeh meridiem versus, inter Shahreza & Semirom, 2600 m, 5.6.1974, *Rechinger 47291* (W), *Iranshahr 34034E* (IRAN).

6b. *Cousinia silyboides* subsp. ***zardkuhensis*** (Attar & Ghahreman) Mehregan, **comb. & stat. nov.** ≡ *C. zardkuhensis* Attar & Ghahreman in Iran. J. Bot. 9: 164. 2002. – Holotype: Iran, Bakhtiari va Chahar Mahall, Gandoman to Boroujen, 2250 m, *Attar 21887* (TUH!); paratype: Iran, Esfahan, c. 5 km from Tiran to Shahr-e Kord, 1800 m, *Ghahreman & Attar 20038* (TUH).

Illustration. – Fig. 5B.

Leaves and *phyllaries* usually densely canescent-tomentose. *Involucre* with bases of phyllaries hidden by the spreading-erect to erect appendages.

Flowering period. – June to August.

Taxonomic remarks. – In comparison with *Cousinia silyboides* subsp. *silyboides,* material of subsp. *zardkuhensis* collected mainly from Bakhtiari province has leaves and phyllaries that usually are densely canescent-tomentose (not sparsely arachnoid-tomentose as in subsp. *silyboides*) and an involucre with the phyllary bases usually hidden by spreading-erect to erect appendages. The involucre of subsp. *silyboides* has ± spreading appendages that leave the base of the phyllaries visible. Although to some extend distinct, the two species are connected by intermediate forms.

Distribution and habitat. – Endemic to C Iran (Fig. 6H), on stony slopes.

Further specimens seen. – Iran: Bakhtiari va Chahar Mahall: Borujen, Wastagan, 2480 m, 27.7.1973, *Riazi 10276* (W); Gandoman to Boroujen, 2250 m, *Attar & Ghahreman 21887* (TUH); in

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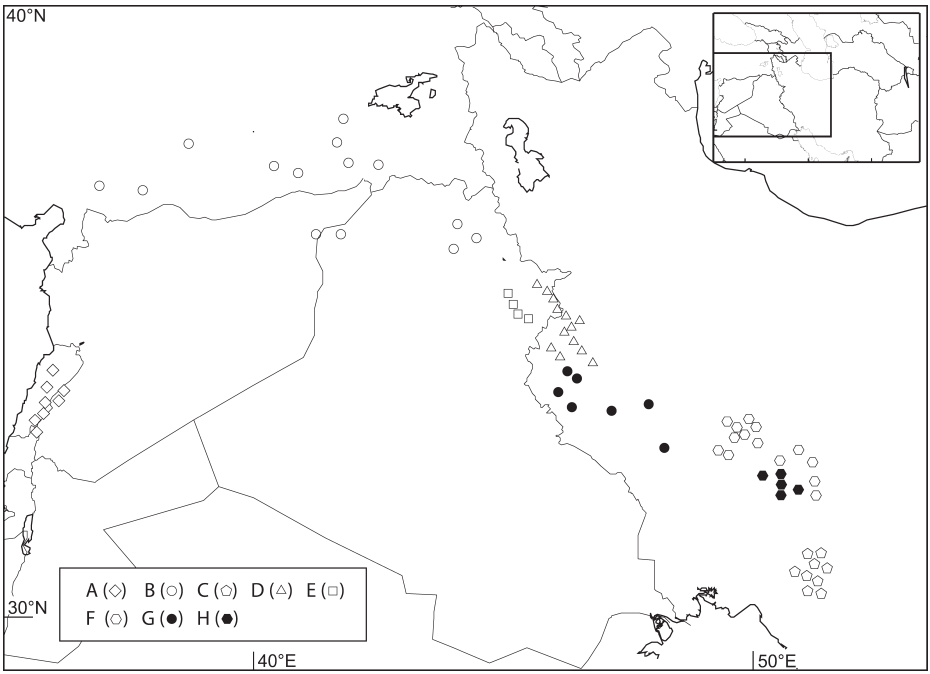

Fig. 6. Distribution of A: *Cousinia libanotica;* B: *C. aintabensis;* C: *C. barbeyi;* D: *C. inflata;* E: *C. kopi-karadaghensis;* F: *C. silyboides* subsp. *silyboides;* G: *C. silyboides* subsp. *disfulensis;* H: *C. silyboides* subsp. *zardkuhensis*. – Each symbol indicates the locality of a single collection or several collections made from the same or nearby localities.

jugo inter Shahreza & Borujen, in pascuis, 2300 m, 2.6.1974, *Rechinger 47038* (W); inter Shahre-Kord & Surashdjan, 2020 m, 1.7.1977, *Afzal-Rafii & Zehzad 427* (W); Shahr-e Kord, neck mountain between Arjenak and Margh-e Malek, Kuh-e Ghater Lang, 2450 m, 7.8.1986, *Mozaffarian 57956* (TARI); Shahr-e Kord, Shamsabad, E slope of Kuh-e Jahanbin from Kharaji,2100-2400 m, 9.7.1986, *Mozaffarian 57635* (TARI); Shahr-e Kord, Shamsabad, Kuh-e Zangian, E of Kharaji, 2120-2800 m, 17.7.1986, *Mozaffarian 57872* (TARI); Shahr-e Kord, Tange Sayyad protected area, 2400 m, 19.7.1986, *Mozaffarian 57914* (TARI); Tange Sayyad protected area, Pir Kuh, 2400 m, 14.6.1987, *Mozaffarian 62126* (TARI); Shahr-e Kord, top mountains of Saldaron from Deh-e Cheshmeh, W slope, 2200 m, 16.7.1986, *Mozaffarian 57844* (TARI). — Esfahan: Between Tiran and Saman, c. 15 km from Tiran, 2000 m, 23.6.1998, *Mozaffarian & Massoumi 77958* (TARI); 12 km E of Borujen, prope Faradoneh, 31.5.1974, *Iranshahr 34022E* (IRAN, W); in declivibus montium 12 km a Borujen versus Sefid Dasht, substr. calc., 2300-2700 m, 2.7.1974, *Rechinger 47082* (B, M, W); in jugo inter Shahreza & Borujen, in pascuis, 2300 m, 2.7.1974, *Rechinger 47041* (B, W).

6c. *Cousinia silyboides* subsp. ***disfulensis*** (Bornm.) Mehregan, **comb. & stat. nov.** ≡ *C. disfulensis* Bornm. in Köie, Beitr. Fl. Südwest-Irans 1 [Danish Sci. Invest. Iran 4]: 23. 1945. – Lectotype (designated here): Iran, Luristan, Chah-Bazan, 60 km nördl. von Dizful, 1200 m, 28.4.1937, *Köie 793* (B!; isolectotype: C).

= *C. jacobsii* Rech. f., Fl. Iranica 90: 237. 1972, **syn. nov.** – Holotype: Iran, Ilam, open forest dominated by *Quercus persica*, on slopes of rocky limestone, 46°26'E, 33°42'N, 1700-1900(-2400) m, 9.6.1963, *Jacob 6834* (W!; isotype: K!).

= *C. kermanshahensis* Attar, Ghahreman & Assadi in Iran. J. Bot. 9: 56. 2001, **syn. nov.** – Holotype: Iran, Kermanshah, Eslam-Abad-Gharb, Mahi Dasht, Gardaneh Bouzhan, 1300 m, 2.7. 1996, *Attar & Mirtajadini 19810* (TUH!; isotype: TUH!).

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Note. – Original material of *Cousinia disfulensis* is deposited in B and C. Since no holotype was designated by the original author, material deposited in B was selected as lectotype.

Illustration. – Fig. 5C.

Leaves lyrate. *Leaves* and *phyllaries* usually sparsely arachnoid-tomentose, ± glabrescent or glabrous. Involucre with phyllary bases ± visible from the side; appendages usually ± spreading.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia silyboides* subsp. *disfulensis* was first published as a species by Bornmüller based on two young specimens collected by Köie. Köie's specimens have lyrate basal leaves and distinct phyllaries with spreading and ± deltoid-lanceolate appendages, characters also found in this combination in widely distributed populations in oak forests in W Iran. Our study of new and mature material recently collected in neighbouring areas but published as *C. jacobsii* and *C. kermanshahensis* revealed that these species have the diagnostic characters of subsp. *disfulensis* and grow in essentially the same habitat, i.e., in *Quercus brantii* forests. *C. silyboides* subsp. *disfulensis,* distributed on western slopes of the Zagros Mts, differs from subsp. *silyboides* mainly in having lyrate basal leaves. Material of *C. shulabadensis* represents an extreme part of the variation and has more xeromorphic features such as less divided and more leathery leaves.

Distribution and habitat. – *Cousinia silyboides* subsp. *disfulensis* is distributed in the mountainous transitional area of the western part of the Zagros Mts (Fig. 6G), on stony slopes and mainly in oak forests.

Further specimens seen. – Iran: Ilam: Between Eyvan-e Gharb and Ilam, 1500 m, 5.7.1999, *Ghahreman, Attar & Mehdigholi 22370* (TUH); 10 due N of Ilam, NE side of Kuh-i Sharazul, 4650 ft., 3.6.1960, *Wright & Bent 603-106* (K, W). — Kermanshah: Near Kermanshah, [34°25'N, 46°15'E], 5500 ft., 18.8.1963, *Corley 58* (K); Krend, 1600 m, 25.6.1991, *Shahsavari 69804* (TARI). — Lorestan: C. 30 km S of Kuh-e-Dasht, [33°21'N, 47°30'E], 1300 m, 16.6.1959, *Wendelbo 2010* (W).

Material of *Veiskarami 22600* (Iran, NW of Khorram-Abad, 1400 m, TUH) shows a morphologically intermediacy between *Cousinia aintabensis* subsp. *disfulensis* and *C. sagittata*.

7. *Cousinia odontolepis* DC., Prodr. 6: 556. 1838 ≡ *Arctium odontolepis* (DC.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectoype (designated here): Iraq, in deserto Assyriae*,* 1837, *Aucher-Eloy 3496* (G-DC!; isolectotypes: P!, K!).

Note. – We found three herbarium sheets with no. *3496* collected by Aucher-Eloy, deposited in G-DC, K and P. As no lectotype has been designated before, the sheet deposited in is selected as lectotype of *C. odontolepis*. As noted before by Rechinger (1972), Aucher-Eloy's material clearly cannot have been collected "in deserto Assyriae" because the species grows in mountainous regions of N and NE Iraq and not in deserts.

Plant up to 50 cm high, densely arachnoid-tomentose, tomentose or ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery to herbaceous, tomentose on both sides, or tomentose beneath and glabrescent above; basal leaves up to 25 × 10 cm including spines, usually lyrate, sometimes lanceolate or oblanceolate, dentate to deeply pinnatisect or pinnatipartite, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to oblong-lanceolate, spiny-lobed, cuneate at base, decurrent to form winged stems. *Capitula* 2.5-7 cm broad with appendages, usually arachnoid-tomentose or ± glabrescent. *Phyllaries* 50-120; middle ones recurved, ± spreading, spreading-incurved, appressed-incurved or -erect or imbricate, their free part usually abruptly expanded above into a usually keeled, concave or flat, rhomboid, deltoid, rhomboid- or deltoid-lanceolate or lanceolate appendage; appendage 10-30 mm long, 4-10 mm broad, attenuate into a long spine at apex, arachnoid-tomentose, tomentose or

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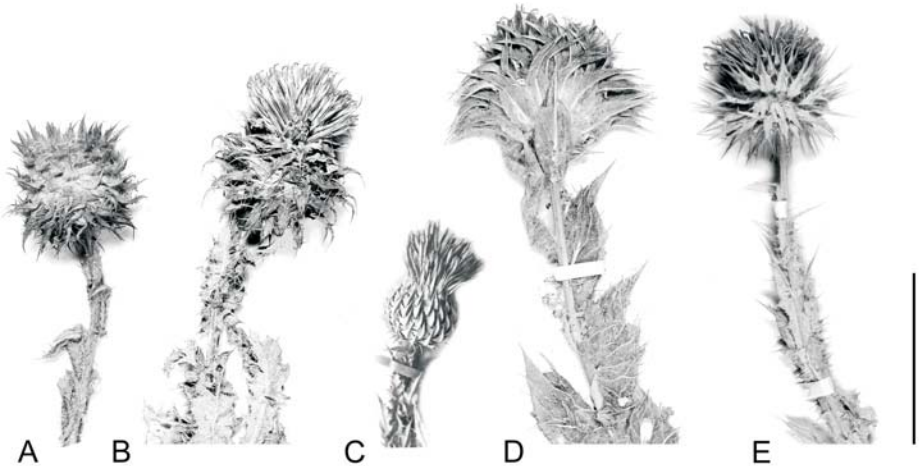

Fig. 7. A: *Cousinia odontolepis* subsp. *odontolepis* (*Kotschy 380,* B-100158867); B: *C. odontolepis* subsp. *odontolepis* (*Rechinger 12049,* B-100157224); C: *C. odontolepis* subsp. *odontolepis* (*Agnew & al. 2147,* E); D: *C. odontolepis* subsp. *kurdica* (*Bornmüller 1404,* B-100093377); E: *C. noeana* (*Rechinger 14618,* B-100158891). – Scale bar: A-E = 5 cm; photographs A, B, D & E by the BGBM, C by I. Mehregan.

glabrescent, with 2-4(-6) spines on both sides. *Receptacular bristles* usually rough. *Flowers* (20-)40-120; corolla purple, rose or flavescent, 18-30 mm long; anthers concolourous. *Achenes* 4-5 mm long.

Key to the subspecies of *Cousinia odontolepis*

1. Uppermost leaves enclosing the involucre; phyllaries usually densely arachnoid-tomentose, with recurved appendages (Iraq, Erbil, Qandil Mts and E of Rawanduz) . . subsp. *kurdica*
– Uppermost leaves not enclosing the involucre; phyllaries usually sparsely arachnoid-tomentose or glabrescent, with ± spreading, recurved or inflated-incurved appendages (Iraq, provinces Mosul and Sulaymaniyah) . . . . . subsp. *odontolepis*

7a. *Cousinia odontolepis* subsp. ***odontolepis***
= *C. cymbolepis* Boiss., Diagn. Pl. Orient. Ser. 1: 119. Jul 1846, **syn. nov.** ≡ *C. schultziana* Jaub. & Spach, Ill. Pl. Orient. 2: 95, t. 177. 1846 ≡ *Arctium cymbolepis* (DC.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iraq, in regionibus superioribus montis Gara Kuristaniae, 6.8.1841, *Kotschy 380* (G-BOIS!; isolectotypes: B!, E!, G!, JE!, K!, M!, P [also lectotype of *C. schultziana*]!, W!).
= *C. baueri* Bornm. & Nab. in Österr. Bot. Z. 63: 61. 1913. – Type: Iraq, Assyria, in derelictis horti coenobii Mâr-Jakub prope Mossul, c. 1000 m, 7.6.1910. *Nábělek 3903* (BRA, photo!).
= *C. odontolepis* var. *leiolepis* Bornm. in Repert. Spec. Nov. Regni Veg. 46: 282. 1939. – Lectotype (designated here): Iraq, Jebel Baykhair near Zakho, 15.-18.6.1934, *Field & Lazar 798* (W!; isolectotypes: P!, K!, G!).
= *C. leatherdalei* Rech. f. in Österr. Bot. Z. 100: 462. 1953, **syn. nov.** – Holotype: Iraq, Mosul, Sursang, 8 km W of Amadia, 3200 ft., 4.6.1947, *Leatherdale 101* (BM-000927947!; isotype: W [fragment]!).
= *C. mazu-shirinensis* Rech. f., Fl. Iranica 90: 226. 1972, **syn. nov.** – Holotype: Iraq, Kurdistan, Arbil, Kani Mazu Shirin, 5000 ft., 20.6.1961, *Wheeler-Haines 2046* (E!; isotypes: K!, W!).
= *C. acanthophysa* Rech. f., Fl. Iranica 90: 227. 1972, **syn. nov.** – Holotype: Iraq, Kurdistan, Mosul, ad confines Turciae prov. Hakkari, in ditione pagi Sharanish, in montibus calc. a Zakho septentrionem versus, in declivibus saxosis (Tonschiefer) montis Zawita, 1400 m, 4.-9.7.1957, *Rechinger 10922* (W!; isotypes: B!, E!, K!, M!).

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Note. – *Cousinia cymbolepis* and *C. schultziana* were published in the same month and are based on the same material collected by Kotschy from N Iraq.

Illustrations. – Fig. 7A-C.

Very variable. *Uppermost leaves* not enclosing the involucre. *Phyllaries* usually sparsely arachnoid-tomentose or glabrescent, with tightly imbricate, appressed-incurved, ± spreading, spreading-erect, recurved or inflated-incurved appendages.

Flowering period. – (May-) June to August.

Taxonomic remarks. – Study of material of *Cousinia odontolepis* subsp. *odontolepis, C. cymbolepis* (≡ *C. schultziana*), *C. baueri, C. leatherdalei, C. mazu-shirinensis* and *C. acanthophysa* revealed that all these are very variable but connected by intermediate forms. None of them can be circumscribed as separate species. Phyllary appendages vary from ± tightly imbricate and appressed in material of *C. mazu-shirinensis* and *C. acanthophysa* to ± spreading in some populations of *C. odontolepis* and *C. baueri* or strongly recurved in *C. leatherdalei*. Even the type material of *C. cymbolepis* has phyllaries with recurved, ± spreading or incurved appendages. The phyllaries of *C. acanthophysa* are imbricate, appressed-incurved or -erect as in *C. mazu-shirinensis,* but larger.

Distribution and habitat. – Endemic to the mountains of N and NE Iraq, provinces Mosul and Sulaymaniyah (Fig. 11A), on stony slopes and in oak forests.

Further specimens seen. – Iraq: Mosul: Galli Zawita, NE of Zakho, 1400 m, 8.7.1957, *Al Rawi 23563* (K); Zawita gorge, Aqra-Dinart, 8.6.1958, *Ghafran 26137* (K); Berd Agha Gin Village, c. 18 km NW of Rania, 1115 m, 12.5.1959, *Al Rawi & al. 28691* (K); prov. Hakari, in ditione oppidi Zakho, in jugo inter Dagh al Radzjiem and Sharanish, in saxosis calc., c. 900 m, 2.-4.7.1957, *Rechinger 10796* (E, W); inter Dohuk and Amadiya, in apertis quercetorum supra Suwara Tuka, 1500 m, 10.-12.7.1957, *Rechinger 11552* (B, E, K, M, W); inter Dohuk and Amadiya, in pinetis (*P. brutia*) saxosis ad Zawita, 21 km a Dohuk orientum versus, substr. dolomit, c. 800 m, 10.-12.7.1957, *Rechinger 11549* (E, W); inter Dohuk and Amadiya, in Quercetim infra Sirsank, c. 800 m, 10.-12.7.1957, *Rechinger 11952* (M, W); inter Dohuk and Amadiya, c. 12 km a Dohuk orientum versus, c. 800 m, 10.-12.7.1957, *Rechinger 11979* (W); inter Mosul and Zakho, in saxosis calc. 103 km a Mosul septentr. versus, 2.7.1957, *Rechinger 10652* (B, E, K, M, W); Sarsang, 1100 m, *Anders 2289* (W); Sarsang, 1200 m, 20.6.1968, *Anders 2334* (W); inter Dohuk and Amadiya, in saxosis calc. supra Sirsank, 1200 m, 10.-12.7.1957, *Rechinger 11643* (E, W); Jabal Khantur prope Sharanish, 1100-1400 m, 4.-9.7.1957, *Rechinger 12049* (B, E, G, K, M, W); Ispindari, above Suwaratuka, 1250 m, 11.6.1958, *Chapman 26328* (K); Sersang, 3500 ft, 18.7.1955, *Wheeler Haines 581, s.n.* (E, K); ibid., 5.8.1957, *Wheeler Haines 1333* (E, K); ibid., 15.5.1957, *Wheeler Haines s.n.* (E); ibid., 9.8.1961, *Wheeler Haines s.n.* (E); 23 km NE of Zakho, 25 km S of Sharanish, 990 m, 4.7.1957, *Al Rawi 2318*9 (K); 5 km S of Zakho, 700 m, 3.7.1957, *Al Rawi 23092* (K); Bikher Mt near Zakho, 700-800 m, 2.7.1957, *Al Rawi 23049 & 22984* (K); Sirsang, Amadia-Sirsang road, gentle smooth slope with cut oak and scrub, 9.8.1961, *Wheeler Haines s.n.* (W); Badi, 860 m, 2.6.1978, *Omar & al. 49639* (K); Dori village, 5 km E Kani Masi, 1320 m, 6.7.1976, *Omar & Kaisi 45432* (K); Kergedraija, 1800 m, 21.6.1947, *Al Rawi 9140* (K); Khantur Mt, NE of Zakho, 1770 m, 6.7.1957, *Al Rawi 23478 & 23403* (K); Seramadia, 5900 ft., 3.8.1933, *Guest 4981* (K); Seramadia, 13.8.1961, *Agnew & Haines W2107* (K, W); Sulaf, hillside with cut oak shrub, 9.8.1961, *Wheeler Haines 2062* (E, K, W); Sundur, near Dohuk, 19.8.1959, *Wheeler Haines 1570* (E, K, W); Zawitah gorge, 2800 ft., 26.9.1933, *Guest 3715* (K, W); M. Potine (Botin) 10 km NNW Shirwan Mazin (Mazu Shirin), 21.6.1961, *Wheeler Haines* (E); Zewita pr. Shirwan Mazin (Mazu Shirin), 19.6.1961, *Wheeler Haines 2147* (E, K); on the mount NNW of Seri Hasan Beg, 6500 ft., 24.7.1932, *Guest 2907* (K). — Sulaymaniyah: Asme, 13.7.1961, *Wheeler Haines 2107* (E, W); 10 km from Sulaymaniyah to Choart, 26.7.1973, *Noori & Khamidi 41254* (K); Azmir, 860 m, 15.5.1971, *Omar & al. 38041* (K); Gweija Dagh above Sulaymaniyah, 1400 m, 4.6.1948, *Al Rawi & Gillett 11715* (K).

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7b. *Cousinia odontolepis* subsp. ***kurdica*** (C. Winkl. & Bornm.) Mehregan, **comb. & stat. nov.** ≡ *C. kurdica* C. Winkl. & Bornm. in Bull. Herb. Boissier 3: 564 & 567. 1895. – Lectotype (designated here): Iraq, Arbil (Erbil), in terrae Riwandous monte Sakri-Sakran altitudine 13-1700 m, 16.1893, *Bornmüller 1404* (B-100093376!; isolectotypes: B!, G!).
= *C. carduchorum* C. Winkl. & Bornm. [as "α *minor*"] in Bull. Herb. Boissier 3: 566 & 568. 1895, **syn. nov.** – Lectotype (designated here): Iraq, in Kurdistaniae terra Riwandous, in monte Händarin, 12-1300 m, 28.6.1893, *Bornmüller 1406* (B-100088384!; isolectotypes: B ["1406b"], G!, JE!).
= *C. carduchorum* var. *major* C. Winkl. & Bornm. [as "α *major*"] in Bull. Herb. Boissier 3: 569. 1895. – Holotype: Iraq, in monte Sakri-Sakran ditionis Riwandous, 1700 m, 23.6.1893, *Bornmüller 1405* (B-100088383!; fragment in JE!).
= *C. qandilica* Rech. f., Fl. Iranica 90: 223. 1972, **syn. nov.** – Holotype: Iraq, Arbil, Montes Qandil, ad confines Persiae, in quercetis saxosis inter Shahidan & Pushtashan, substr. calc., 1200 m, 28.7.1957, *Rechinger 11003* (W!; isotype: M!)

Note. – Bornmüller described *Cousinia carduchorum* var. *carduchorum* (autonym, originally as "α *minor*") and *C. carduchorum* var. *major* based on material collected by himself from Mt "Händarin" near "Riwandous" (no. *1406,* "with duplicates"; stems 15-25 cm long) and Mt "Sakri-Sakran" (syntypes including no. *1405,* "unicum"; *1406b,* "unicum"; stems 30-40 cm long), respectively. We found several herbarium sheets in B, G and JE that match the description of *C. carduchorum* var. *carduchorum* under no. *1405, 1406* and *1406b,* plus a single sheet in B under no. *1405* that matches the description of *C. carduchorum* var. *major*. Examination of the type material, its labels and the original publication revealed some contradictions. We designated sheet B-100088384 as lectotype of *C. carduchorum* var. *carduchorum*. This sheet clearly matches the original illustration of *C. carduchorum* (α *minor*), but is mistakenly labelled as no. *1405* (not *1406* as cited by Bornmüller). The label is apparently erroneous because the type material of *C. carduchorum* var. *major* (no. *1405*) in B and JE (fragment) is from a single sheet designated by Bornmüller as "unicum". Therefore, the label of sheet B-100088384 must be corrected to no. *1406*.

Citing no. *1406b* as material for *Cousinia carduchorum* var. *major* in the original publication seems to be a mistake by Bornmüller himself. Sheet B-100088382, collected by Bormüller as no. *1406b,* clearly matches the description of *C. carduchorum* var. *carduchorum* (α *minor*) and was mistakenly named var. *major* in the original publication. Its label seems to have been later corrected by Bornmüller himself to var. *minor* (designated by Bornmüller's handwriting as "unicum").

On this background, some clarification and correction is necessary: (1) type material of *Cousinia carduchorum* var. *carduchorum* (α *minor*) includes sheets no. *1406* (multiple) and *1406b* (single), (2) the type material of *C. carduchorum* var. *major* is a unicate under no. *1405* and does not include sheet no. *1406b*.

Illustration. – Fig. 7D.

Uppermost leaves enclosing the involucre. *Phyllaries* usually densely arachnoid-tomentose, with recurved appendages.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia odontolepis* subsp. *kurdica, C. carduchorum* and *C. qandilica,* all distributed in NE Iraq (Qandil mountain range and neighbouring area), are connected by intermediate forms. Subspecies *kurdica* is similar to subsp. *odontolepis* and differs mainly in having a densely arachnoid-tomentose indumentum.

Distribution and habitat. – Endemic to N Iraq (province Erbil) (Fig. 11B), on stony slopes and in oak forests.

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Further specimens seen. – Iraq: Erbil: Kermasur lake, Qandil range, 2210-2610 m, 1.8.1957, *Al-Rawi & Serhang 24137* (K); Mons Helgurd ad confines Persiae, in valle supra pagum Nowanda, 36°40'N, 44°50'E, 2600 m, 10.-14.8.1957, *Rechinger 11348* (E, K, M, W); Montes Qandil ad confines Persiae, in decliv. orient. supra Pushtashan, in Astragaletis, [36°30'N, 45°E], 2000-2200 m, 28.7.-1.8.1957, *Rechinger 11748* (E, W); Montes Qandil, in quercetis infra Pushtashan versus Shahidan, 1000 m, 8.-9.8.1957, *Rechinger 11022* (E, G, K, W); Baaki Hawaran Mt, roadside, 1500-1820 m, 29.7.1957, *Al-Rawi 23960* (K); Koorak Mt, N of Shahidan Project, c. 1000 m, 28.7.1957, *Al-Rawi & Serhang 23800* (K).

8. *Cousinia noeana* Boiss., Diagn. Pl. Orient. Ser. 2: 57. 1856 ≡ *Arctium noeanum* (Boiss.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iran, Kirrind in montibus ibidem, 8.1851, *Nöe 1028* (G-BOIS!; isolectotypes: P!).
= *C. kirrindica* Bornm. & Rech. f. in Repert. Spec. Nov. Regni Veg. 48: 141. 1940, **syn. nov.** – Holotype: Iran, Kermanshah, inter Kermanshah & Kirrind, substrato calcareo, 17.8.1937, *Rechinger 2136* (W!; isotype: B [fragment]!).
= *C. mobayenii* Ghahreman & Attar in Iran. J. Bot. 8: 260. 2000, **syn. nov.** – Holotype: Iran, Kermanshah, between Eslamabad-e Gharb and Kerend-e Gharb, 3 km after Firouzabad village, 1490 m, 16.7.1997, *Ghahreman & Attar 20569* (TUH!); paratypes: Iran, Kermanshah, between Eslamabad-e Gharb and Kermanshah, 1500 m, *Ghahreman & Attar 22378* (TUH); 18 km N of Kerend-e Gharb, Lotfeh village, 1760 m, 21.6.1987, *Hamzehee & Hatami 1425* (TARI!); mountains above Kerend, beginning of the road Dalahu, 1700-2000 m, 18.6.1987, *Assadi 60789* (TARI!).

Illustration. – Fig. 7E.

Plant up to 40 cm high, arachnoid-tomentose or ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery or herbaceous, tomentose on both sides or ± glabrescent above; basal leaves up to 20 × 6 cm including spines, oblong-lanceolate, pinnatifid to deeply pinnatisect, with spiny-dentate lobes; stem leaves sessile, abruptly or gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed, usually long-decurrent to form winged stems. *Capitula* 2-7.5 cm broad with appendages, arachnoid-tomentose or ± glabrescence. *Phyllaries* 70-120; middle ones recurved or ± spreading, their free part slightly expanded above into a usually keeled or flat, lanceolate to linear appendage; appendage 12-30 mm long, 3-6 mm broad, attenuate into a long spine at apex, tomentose or glabrous, with 2-3 spines on both sides. *Receptacular bristles* usually rough. *Flowers* 20-120, corolla purple or rose, 15-23 mm long; anthers concolourous. *Achenes* 3-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – The type material of *Cousinia noeana* deposited in G-BOIS and P was not seen by Rechinger when he published his treatment of *C.* sect. *Cynaroideae* (Rechinger 1972). The type material of *C. noeana, C. kirrindica* and *C. mobayenii* was collected in a relatively small area near Kerend (Iran, province Kermanshah). Examination of this type material and other specimens collected around Kerend shows that all material belongs to a single species with limited morphological variation.

Distribution and habitat. – Endemic to W Iran, provinces Ilam and Kermanshah (Fig. 11C), in oak forests.

Further specimens seen. – Iran: Ilam: *Quercus* forest, 1800 m, 10.7.1997, *Ghahreman & Attar 19711 & 19705* (TUH). — Kermanshah: 100 km W of Kermanshah, Beig-Rezaee village, 1560 m, 24.8.1987, *Hamzehee & Hatami 1683* (TARI); 43 km SW of Kermanshah, 1680 m, 14.6.1959, *Pabot 1873* (TARI); Kermanshah, Resarch Inst. Forests & Rangelands, 1450 m, 24.6. 1987, *Hamzehee & Hatami 1514* (TARI); road of Eslamabad-Zavar-e Kuh, 1600 m, 4.7.1997, *Ghahreman & Attar 19962* (TUH); road of Ilam, Kalleh-Joub, 1350 m, 16.7.1997, *Ghahreman &*

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Attar 20563 (TUH); Sarabe Kerend, 2030 m, 29.6.1967, *Iranshahr & Terme 12200E* (IRAN, W); inter Qasr Shirin & Kermanshah, inter Shahabad & Kermanshah, substr. calc., 28.8.1957, *Rechinger 14618 & 14621* (B, E, K, M, TARI, W); Kirrind (Karand), 8.1851, *Noe 629* (P).

9. *Cousinia algurdina* Rech. f. in Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 101: 344. 1964. – Lectoype (designated here): Iraq, Erbil, Mons Helgurd (Algurd) ad confines Persiae, in valle supra pagum Nowanda, 2600-3000 m, 36°40'N, 44°50'E, 10.-14.8.1957, *Rechinger 11465-II* (W-1972-01633!; isolectotypes: B!, E!, K!, M!, W!).
= *C. cynaroides* var. *arlgirdensis* Blakelock in Kew Bull. 1949: 50. 1949. – Lectotype (designated here): Iraq, Sulaymaniyah, Arl Gird Dagh, 2700 m, 24.7.1932, *Guest 2951* (K [specimen with five capitula]!; isolectotype: K!).

Note. – Type material of *Cousinia algurdina* at W is mounted on two sheets, both of them with a "Typus" stamp. Sheet *Rechinger 11465-II* is here selected as lectotype.

Illustration. – Fig. 12A.

Plant up to 50 cm high, densely arachnoid-tomentose or tomentose, usually yellowish especially in upper part. *Stems* erect, branched above. *Leaves* leathery, tomentose on both sides; basal leaves up to 15 × 4 cm including spines, linear-lanceolate to oblanceolate, pinnatilobed to pinnatisect, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed, round to cuneate at base, up to 2 cm decurrent. *Capitula* 4.5-7 cm broad with appendages, usually yellowish arachnoid-tomentose. *Phyllaries* 40-60; middle ones ± spreading, their free part ± expanded above into a usually keeled, lanceolate appendage; appendage 20-25 mm long, 5-8 mm broad, attenuate into a long spine at apex, arachnoid-tomentose, usually with 2-3 spines on both sides. *Receptacular bristles* usually rough. *Flowers* 120-150; corolla creamy white or flavescent, 22-27 mm long; anthers concolourous. *Achenes* 4-6 mm long.

Flowering period. – July to August.

Taxonomic remarks. – Although *Cousinia algurdina* along with *C. odontolepis* subsp. *kurdica* are distributed in the Qnadil range in N Iraq, they are not sympatric. *C. algurdina* grows mainly in the alpine zone, whereas *C. odontolepis* subsp. *kurdica* grows in the subalpine zone or lower. *C. algurdina* is more similar to *C. canescens* but differs by appendages with spines on both sides and a yellowish indumentum especially in its upper part.

Distribution and habitat. – Endemic to the alpine zone of Qnadil range, a mountainous area in the Iraqi provinces Erbil and Sulaymaniyah close to the border with Iran (Fig. 13F), on rocky alpine summits and east- and south-facing mountain slopes.

Further specimens seen. – Iraq: Erbil: Montes Qandil ad confines Persiae, [36°30'N, 45°E], 2000-2600 m, 28.7.-1.8.1957, *Rechinger 11116* (E, W). – Sulaymaniah: Malikh Mt (Goomasur), Qnadil range, 2400-2600 m, 30.7.1957, *Al Rawi 24042* (K).

10. *Cousinia canescens* DC., Prodr. 6: 556. 1838. – Lectotype (designated here): Iran, 1837, *Aucher-Eloy 3494* (G-DC!; isolectotypes: K!, P!).
= *C. onopordon* Freyn. & Sint. in Österr. Bot. Z. 42: 207. 1892. – Lectotype (designated here): Turkey, Erzincan, Sipikordagh, in declivib. supra pag. Sipikor, 25.7.1890, *Sintenis 3285* (W!; isolectotypes: JE!, P!, WU!).
= *C. onopordon* var. *lancea* Bornm. in Repert. Spec. Nov. Regni Veg. 46: 284. 1939. – Lectotype (designated here): Turkey, ad Euphratem superiorem, 1834, *Montbert 2397* (W-1889-171723!; isolectotypes: B!, E!, P!).
= *C. onopordon* f. *anodonta* Bornm. in Repert. Spec. Nov. Regni Veg. 46: 285. 1939. – Lectotype (designated here): Turkey, Euphrat, 1834, *Montbert 2397* (W-1889-170989!; isolectotype: W!).

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= *C. eriocephala* Boiss. & Hausskn. in Boissier, Fl. Orient. 3: 504. 1875 ≡ *Arctium eriocephalum* (Boiss. & Hausskn.) Kuntze, Revis. Gen. Pl. 1: 307. 1891, **syn. nov.** – Lectotype (designated here): Turkey, Taurus Cataonicus, in lapidosis pr. Berytdagh, 8000', 6.8.1865, *Haussknecht 1002* (G-BOIS: G-00152016!; isolectotypes: E!, G-BOIS!, JE!, P!, W!); former second syntype: Armenia, in valle Goshkar warto, 5600 ped., 20.8.1859, *Kotschy Suppl. 630* (G-BOIS!, W!).
= *C. zagrica* Attar, Ghahreman & Assadi in Sendtnera 8: 5. 2002, **syn. nov.** – Holotype: Iran, Azerbaijan, West of Urmieh, Mavana, Hakki Mts, West of Darreh Rash village, 2100-2700 m, 31.7.1995, *Mozaffarian 74871* (TARI!; isotypes: TARI!).
= *C. satdaghensis* Hub.-Mor. in Notes Roy. Bot. Gard. Edinburgh 32: 55. 1972, **syn. nov.** – Holotype: Turkey, Hakkari, 21 km from Bajirge to Yüksekova, meadow on shaley hillside, 2230 m, 18.6.1966, *Davis 45230* (E!).
= *C. qaradaghensis* Rech. f., Fl. Iranica 90: 258. 1972. – Lectotype: Iran, Azerbaijan, Qara Dagh, in monte Kiamaki Dagh (Kamcheh) prope Daran, SE Jolfa, 1400-2400 m, 26.7.1971, *Terme in Rechinger 43662-II = Terme 5062-IRAN* (W-1972-06679!; isolectotypes: IRAN!, K!, W-1972-19791!), **syn. nov.**
[– *C. onopordon* α *genuina* Bornm. in Repert. Spec. Nov. Regni Veg. 46: 284. 1939, nom. inval. (Art. 24.3, McNeill & al. 2006). – Original material: Turkey, Chama ad Euphratem inter Altbuschik Surek, 30.6.1889, *Sintenis 1062* (K!, W!)].

Note. – Both sheets *Rechinger 43662-I* and *43662-II* of *Cousinia qaradaghensis* at W bear the identical "Typus" stamp, the latter sheet is here selected as lectotype.

Illustration. – Fig. 12B.

Plant up to 60 cm high, white-arachnoid-tomentose, rarely glabrous or glandular. *Stems* usually branched from the middle or higher. *Leaves* leathery, white-arachnoid-tomentose on both surfaces, rarely glabrous or glandular; basal leaves up to 27 × 10 cm including spines, lanceolate to oblong-lanceolate, undulate, sinuate-lobate with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, oblong, ovate to lanceolate, spiny-lobed, rounded to cuneate at base, up to 5 cm decurrent. *Capitula* 3-9 cm broad with appendages, arachnoid or ± glabrescent. *Phyllaries* 40-100; upper ones often tinted red-brown; middle ones spreading-erect, spreading to recurved, rarely erect-incurved, their free part expanded above into a keeled, (ovate-)lanceolate to linear-lanceolate appendage; appendage 6-30 mm long, 3-8 mm broad, gradually attenuate into a spine at apex, usually arachnoid-tomentose, without or rarely with 1-2 tiny spines on both sides. *Receptacular bristles* rough or smooth. *Flowers* 70-150; corolla rose or purple, 22-30 mm long; anthers concolourous. *Achenes* 5-7 mm long.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia canescens* s.l. consists of variable populations widely distributed in Turkey and NW Iran, and is relatively uniform in vegetative morphology and corolla colour, but very variable in involucral morphology. Phyllary appendages vary from small to large, recurved to incurved, (ovate-)lanceolate to linear-lanceolate. As an extreme, the indumentum may be absent *(Davis 22708b)*. The type material of *C. eriocephala* has relatively short phyllary appendages but falls within the variation of *C. canescens*. Therefore, we are unable to maintain *C. eriocephala* as a distinct species.

Type material of *Cousinia zagrica* is very similar to *C. eriocephala* but differs in having straight lanceolate phyllary appendages, a character common in *C. canescens*.

The type material of *Cousinia satdaghensis* at E is an immature plant with closed flowers and recurved lanceolate phyllaries. Stems and leaves are similar to *C. canescens*. *C. satdaghensis* has been incorrectly classified under *C.* sect. *Sphaerocephalae,* a small group of species endemic to N Iran. Flowering material in E and K *(Davis 24130)* matches the description of *C. satdaghensis* and shows the diagnostic characters of *C. canescens* including the arachnoid-tomentose involucre and rose or purple flowers.

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Type material of *Cousinia qaradaghensis* described from NW Iran was collected in the late flowering and fruiting period. It has the typical characters of *C. canescens* including arachnoid-tomentose leaves, stems and involucres, lanceolate phyllaries and rose or purple flowers and cannot be regarded as a distinct species.

Distribution and habitat. – C to E Turkey and NW Iran (Fig. 13A), on stony slopes.

Further specimens seen. – Turkey: Sivas: 5 km W Susehri, 950 m, 8.7.1969, *Sorger 69-32-3* (W); Gürün, Sivas, 36 km N Gürün bei Bögrüdelik, 1700 m, 11.7.1981, *Nydegger 16864* (G). — Kayseri: Binboga Daghi, Yalak Mevkii, hareketli Yamaclar, 1620-2100 m, 4.8.1988, *Aitac 2502* (GAZI); Yalak muk, Tekke kayasi, 1800-2200 m, 4.8.1991, *Aitac & Duman 4292* (GAZI); Sarkisla-Ortakay yolu, 1250-1350 m, 27.8.1995, *Aytoa & Dönmez 6719* (GAZI). — Maras: Distr. Goksun, Binboga dag above Yalak, in gravel at edge of ravine bed, 2000, 17.7.1952, *Davis 20163a & 20163b* (ANK, E, W); Distr. Cardak, Berit dagh, above Ericek, 2100 m, 27.7.1952, *Davis 20397* (ANK, E). — Erzincan: Kemah-Erzincan, bei Sürek, 1300 m, 25.6.1992, *Nydegger 46445* (G, GAZI); Kemah, bei Sürek, 1200 m, 16.7.1988, *Nydegger 43802* (G); Pasinler-Hinis, 62 km N Hinis, 1680 m, 1.8.1984, *Nydegger 19550* (G, GAZI, M); 66 km from Hinis to Erzurum, in Aras gorge, 1650 m, 12.7.1966, *Davis 46436* (E, K, W). — Tunceli: Munzur dagh, above Ovacik, rocky limestone slopes, 2400 m, 16.7.1957, Davis & Hedge 31150 (ANK, E, K); Euphrati Superior, *Montbret s.n.* (P). — Erzurum: Karliova-Cat, 31 km N Karliova, 2440 m, 21.7.1982, *Nydegger 18432* (G); grands ravins priès Ispir, 1862, *Bourgeau s.n.* (P); Eqin, Kainartschar, in lapidosis, 13.7.1890, *Sintenis 2907* (B). — Artvin: 29 km E Demirkent (S Saliöy), 2300-2650 m, 16.8.1981, *Sorger 81-83-14* (W). — Kars: Distr. Olty pr. pg. Erjük, 2.7.1911, *Gosnowsky s.n.* (B); Akcay-Cumacay, 20 km S Akcay, 2200 m, 30.7.1984, *Nydegger 19503* (G); near Kötek, dry shaley yellow hills, 1450 m, 16.7.1966, *Davis 46679* (E, K); Bayburt, 5000 ft., 10.8.1962, *Furse 3850* (K). — Agri: 15 km from Eleskirt to Horasan, E of Tahir pass, sloping meadow, 2200 m, 24.7.1966, *Davis 47117* (E, K); E side of Tahir pass, 19 km from Eleskirt to Horasan, 2400 m, 24.7.1966, *Davis 47115* (E); Agri to Horasan, E of pass, Roadsid bands and fieldsides, c. 2150 m, 3.8.1965, *Lamond 2568* (E); W side of Tahir pass (Horasan-Eleskirt), dry slopes on sandy soil, 2350 m, 21.7.1966, *Davis 47308* (E, K); in jugo inter Agri (Karaköse) & Horasan, 2000-2500 m, 3.8.1965, *Rechinger 32865* (B, G, M, W). — Bitlis: Kotum, Karz Dag above Kamer, 2600 m, 24.8.1954, *Davis 24568* (K); Kambos Dag above Hurmuz, rocky slops, 6000 feet, 31.7.1954, *Davis 23415* (ANK, E, K); southern slopes of Kambos Dagh above Tutu, rocky slopes, 2000 m, 17.8.1956, *Mc Neill 617* (E, K); in monte Meleto (Meretug) Dagh distrctus Bitlis, in lapidosis usque in vallem Sassim descendens, 1400-2700 m, 10.-12.8.1910, *Handel-Mazzetti 2866* (B, W, WU). — Van: Mountain 10 km SE of Pelli, E side of summit ridge, 9600 ft, 8.7.1957, *Davis 22585* (E, K); Hasap-Güzeldere, 2200 m, 30.6.1989, *Güner 7350* (GAZI); Hasap-Güzeldere, 2800 m, 18.8.1993, *Altan s.n.* (GAZI); Artos dagh, above Cevas, rocky slopes, 6500 ft, 14.7.1954, *Davis 22708b* (ANK, E, K, W); Artos Dagh, north ridge, 8000-9000 ft, 3.8.1966, *Tong 313* (E); Ispiriz Dagh, dry rocky slope, 2700 m, 31.7.1954, *Davis 23722* (E, K, ANK); Güceldere Gecidi, 2790 m, 7.7.1981, *Sorger 81-36-2* (W); Gürpinar Samran Anakanali, Bashet Daghi eteckleri Nemli yerler stepte, 2000 m, 4.7.1993, *Actan 5298* (GAZI); in faucibus 25 km NW Bashkale, 2400 m, 23.7.1974, *Rechinger 49901* (G, W); in summo jugo inter Bashkale & Hoshap, 2700 m, 31.6.1975, *Rechinger 53880* (G, W); 26 km from Baskale to Hosap, calc. rocky slopes of ravine, 2400 m, 3.7.1966, *Davis 45886* (E, K). — Hakkari: Cilo Dagh, 10 km W of Cilo Tepe, dry rocky slope,10000 ft, 9.8.1954, *Davis 24130* (ANK, E, K); Kara Dagh, Eroded S slope, 9000 ft, 15.8.1954, *Davis 24377* (ANK, E, K); Sat Daghi, NW of Sat Gölu, rocky igneous slopes, 2850 m, 28.6.1966, *Davis 45488* (E, K); Esendere, Yüksekova, 23 km W Esendere, beim Tunnel, 2230 m, 24.7.1983, *Nydegger 18432* (G); pass between Hakkari and Kaval (Piyannis), shaley N slopes, 2500 m, 23.6.1966, *Davis 45422* (E, K); zwischen Uludere und Hakkari, 14 km E Uludere, felsiger Abhang, 2080 m, 20.7.1983, *Nydegger 18348* (B, M).

Iran: Azarbaijan: Khoy, Ghotur, 1600 m, 23.6.1999, *Ghahreman & Attar 22442* (IRAN, M, TUH); Maku, 2000 m, 20.6.1995, *Siami 79101* (TARI); Siahcheshmeh, 2600 m, *Siami 79102*

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(TARI); in valle flavii Qotur W Khvoy versus fines Turcicas, 1800-2000 m, 10.6.1971, *Rechinger 41627* (W); inter Ashgharabad & Kolavana NNW Khvoy, 2100 m, 16.7.1974, *Rechinger 49437* (B, E, G, K, M,); Maku, Khan Goli, Kalissa-Kandi, 2500 m, 1.7.1973, *Siami 01793 = 7634* (W); c. 70 km W of Khoy, mountain above the village Razi, 2000-2250 m, 26.7. 1990, *Assadi & Olfat 68887* (TARI); Khoy, Ghotur, 1600 m, 23.6.1999, *Ghahreman & Attar 22442* (IRAN, M, TUH); Khoy, Razi station, 1950 m, 20.7.2000, *Attar & Mehdigholi 21981* (TUH).

11. *Cousinia hakkarica* Hub.-Mor. in Notes Roy. Bot. Gard. Edinburgh 32: 54. 1972. – Holotype: Turkey, Hakkari, Zap gorge beneath (2-3 km from) Cölemerik, stony S slopes, 1400 m, 24.6.1966, *Davis 45467* (E; isotypes: K!, W!).

Illustration. – Fig. 12C.

Plant up to 60 cm high, glabrous or glabrescent. *Stems* usually branched from the base or higher. *Leaves* leathery or ± herbaceous, white-arachnoid-tomentose beneath, glabrous or glabrescent above; basal leaves up to 25 × 10 cm including spines, lanceolate, sinuate-lobate with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed, round to cuneate at base, up to 6 cm decurrent. *Capitula* 3-5 cm broad with appendages, arachnoid, ± glabrescent. *Phyllaries* 90-120; middle ones ± spreading or spreading-incurved, their free part expanded above into a keeled, lanceolate to narrowly lanceolate-mucronate appendage; appendage 7-17 mm long, 3-9 mm broad, gradually attenuate into a spine at apex, usually glabrous, with 1-2(-4) tiny spines on both sides. *Receptacular bristles* rough. *Flowers* 110-150; corolla white, 23-25 mm long; anthers rose or purple. *Achenes* c. 5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – Similar to *Cousinia canescens* but differing mainly by lacking an arachnoid-tomentose indumentum on the vegetative parts and by having dicolourous leaves and white flowers.

Distribution and habitat. – Endemic to SE Turkey and NW Iran (Fig. 13B), on rocky slopes.

Further specimens seen. – Turkey: Hakkari: Kara Dagh, eroded S slopes, 8000 ft, 15.8.1954, *Davis 24376* (ANK, E, K).
Iran: Azarbaijan: Between Agh-Bolagh and Silvana, before Dizej, Darabad, 2200 m, 27.6.2003, *Assadi 85176* (TARI).

12. *Cousinia macrocephala* C. A. Mey., Verz. Pfl. Casp. Meer.: 231. 1831 ≡ *Onobroma macrocephalum* C. A. Mey., Verz. Pfl. Casp. Meer.: 67. 1831 ≡ *Arctium macrocephalum* (C. A. Mey.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Azerbaijan, in montibus Talüsch prope pagum Drych & versus rupem Kis-Kale, locis lapidosis, 500-800 hexap., 6.1830, *Meyer s.n.* (G-BOIS!; isolectotypes: LE, P!).
= *C. macrocephala* var. *spinulosa* Lomak. ex Lipsky, Fl. Caucasi: 355. 1899. – Holotype: Azerbaijan, Talysch, in m. Mapajünt, 7000', *Lomakin s.n.* (LE; isotype: B!).
= *C. gigantolepis* Rech. f., Fl. Iranica 90: 257. 1972, **syn. nov.** – Holotype: Iran, Azerbaijan, versant nord de la Kuh-i Savelan (Sabalan), au-dessus de Mishgin Sar (Meshgin Shahr), 1600-3550 m, 22.-26.8.1956, *Schmid 6539* (W!; isotype: G!).
= *C. gabrieljanae* Takht. & Tamanian in Bot. Zhurn. 73: 1612. 1988, **syn. nov.** – Holotype: Armenia, Kafan district, in the suburbs of town Kafan, Shiblik on the territory of forestry company, 31.7.1986, *Gabrielian, Tamanian & Fajivush 132334* (ERE; isotypes: B!, LE, WU!).
= *C. takhtajanii* Tamanian, Fl. Rastitel'nost' Rastitel'nye Resursy Armyansk. S.S.R. 13: 16. 1991, **syn. nov.** – Holotype: Armenia, Goris district, vicinity of Galidzor village, 4.7.1987, *Tamanian 132335* (ERE).

Note. – We did not see the type material of *Cousinia takhtajanii* but instead a specimen collected from near the type locality, which was identified by Tamanian as *C. takhtajanii* (*Vitek & al. 04-0991*, MJG).

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Illustration. – Fig. 12D.

Plant up to 60 cm high, white-arachnoid-tomentose. *Stems* usually branched from the base or higher. *Leaves* leathery, white-arachnoid-tomentose on both surfaces; basal leaves usually petiolate, up to 30 × 8 cm including spines, lanceolate to oblong-lanceolate, undulate, sinuate-lobate to pinnatisect, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, oblong, ovate to lanceolate or linear-lanceolate, spiny-lobed, rounded to cuneate at base, up to 4.5 cm decurrent, sometimes forming winged stems especially in lower part. *Capitula* 4-12 cm broad with appendages, arachnoid-tomentose or ± glabrescent. *Phyllaries* 40-80; middle ones usually ± spreading, their free part expanded above into a keeled, ovate, broadly lanceolate to linear-lanceolate appendage; appendage 15-30 mm long, 5-25 mm broad, gradually attenuate into a spine at apex, usually arachnoid-tomentose, rarely ± glabrescent, smooth at margin, rarely with 2-3 spines at both sides. *Receptacular bristles* rough or smooth. *Flowers* 70-200; corolla usually yellow, rarely purple or white (in dried material), 28-38 mm long; anthers concolourous. *Achenes* 3-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – According to Rechinger (1972), *Cousinia gigantolepis* is endemic to NW Iran and differs from the Caucasian *C. macrocephala* in having phyllaries with broader appendages. *C. gabrieljanae* has phyllaries with deltoid-cordate appendages similar to those of *C. gigantolepis*. Tamanian (1999) reported *C. gigantolepis* from the Caucasus and Talysh. Comparison of *C. gigantolepis* with *C. macrocephala* revealed continuous variation in the size and morphology of the phyllaries and we were unable to distinguish these two taxa. Material of *C. gabrieljanae* and of *C. takhtajanii* is connected with material of *C. macrocephala* by intermediate forms.

Distribution and habitat. – Endemic to the Caucasus (and Talysh) and NW Iran (Fig. 13C), on dry stony slopes.

Further specimens seen. – Armenia: Goris, inter opp. Goris & pag. Latschin, in siccis lapidosis, 27.6.1962, *Gabrielian s.n.* (E, G, W); Gegharkunik, Chambarak distr., area NE of lake Seven, along road between Tzovagyugh and Shordzha, c. 4 km WNW Shardzha, rocks and cliffs, [40°31'E, 45°14'N], 1920 m, 15.6.2002, *Oberprieler 10072* (B, M, W); Sjunik province, Kapan district, N Kapan, c. 0.5 km E of Jeritzavank, [46°29'28"E, 39°16'53"], 1650 m, *Vitek & al. 04-0991* (MJG).
Azerbaijan: In collibus aprisi Surnabad, Prov. Elisabethpol., *Hohenacker s.n.* (JE, P, WU); in saxosis montanis prope blanem Sura ditionis Elisabethpol Gaorg., 6.1838, *Hohenacker s.n.* (E, K, P, W); Distr. Schuscha. in collibus prope locum Chan-Kendy, 7.1900, *Fedossejew s.n.* (B); *Iberia caucasica, Hohenacker s.n.* (P); Iberia, *Besser s.n.* (K).
Iran: Azarbaijan: Ahar, Yarmadouz, 1.8.1968, *Terme 9012* (IRAN); 10 km from Kaleybar to Ahar, 1600 m, 22.7.1971, *Terme, 9011 & 9013* (IRAN); 13 km after Peigham village, on the road to Ahar, 1700 m, 13.7.1991, *Zehzad & al. 70677* (TARI); 14 km from Namin to Chulandarreh Sofla to Germi, after Anbaran, 1600 m, 20.6.1980, *Mozaffarian & Nowrouzi 34486* (TARI); 20 km from Kaleybar on raod to Ahar, 1600 m, 22.7.1971, *Lamond 4940 = Lamond in Rechinger 44207* (E, G, M, W); 40 km from Razi to Germi, 1700 m, 22.6.1980, *Mozaffarian & Nowrouzi 34780* (TARI); Ahar, 1400 m, 21.6.1988, *Assadi & Shahsavari 65915* (TARI); Ahar, Marzrud vers Peyghan, 6 km E de Barzin, 1650 m, 29.6.1978, *Terme, Moussavi & Habibi 9010* (IRAN); Arasbaran protected area, between Tolua-Ali and Veinagh, 900 m, 26.5.1977, *Assadi & Vosoughi 24574* (TARI); Arasbaran protected area, Doghroon mountain, 2000 m, 23.8.1976, *Runemark & Assadi 20942* (TARI); Arasbaran protected area, Ghaghalu, 650 m, 25.5.1977, *Assadi & Vosoughi 24528* (TARI); Arasbaran protected area, Veinagh to Dasharasi, 1000 m, 26.6.1997, *Hamzehee & Asri 81343* (TARI); Veinagh to Ghaghalu, 1000 m, 11.6.1976, *Assadi & Massoumi 20513* (TARI); Arasbaran, Asheghlou road, Toup Khaneh mountain, 2000 m, 22.6. 1997, *Hamzehee 21344* (TUH); Ardebil, Kuh-e Sabalan, 2650 m, 24.7.1974, *Foroughi & Assadi*

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13871 (TARI); between Meshkin-Shahr and Ahar, Now-Duz, 1000 m, 30.5.1978, *Wendelbo & Assadi 27886* (TARI); c. 40 km N of Meshkinshahr, near Moradlu, 1500 m, 7.7.1995, *Assadi 73804* (TARI); Ghotour-Sou, 1900 m, 16.7.1993, *Attar & Dadjou 17240* (TUH); Kaleybar, just before Gahleh Babak, 1500 m, 17.5.1993, *Ghahreman & al. 17507* (TUH); Mashkin-Shahr, 4.6. 1998, *Pour-Mohammadi 21808* (TUH); près de Tabriz, 22.8.1968, *Abai & Mojib 9014* (IRAN); Salavat, Goli Daragh village, Goli Daragh mountains, 1500-1850 m, 24.6.1980, *Mozaffarian & Nowrouzi 35001* (TARI); 20 km N of Ahar on road to Kaleibar, [38°36'30"N, 47°13'E], 1770 m, 20.6.2001, *Podlech & Zarre 55338* (M, TUH); Ahar, Iarmadouz, 1.8.1968, *Terme 13197* (W).

13. *Cousinia grandis* C. A. Mey. in Candolle, Prodr. 6: 557. 1838 ≡ *Arctium grande* (C. A. Mey.) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Lectotype (designated by Huber-Morath 1972: 261 [as "holotype"]): Iran, Azerbaijan, in montibus Seidchadschi (Seyed Hadji), distr. Khoi, 1832, *Szovits s.n.*(G-DC !; isolectotypes: K!, P!).
= *C. grandis* var. *minor* Bornm. in Verh. Zool.-Bot. Ges. Wien 60: 139. 1910. – Lectotype (designated here): Iran, Urumia, in lapidosis ad Sameschli, 7.7.1884, *Knapp s.n.* (WU [sheet with a long root]!; isolectotypes: B!, JE!, WU!).
= *C. wettsteiniana* Bornm. in Verh. Zool.-Bot. Ges. Wien 60: 137. 1910, **syn. nov.** – Lectotype (designated here): Iran, Azerbaijan, Tabriz, Güldize (Gülisähr), in aridis declivitatibus, 21.9. 1884, *Knapp s.n.* (WU!; isolectotypes: B!, JE!).
= *C. grantii* Rech. f., Fl. Iranica 90: 245. 1972, **syn. nov.** – Holotype: Iran, Azerbaijan, 23 km W Rezaiyeh, 1700 m, 12.7.1964, *Grant 16123* (W!).

Illustration. – Fig. 8A.

Plant up to 60 cm high, either completely glandulose-punctate or glabrous, rarely arachnoid-tomentose or ± glabrescent. *Stems* branched from the base or higher. *Leaves* herbaceous-leathery, glandulose-punctate, rarely arachnoid-tomentose on both surfaces; basal leaves up to 30 × 9 cm including spines, oblong to linear-lanceolate, sinuate-lobate to pinnatisect; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed to spiny-dentate, rounded to cuneate at base, usually long-decurrent to form interrupted wings in lower part of stems. *Capitula* 2.5-12 cm broad with appendages, glabrous, ± glabrescent or arachnoid. *Phyllaries* 40-110; outer ones usually similar to uppermost leaves; middle ones spreading to erect, their free part expanded above into a usually keeled, often leaf-like, straight to incurved, cordate, ovate, cordate-lanceolate to lanceolate appendage; appendage 10-40 mm long, 5-20 mm broad, attenuate into a spine at apex, usually with black glands, glabrous, ± glabrescent or arachnoid-tomentose, without or with up to 3 tiny spines on both sides. *Receptacular bristles* smooth or ± rough. *Flowers* 45-160; corolla dirty cream, dirty white or rose, 20-30 mm long; anthers concolourous. *Achenes* 4-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia grantii* was compared with *C. gilliatii* by Rechinger (1979) but differs from it by phyllaries with entire appendages (as opposed to middle phyllaries with obviously spiny appendages in *C. gilliatii*). *C. grantii* is more similar to *C. grandis* but mainly has phyllaries with narrower appendages. However, intermediate forms exist. Our study showed that plants with narrower appendages are distributed throughout the range of *C. grandis* but can be delimitated neither geographically nor morphologically. Phyllary appendages vary from cordate, ovate, cordate-lanceolate to lanceolate and are 10-40 mm long and 5-20 mm broad.

The type material of *Cousinia wettsteiniana* with relatively broad, leaf-like, dentate outer appendages is more similar to *C. grandis* than to *C. canescens* with usually entire, lanceolate outer phyllaries but differs from *C. grandis* by an exceptionally dense indumentum. *C. wettsteiniana* has phyllaries similar to those of *C. grandis* p.p. For example, glabrous material (*Ghahreman & Attar, 21343;* TUH) is clearly similar to the arachnoid-tomentose type of *C. wettsteiniana*. Also, some material of *C. grandis* with an arachnoid-tomentose indumentum was seen by us (e.g., *Siami 3708,* TARI, *Mozaffarian 69907,* TARI)).

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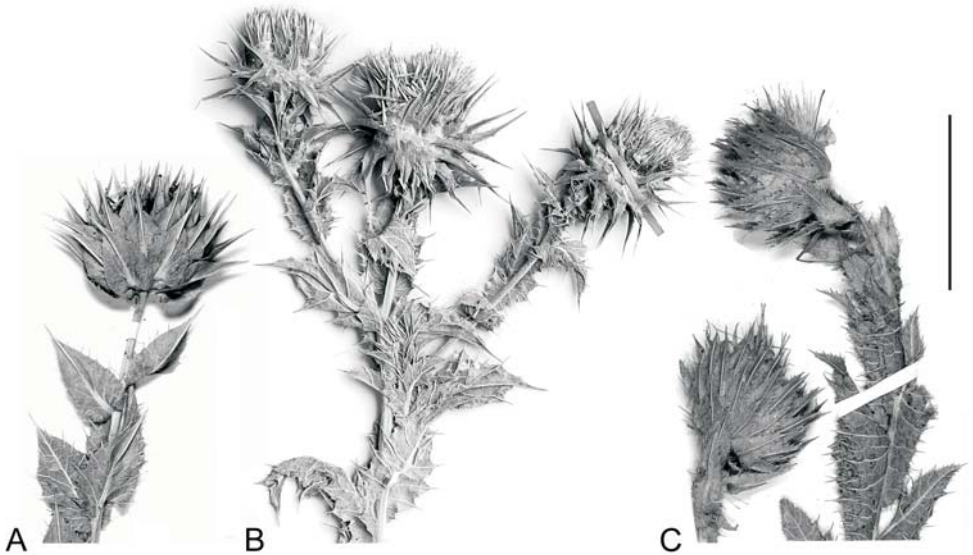

Fig. 8. A: *Cousinia grandis* (*Rechinger 57020,* B-100157173); B: *C. gilliatii* (*Rechinger in Lamond 5104,* E); C: *C. macrolepis* (*Haussknecht 570,* B-100093390). – Scale bar: A-C = 5 cm; photographs A & C by BGBM and B by I. Mehregan.

Distribution and habitat. – Endemic to SE Turkey and NW Iran (Fig. 13D), on rocky slopes.

Further specimens seen. – Iran: Azarbaijan: Maku, Khak-e Sorkh Pass, 5.8.1973, *Siami 7632* (TARI); Khoy, Seyyed Hajin, 1490 m, 1.8.1998, *Ghahreman 21803 (*TUH); 16 km S Rezaiyeh, roadside, 1350 m, 15.6.1971, *Lamond 4168* (E); between Khoy and Salmas, Gharetappe, 1600 m, 10.8. 1996, *Mozaffarian 77146* (TARI); between Oroumieh and Salmas, 1900 m, 19.7.1998, *Assadi 78929* (TARI); inter Oshnoviyeh & Dizaj, Mahal-e Dasht-Bel, 2050 m, 14.7.1974, *Zehzad & Siami 3625* (W); Rezaiyeh to Balansh, 15.6.1971, *Iranshahr 9027* (IRAN); Rezayieh, Ghasemlu valley, 1650 m, 26.7.1972, *Sabeti 6791* (TARI); S of Urumieh, 1500 m, 3.8.1997, *Ghahreman & Attar 21805* (TUH); Seluk, Margavar, 28.8.1972, *Siami 1245* (W); Silvana, Bardeh-Su, 10.7.1973, *Siami 01975* (W); Bardeh-Su, 6.7.1973, *Zehzad & Siami 1173* (W); Bardeh-Su, 2000-2200 m, 1.7.1974, *Cesad 2890* (W); Urumieh, 1350 m, 15.6.1999, *Attar 22490* (TUH), 1400 m, 15.6.1999, *Attar 22567* (TUH); Urumieh, Gardaneh Ghoushchi, 1750-2000 m, 16.7.1991, *Mozaffarian 70086* (TARI); Urumieh, Khoshakuh to Jermi, 2500 m, 7.7.1991, *Mozaffarian 69907* (TARI); Urumieh, Mavana, Makki, mountains W of the village Kuh-e Dare Rash, 2100-2700 m, 31.7.1995, *Mozaffarian 74886 & 74870* (TARI); Targuevar region, 3 km from Movana toward Sero, 1400-1450 m, 26.7.1990, *Mozaffarian 68265* (TARI); Urumieh, Targevar region, Kay villag, Germi, 2000-2100 m, 5.7.1991, *Zarre 12778* (TUH); Targevar, before Mavana, 30.7.1997, *Ghahreman & Attar 20578* (TUH); Rezaiyeh (Urmia), in valle Targavar-Benar, 28.9.1972, *Siami 1327* (TARI, W); prope Sero, 21.7.1974, *Siami 3517* (TARI, W); ad versuras 16 km S Rezaiyeh, 1350 m, 15.6.1971, *Rechinger 42100* (B, G, K, M, TARI, W); ad versuras N Sero, 62-69 km WNW Rezaiyeh, 1600-1800 m, 21.7.1974, *Rechinger 49769* (B, E, G, K, M, W); Chalil Kuh, in faucibus NW Selvana, 1750-2000 m, 4.7.1974, *Rechinger 48931* (B, G, M, W); in colle argilloso SW Rezaiyeh, 1500 m, 12.-13.7.1974, *Rechinger 49321* (B, W, WU); Marand to Evoghli, Kashk-Saray to Erelan, 1250 m, 5.6.1990, *Ghahreman & Mozaffarian 9767* (TUH); between Zonouz and Zonouzagh, 1750 m, 29.7.1997, *Ghahreman & Attar 21343* (TUH); Marand, Kuh-e Mishoudagh, 2000 m, 4.7.1998, *Assadi 78971* (TARI); 20 km W of Marand, mountains above the village Orlan, Mishoudagh, 2000-2500 m, 15.6.1988, *Assadi & Shahsavari 65470* (TARI); 30 km from Tabriz to Ahar, 1600 m, *Ghahreman & Attar 20577* (TUH); 35 km NW

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Bonab to Azadshahr, 1550 m, 8.7.1971, *Terme 9029* (IRAN); between Marand and Sufian, Payam, Mishoudagh, 2400-2700 m, 29.6.2003, *Assadi 85329* (TARI); c. 18 km NW of Marand, between Kashk-Saraj and Orlan, 1500 m, 15.6.1988, *Assadi & Shahsavari 65432* (TARI); c. 35 km N of Marand, above the village Miab, slopes of Kiamaki Dagh, 1790-1800 m, 24.7. 1990, *Assadi & Olfat 68558* (TARI); Tabriz, Osko, Kandavan, Ainsh, Kuh-e No'ur, 2200-2350 m, 8.8.1984, *Terme & Moussavi 15188* (IRAN); Tabriz to Marand, after Sufian, 1500 m, 26.6.1978, *Assadi & Mozaffarian 29816* (TARI); Tabriz to Sahand, between Basmanj and Vaighan, 2100 m, 10.7.1995, *Assadi 73988* (TARI); Tabriz, Sperkhan (Sefideh Khan), Sahand Mt, 2650 m, 30.8.1987, *Mozaffarian 64324* (TARI); ibid., 2400 m, 23.6.1994, *Attar & Dadjou 18038* (TUH); Tabris (Atropatana), 1350-1500 m, 25.6.1924, *Grossheim s.n.* (B); 38 km N of Bonab on road to Tabriz, 1550 m, 8.7.1971, *Rechinger 43163* (B, G, K, W), *Lamond 4650* (E); ad versuras lapidosas inter Miab & Babre ad radices montium Kiyamaki Dagh, 1600 m, 18.6.1977, *Rechinger 57020* (B, G); in valle fluvii Talkheh Rud (Atschi Tschai), 20-30 km NE Tabriz, 1600 m, 2.7.1971, *Rechinger 43567* (G, W); near Tabriz, 28.8.1927, *Gillet-Smith 2103 & 2367* (K); Achi Chay valley, 20-30 km NE Tabriz, limestone hills with salt and gypsum, 1600 m, 20.6.1971, *Rechinger 5191* (E, IRAN).
TURKEY: VAN: Catak, Dalbasti köyö-seytanderesi, mese acikligi, 1350-1600 m, 20.7.2002, *Bani 1283* (GAZI); Zab valley 25 miles S of Baskale, edge of fallow fields, 2.8.1954, *Davis 23808* (ANK, E, K, W); 39 km S Gürpinar, 2200 m, 22.8.1984, *Sorger 84-73-2* (W); 65 km S Gürpinar, 2500 m, 22.8.1984, *Sorger 84-76-9* (W).

14. *Cousinia gilliatii* Rech. f., Fl. Iranica 90: 244. 1972. – Holotype: Iran, Azerbaijan, near Tabriz, 25.6.1927, *Gilliat-Smith 1955* (K!; isotype: K!).
= *C. shebliensis* Ghahreman, Iranshahr & Attar in Iran. J. Bot. 8: 19. 1999, **syn. nov.** – Holotype: Iran, Azerbaijan, Tabriz, Shebli pass, 1830 m, 30.7.1997, *Ghahreman, Attar & Ghahremani-Nezhad 20580* (TUH!; isotype: TUH!).

Illustration. – Fig. 8B.

Plant up to 50 cm high, arachnoid-tomentose or ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery, arachnoid-tomentose on both surfaces or ± glabrescent above or on both surfaces; basal leaves up to 15 × 5 cm including spines, oblong to lanceolate, pinnatipartite to pinnatisect; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed to spiny-dentate, rounded to cuneate at base, usually long-decurrent to form interrupted wings in the lower part of the stems. *Capitula* 2.5-9.5 cm broad with appendages, arachnoid, or ± glabrescent. *Phyllaries* 70-110; middle ones spreading to recurved, their free part expanded above into a usually keeled, straight to recurved, lanceolate to linear-lanceolate appendage; appendage 20-40 mm long, 5-12 mm broad, attenuate into a spine at apex, arachnoid-tomentose or ± glabrescent, with 1-4 spines on both sides. *Receptacular bristles* ± rough. *Flowers* 60-115; corolla rose (dirty cream in dried material), 20-24 mm long; anthers concolourous. *Achenes* 4-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – The type material of *Cousinia gilliatii* and *C. shebliensis* collected around Tabriz is very similar and characterised by middle phyllaries with obviously spiny appendages. This is the main difference from *C. grandis,* the middle phyllaries of which usually have entire appendages. We could not find any character justifying the recognition of *C. shebliensis* as a separate taxon.

Distribution and habitat. – Endemic to NW Iran (Fig. 13E), on rocky slopes E of Tabriz.

Further specimens seen. – IRAN: AZARBAIJAN: In declivibus siccis 8 km E Tabriz, 1650 m, 14.7.1971, *Rechinger 43189 & 43190 = 5104* (B, E, M, W); Tabriz, 21.7.1926, *Gilliat-Smith 1753* (K, W [fragment]).

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15. *Cousinia macrolepis* Boiss. & Hausskn. in Boissier, Fl. Orient. 3: 505. 1875 ≡ *Arctium macrolepis* (Boiss. & Hausskn.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iraq, Sulaymaniyah, in monte Pir Omar Gudrun Kurdistaniae Persicae, 4-5000', 6.1867, *Haussknecht 570* (G-BOIS [sheet with tree labels designated as *C. macrolepis*]!; isolectotypes: B!, G!, JE!, W!).
= *C. gigantosphaera* Rech. f. in Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 101: 345. 1964, **syn. nov.** – Holotype: Iraq, Kurdistan, Asma near Sulaymaniyah, slope above Casino, poor oak scrub, 13.7.1961, *Wheeler-Haines s.n.* (E!; isotype: W!).

Illustration. – Fig. 8C.

Plant up to 50 cm high, densely arachnoid-tomentose or ± glabrescent. *Stems* divaricately branched from base or higher, densely leafy to apex. *Leaves* leathery, tomentose on both sides; basal leaves up to 25 × 15 cm including spines, obovate, oblong-lanceolate to lanceolate, dentate to deeply pinnatisect with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate-elliptic to broadly lanceolate, spiny-lobed, decurrent to form winged stems, upper leaves enclosing lower part of the involucres. *Capitula* 4-8 cm broad with appendages, usually arachnoid-tomentose. *Phyllaries* 80-100 or more; outer ones similar to uppermost leaves but gradually smaller; middle ones densely imbricate, their free part abruptly expanded above into a usually keeled, concave or apically recurved, deltoid, rhomboid- or sagittate-lanceolate appendage; appendage 15-25 mm long, 8-15 mm broad, attenuate into a short spine at apex, arachnoid-tomentose, with 3-8 prickles on both sides. *Receptacular bristles* rough. *Flowers* 70-160; corolla purple (dirty white in some herbarium material), 28-35 mm long; anthers concolourous. *Achenes* 4-5.5 mm long.

Flowering period. – May to June.

Taxonomic remarks. – *Cousinia macrolepis* and *C. gigantosphaera,* both described from around Sulaimaniyeh, are characteristic in having uppermost leaves enclosing the leaf-like outer phyllaries, and differ from each other mainly in the shape of the phyllaries (deltoid versus rhomboid- or sagittate-lanceolate). The two species are connected by intermediate forms and cannot be maintained as separate.

Distribution and habitat. – NE Iraq, province Sulaymaniyah (Fig. 11D), in oak forests.

Further specimens seen. – Iraq: Sulaymaniyah: Haibat Sultan Dagh (Mt), N of Koi Sanjaq, 950 m, 7.5.1959 *Al Rawi & al 28264* (K); Pir-i Mukrurn Dagh rocks, 1100-1200 m, 19.9.1933, *Eig & Duvdevani 510* (W); Piere Magroun, hillside with oak scrub and vinefields, 18.7.1961, *Wheeler Haines 2042* (E, K, W); Piera Magroun, stony slope, 5000 ft, 22.10.1960, *Wheeler Haines & al. 1860* (E, K, W); Talan region near Dokan, 7.7.1972, *Karim 39293* (K); Dokan, 26.5.1961, *Wheeler Haines s.n.* (E); Azmir (Asme) Mt, 9.7.1972, *Karim 39320* (E, K).
Iran: Azarbaijan: 8 km N of Mirabad on road to Piranshahr, close to a big river, 1300-1400 m, 29.5.1978, *Runemark & Mozaffarian 29148* (TARI); 30 km from Sardasht to Piranshahr, 1300 m, 21.7.1998, *Ghahreman & Attar 22009* (TUH).

16. *Cousinia sagittata* C. Winkl. & Strauss in Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 233. 1897. – Lectotype (designated here): Iran, prope Sultanabad, in collibus, 8.1890, *Strauss* (JE!).

Plant up to 60 cm high, arachnoid-tomentose or ± glabrescent. *Stems* branched from base or higher, usually densely leafy to apex. *Leaves* leathery or herbaceous, tomentose on both sides, glabrescent above and tomentose beneath, or ± glabrescent on both surfaces; basal leaves up to 25 × 15 cm including spines, oblong-lanceolate to broadly lanceolate, finely dentate to deeply pinnatifid with spiny-dentate lobes, rarely lyrate; stem leaves sessile, gradually smaller and less divided towards the apex, ovate-elliptic, oblong to broadly lanceolate, spiny-lobed, usually decurrent to form winged stems, upper leaves usually enclosing the involucres (at least in their lower parts). *Capitula* 4-9 cm broad with appendages, glabrous, ± glabrescent or arachnoid-to-

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mentose. *Phyllaries* 50-100(-120); outer ones similar to uppermost leaves; middle ones densely imbricate, their free part abruptly expanded above into a usually keeled, slightly to completly recurved, rhomboid-deltoid to lanceolate-deltoid appendage; appendage 15-35 mm long, 8-20 mm broad, attenuate into a strong spine at apex, arachnoid-tomentose or glabrous, without or with up to 5 tiny spines on both sides. *Receptacular bristles* rough or rarely smooth. *Flowers* 60-150; corolla rose, purple or white, 20-30 mm long; anthers usually concolourous, sometimes purple at apex. *Achenes* 5-7 mm long.

Key to the subspecies of *Cousinia sagittata*

1. Leaves and phyllaries densely canescent-tomentose; phyllary appendages usually slightly recurved; flowers white, rarely purple (provinces Markazi and western part of Esfahan) . . . . . subsp. ***iranica***
– Leaves and phyllaries sparsely arachnoid-tomentose; appendages slightly to strongly recurved; flowers purple, rose or white (province Lorestan) . . . . . subsp. ***sagittata***

16a. *Cousinia sagittata* subsp. ***sagittata***
= *C. rhombiformis* C. Winkl. & Strauss in Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 232. 1897, **syn. nov.** – Lectotype (designated here): Iran, Sultanabad, inter Shuturum Kuh & Kuhe Sass, Sefidab, 24.6.1889, *Strauss s.n.* (JE!; isolectotype: B [fragment]!, W!).
= *C. phyllocephala* Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 36: 330. 1934, **syn. nov.** – Lectoype (designated here): Iran, Luristaniae in montosis ad Khoremabad, 8.1933, *Madani in Gauba 50* (B!; isolectotype: W!).
= *C. koieana* Bornm. in Köie, Beitr. Fl. Südwest-Irans 1 [Danish Sci. Invest. Iran 4]: 26. 1945, **syn. nov.** – Lectotype (designated here): Iran, Luristan, Bicheh, 50 km östl. von Khorramabad, 1600 m, 21.5.1937, *Köie 794* (B!; isolectotype: C).
= *C. koieana* var. *adenoloba* Bornm. in Köie, Beitr. Fl. Südwest-Irans 1 [Danish Sci. Invest. Iran 4]: 29. 194. – Lectotype (designated here): Iran, Luristan, 50 km östl. von Bicheh, 1200-1600 m, 28.5.1937, *Köie 798* (B!; isolectotype: C).
= *C. khorramabadensis* Bornm. in Köie, Beitr. Fl. Südwest-Irans 1 [Danish Sci. Invest. Iran 4]: 25. 1945, emend. Rech. f., Fl. Iranica 90: 239. 1972, **syn. nov.** – Lectoype (designated here): Iran, Ninjiu, 25 km südöstl. von Khorramabad, 1900 m, 9.5.1937, *Köie 800* (B!; isolectotype: C).
= *C. khorramabadensis* var. *purpurea* Attar & Ghahreman in Iran. J. Bot. 9: 166. 2002. – Holotype: Iran, Lorestan, Aligoudarz to Dalani, 33°11'N, 49°30'E, 24.7.2001, *Ghahreman, Attar & Mehdigholi 27591* (TUH!).

Note. – Two sheets with no. *27591* exist of *Cousinia khorramabadensis* var. *purpurea* but neither was marked as holotype by the authors.

Illustration. – Fig. 9A.

Leaves and *phyllaries* sparsely arachnoid-tomentose; appendages slightly to strongly recurved. *Flowers* purple, rose or white.

Flowering period. – May to August.

Taxonomic remarks. – *Cousinia sagittata* subsp. *sagittata, C. rhombiformis, C. phyllocephala, C. koieana* and *C. khorramabadensis,* all distributed in mountainous areas of Lorestan province in Iran, are characterised by their uppermost leaves partly to completely enclosing the outer imbricate phyllaries. They differ from each other in the texture of their leaves (herbaceous to leathery), the shape of the apex of the phyllaries (slightly to completely recurved) and the degree of enclosure of the capitula by the uppermost leaves. All these characters vary continuously and none of the above taxa can be maintained as separate species.

Distribution and habitat. – Endemic to W Iran, province Lorestan (Fig. 11E), on stony slopes, mountain sides and in oak forests.

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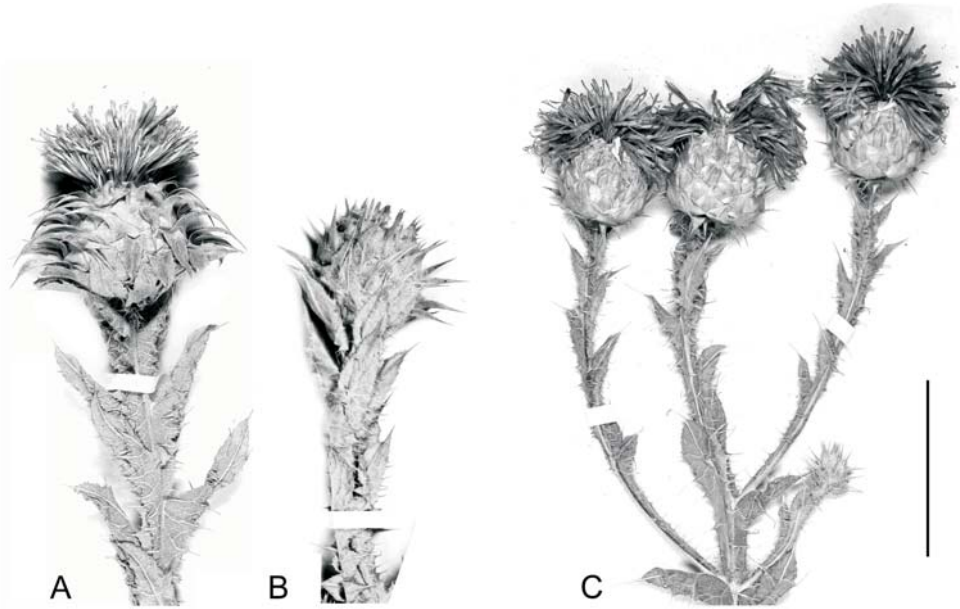

Fig. 9. A: *C. sagittata* subsp. *sagittata* (*Rechinger 48031,* B-100158854); B: *C. sagittata* subsp. *iranica* (*Strauss 236,* B-100157164); C: *C. chlorosphaera* (*Strauss s.n.,* B-100093354). – Scale bar: A-C = 5 cm; photographs by the BGBM.

Further specimens seen. – Iran: Lorestan: 35 km N of Borojerd, *Gauba & Sabeti 1419* (W); Khorram-Abad, NW of Kuh-e Sefid, 1600-1900 m, *Veiskarami 22598* (TUH); Khorram-Abad, on the road of Sefid-Dasht, after Aznacryt, 1850 m, 18.6.1998, *Ghahreman & Attar 21838* (TUH); Khorram-Abad, on the road of Sefid-Dasht, after Azna crypt, 1850 m, 18.6.1998, *Ghahreman, Attar & Ghaffari 21837* (TUH); Azna, Daratakht, 1820-1960 m, 9.7.1997, *Jamzad, Ahmadi & Karimi 76852* (TARI); NW of Khorram-Abad, Kuh-e Sefid, 1600-1900 m, *Veiskarami 22602* (TUH); inter Khorramabad & Sefid-Dasht, Baghbanan, 60 km a Khorramabad, 1800 m, 12.6.1974, *Iranshahr 34001-E* (IRAN, W); Khorram-abad towards Koouh-e Hashtad Pahlou, 20 km, Khorramabad, 1700 m, 16.7.1992, *Delghandi & Tehrani 9183* (IRAN); 50 km E Khorramabad orientem versus, substr. calc., 1200-1400 m, 14.-16.7.1948, *Rechinger 5760* (B, E, K, TARI, W); E of Alashtar, 33°56.742'N, 48°21.675'E, 2165 m, 29.6.2005, *Mehregan 18* (MJG); mountains west of Doroud, 33°28.827'N, 49°01.105'E, 2235 m, 23.6.2005, *Mehregan 10* (MJG); 15 km from Khorram-Abad on the road to Keshvar, 1500 m, 18.6.1998, *Ghahreman & Attar 21827* (M, TUH); 39 km on road from Khorramabad to Nowjian and Keshvar, 2150 m, 27.6.1977, *Runemark & Lazari 26012 & 26054* (TARI); ibid., mountains S of the road, 2300-2550 m, 28.6.1977, *Runemark & Lazari 26124* (TARI); in jugo Chariveh Shah 32 km E Khorramabad, substr. calc., 2050 m, 11.6.1974, *Rechinger 47730* (B, M, W); Baghbanan 55 km SE Khorramabad versus Sefid Dasht, in quercetis *(Q. brantii)* devastatis, substr. calc., 1950 m, 12.6.1974, *Rechinger 47823* (B, W); Dow Rud, in declivibus aridis ad introitum faucium fluvii Dez, substr. calc., 1500-1600 m, 17.6.1974, *Rechinger 48197* (B, M, W); inter Khorram-Abad and Doroud, Zagheh, 1950 m, 17.6.1998, *Ghahreman, Attar & Ghaffari 21825* (TUH); 30 km W Dorud versus Khorramabad, 1750 m, 11.6.1974, *Iranshahr 34025-E* (W); inter Dorud & Khorramabad, Gardaneh Togha, prope Zagheh, microwave station, 1900 m, 11.6.1974, *Iranshahr 9187* (IRAN); Dorud, 6.6.1941, *Koelz 18098* (W), 8.6.1941, *Koelz 18141* (W); Dorud, neck mountain between Saravand and Gahar lake, 2300-3500 m, 17.8.1982, *Mozaffarian & Sardabi 42345* (TARI); Shuturankuh, 2-5.7.1890, *Strauss s.n.* (K); Schuturankuh, 1899, *Strauss s.n.* (JE); Schuturankuh, 25.6.1905, *Strauss s.n.* (B, JE); Oshtorankuh, above the village

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Tihun, 2000-2500 m,12.7.1981, *Assadi & Mozaffarian 37050 & 37081* (TARI); Schuturankuh, prope Kali Rustam (Ghaleh Rostam), faüce Dere-Tschah, 21.7. 1889, *Strauss s.n.* (JE); Oshtorankuh protected region, 31.5.- 4.6.2000, *Djavadi & Ghanbari 29549 & 29550* (IRAN); Oshtorankuh protected region, inter Saravand & lacus Gahar, 16.6.1974, *Iranshahr 34000-E* (IRAN); Dorud, Oshtorankuh, S slope, opposite to Gahar lake, 2380-3200 m, 16.8.1982, *Mozaffarian & Sardabi 42281* (TARI); mountains south of Doroud (Oshtorankouh), 33°21.547'N, 49°12.210'E, 2500 m, 25.6.2005, *Mehregan 11* (MJG); Kalvar, 5000 ft, 5.6.1940, *Koelz 15995* (E, W); prope Mowdere, 8.1890, *Strauss s.n.* (B, WU); c. 40 km S of Doroud, at Bisheh, 1250-1600 m, 11.7.1981, *Assadi & Mozaffarian 37024* (TARI); Bisheh, 1200-1400 m, 14.-16.7.1948, *Rechinger 5744* (IRAN, W); in declivibus saxosis inter Azna & Dow Rud, 1600-1900 m, 15.-16.6.1974, *Rechinger 48031* (B, E, K, M, W, WU); Aligoudarz to Dalani, [33°11'N, 49°30'E], 24.7.2001, *Ghahreman, Attar & Mehdigholi 27590* (TUH); before Azna, Darreh Takht, 1900 m, 19.6.1998, *Ghahreman, Attar & Ghaffari 21851* (TUH); between Azna and Doroud, 1700 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29560* (IRAN).

16b. *Cousinia sagittata* subsp. ***iranica*** (C. Winkl. & Strauss) Mehregan, **comb. & stat. nov.** ≡ *C. iranica* C. Winkl. & Strauss in Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 233. 1897. – Lectotype (designated here): Iran, prope Sultanabad in monte Raswend, 28.7.1892, *Strauss 236* (JE [the sheet with two plants]!; isolectotypes: B!, JE!).
= *C. straussii* Hausskn. & C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 235. 1897. – Lectotype (designated here): Iran, Sultanabad prope Girdu, 3.7.1892 ["1891"], *Strauss 204* (JE!; isolectotype: JE!); former second syntype: Sultanabad, prope Mowdereh, 20.6.1892, *Strauss s.n.* (JE!).

Illustration. – Fig. 9B.

Leaves and *phyllaries* densely canescent-tomentose; phyllary appendages usually slightly recurved. *Flowers* white, rarely purple.

Flowering period. – May to August.

Taxonomic remarks. – Type material of *Cousinia sagittata* subsp. *iranica* and *C. straussii* is very similar. The only notable difference is that the uppermost leaves of subsp. *iranica* enclose the capitulum more strongly. Irrespective of this, *C. straussii* cannot be segregated from subsp. *iranica* as a separate taxon. *C. sagittata* subsp. *iranica* is distributed in the mountain range parallel and to the east of the mountain range where *C. sagittata* subsp. *sagittata* is distributed. The two taxa are connected by intermediate forms. Subspecies *iranica* has leaves and phyllaries that are more densely canescent-tomentose than in subsp. *sagittata*, its uppermost leaves usually enclose the involucre less, and the phyllaries are less recurved at the apex.

Distribution and habitat. – Endemic to W Iran, provinces Markazi and western part of Esfahan (Fig. 11F), on stony slopes, mountain sides.

Further specimens seen. – Iran: Markazi: 100 km SW Hamedan v. Sultanabad, 1800 m, 10.6.1937, *Koie 795, 796 & 801* (B); Toureh, Besri, NE slopes of Kuh-e Aladagh, 2100-3100 m, 11.7.1985, *Mozaffarian 64067 & 64161* (TARI); ad stationen viae ferrae Fuzieh ad occidentem urbis Sultanabad, 13.7.1948, *Rechinger & Rechinger 5744* (K, W); Arak, Khan-e Miran, Kuh-e Sefid, 2500-2850 m, 6.7.1985 *Mozaffarian 63737* (TARI); Sefid Khany Mts, 2100-2600 m, 16.7.1984, *Mozaffarian 48204* (TARI); Arak towards Sefidkhani, 29.5.1985, *Ghahreman 9182* (IRAN); in dit. urb. Sultanabad, Chaladjistan, 5.1899, *Strauss 15* (B); Arak to Boroujerd, Sendjan, 1800 m, 4.-6.6.1997, *Djavadi 15186* (IRAN); Arak, 1.6.1967, *Kelet 13432* (IRAN); Mt Chal-Khaloun, 2050 m, 19.6.1998, *Ghahreman, Attar & Ghaffari 21880* (TUH); Rasvand, *Gauba k2488* (W); in monte Raswend, 1899, *Strauss 13 & 14* (B); S of Shazand, Mt Rasvand, 33°49.169'N, 49°29.876'E, 2160 m, 24.7.2005, *Mehregan 41* (MJG); Abbas Abad, Kuh-e Rasvand, 25.7.1995, *Assadi 75038* (TARI); ditionis Sultanabad in monte Rasbend, 7.1897, *Strauss s.n.* (B, JE); in monte Raswend, 22.6.1891, *Strauss s.n.* (B, JE); road of Shahzand, 1950 m, 17.6.1998,

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Ghahreman, Attar & Ghaffari 21822 (TUH); Mt Schahzinde, 7.1897, *Strauss s.n.* (B); Mt Shahzand, Abbas Abad, 2050 m, 19.6.1998, *Ghahreman, Attar & Ghaffari, 21881* (TUH); Kuh Schahsinde, 19.7.1902, *Strauss 400* (B, JE); Kuh-e Shahzende, 1700-1800 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29557* (IRAN); Shahzand, Hafteh-o Emarat, Anbarteh and Tajereh, Kuh-e Sero, 2150-2950 m, 8.7.1985 *Mozaffarian 63849* (TARI); Moudar, 2000 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29559* (IRAN); prope Mowdere, 8.1890, *Strauss 291* (JE, W); Gerdou, 1700-1800 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29558* (IRAN); Girdü, 2.6.1889, *Strauss 239* (JE); Gerdu region, 2000 m, 19.6.1998, *Ghahreman, Attar & Ghaffari 21882* (TUH); Khomeyn to Arak, road of Emarat, 2100 m, 29.6.1998, *Ghahreman & al. 21879* (M); mountain with microwave station NE of Varche (between Arak and Khomein), 2700 m, 3.7.1977, *Runemark & Lazari 26574* (TARI). — Esfahan: Golpayegan, Hendeh, 2200-2800 m, 27.6.1969, *Iranshahr 13463-E* (IRAN, W); Golpayegan, Hendeh, 1970 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29545* (IRAN); Golpaigan, 1899, *Strauss 213* (B, JE).

17. *Cousinia chlorosphaera* Bornm. in Beih. Bot. Centralbl., Abt. 2, 28: 253. 1911. – Lectotype (designated here): Iran, Luristan, ditionis Kermanschah, in trajectu Ushturan, Paß von Uschturan, 19.6.1906, *Strauss s.n.* (B-100088374!; isolectotype: JE!).
= *C. chlorosphaera* f. *straminea* Bornm. in Beih. Bot. Centralbl., Abt. 2, 32: 405. 1914. – Lectotype (designated here): Iran, in m. Kuh-i-Gerru, 7.1908, *Strauss s.n.* (B-100093354!; isolectotype: JE!).
= *C. chlorosphaera* var. *producta* Bornm. in Beih. Bot. Centralbl., Abt. 2, 32: 405. 1914. – Lectotype (designated here): Iran, in m. Kuh-i-Gerru, 7.1908, *Strauss s.n.* (B-100088373!; isolectotype: JE!).
= *C. hamadanensis* Rech. f., Fl. Iranica 139a: 142. 1979, **syn. nov.** – Holotype: Hamedan, Nahavand to Malayer, 28 km S of Nahavand, monts. Gerrau (Yalkow), 1800-2400 m, 16.7.1974, *Terme & Moussavi 33895-E = 5055-IRAN* (W!; isotype: IRAN).

Illustration. – Fig. 9C.

Plant usually many-stemmed, up to 50 cm high, arachnoid-tomentose. *Stems* branched from base or higher, usually densely leafy to apex. *Leaves* leathery or leathery-herbaceous, tomentose or ± glabrescent on both surfaces; basal leaves up to 25 × 7 cm including spines, oblong-lanceolate, coarsely dentate to pinnatifid with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate-elliptic, oblong-ovate to lanceolate, spiny-lobed, decurrent to form winged stems. *Capitula* 1.5-3.5 cm broad with appendages, glabrous or glabrescent. *Phyllaries* 60-90, coriaceous at least in upper half; middle ones densely imbricate, their free part abruptly expanded above into a usually keeled, apically slightly recurved or erect, broadly rhomboid-deltoid or rhomboid-flabellate appendage; appendage 5-15 mm long, 6-14 mm broad, sharply attenuate into a spine at apex, glabrous, without or rarely with up to 2 tiny spines on both sides. *Receptacular bristles* rough. *Flowers* 60-100; corolla rose, purple or pale purple, 18-22 mm long; anthers rose. *Achenes* unknown.

Flowering period. – June to August.

Taxonomic remarks. – The type material of *Cousinia chlorosphaera* was collected by Strauss in Iran, province Lorestan, most probably on the old road from Arak (Sultan-Abad) to Kermanshah at the pass from Oshtorinan to Nourabad. This pass crosses the mountain range today know as Garrin (Gerrau, Kuh-e Gerru). We studied all available material collected from the Garrin mountain range and found that the area houses only one species of *C.* sect. *Cynaroideae* with relatively little morphological variation. Type material of both *C. chlorosphaera* and *C. hamadanensis* was collected in the same mountain range. As we could not find any differences between the type material of these two species, we regard *C. hamadanensis* as a synonym of *C. chlorosphaera*.

Distribution and habitat. – Endemic to W Iran, provinces Lorestan and southern part of Hamadan (Fig. 11G), in open areas, stony slopes and mountain sides.

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Further specimens seen. – IRAN: HAMADAN: C. 20 km S of Nahavand, Kuh-e Garu, above Cheshme-Gamasb, 1800-2200 m, 9.7.1981, *Assadi & Mozaffarian 36912* (TARI); Nahavand, Borzol, Gian, Sarab-e Gian, Kih-e Garrin, 1950-2700 m, 14.7.1988, *Mozaffarian 65082* (TARI); Nahavand, Borzol, on the road to Nurabad, above Gamasb, Kuh-e Garin, 2500-3400 m, 27.7.1995, *Assadi 75116* (TARI); Nahavand, Gamasb, 1520 m, 27.-30.6.1998, *Djavadi & Ghanbari 20369* (IRAN); Nahavand, Garrin Mts, 1800 m, 10.7.1997, *Ghahreman & Attar 20551* (TUH); in dit. urb. Sultanabad, in m. Elwend, 1899, *Strauss 10* (B). — LORESTAN: Inter Boroudjerd and Kermanschah, 6.1926, *Cavara s.n.* (B); Boroujerd, W of Kolidar village, Mt Mishparvar, 33°50.355'N, 48°39.365', 2500-2900 m, 9.7.2005, *Mehregan 35, 36 & 37* (MJG); Boroujerd, W of Vanayee village, 33°53.696'N, 48°34.667'E, 2100-2350 m, 2.7.2005, *Mehregan 27 & 28* (MJG); mountains E of Alashtar, 33°57.290'N, 48°22.905'E, 2700-2750 m, 29.6.2005, *Mehregan 19 & 20* (MJG); Nour-Abad to Oshtorinan, S of Isalam-Abad, 34°01.641'N, 48°16.835'E, 2600-3000 m, 1.7. 2005, *Mehregan 25 & 26* (MJG); Borujerd towards Nahavand, Kouh-e Garin, 1800-2300 m, 21.7.1992, *Delghani & Tehrani 9030* (IRAN).

18. *Cousinia pergamacea* Boiss. & Hausskn. in Boissier, Fl. Orient. 3: 513. 1875 ≡ *Arctium pergamaceum* (Boiss. & Hausskn.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iran, in dumetis montis Teriter prope Pendjavin Kurdistaniae Persicae, 7000', 8.1867, *Haussknecht 570a* (G-BOIS [specimen with four labels]!; isolectotypes: G!, JE!, P!, W!).

Plant up to 80 cm high, arachnoid-tomentose or glabrescent. *Stems* branched from base or higher. *Leaves* leathery or herbaceous, tomentose on both sides or glabrescent above and tomentose to ± glabrescent beneath; basal leaves up to 40 × 15 cm including spines, obovate, ovate, lanceolate to oblong-lanceolate, undivided to deeply sinuate-lobate with spiny-dentate lobes; stem leaves sessile, rarely distinctly attenuate at base, gradually smaller and less divided towards the apex, oblong-ovate to lanceolate, spiny-lobed, usually long-decurrent to form winged stems. *Capitula* 1.5-5 cm broad with appendages, glabrous, sparsely arachnoid or glabrescent. *Phyllaries* 50-140; middle ones imbricate, with prominent yellow midrib, their free part abruptly expanded above into a usually flat, erect, deltoid or deltoid-sagittate appendage, at least two times broader than base; appendage 5-17 mm long, 5-15 mm broad, attenuate into a spine at apex, usually glabrous, without or with up to 4 prickles or spines on both sides. *Receptacular bristles* rough. *Flowers* 40-110; corolla yellow, 20-27 mm long; anthers rose or yellow. *Achenes* 4-6 mm long.

Key to the subspecies of *Cousinia pergamacea*

1. Phyllary appendages usually without or rarely with very tiny appressed prickles on both sides . . . . . subsp. ***pergamacea***
– Phyllary appendages with ± erect and distinct spines on both sides . subsp. ***sardashtensis***

18a. *Cousinia pergamacea* subsp. ***pergamacea***
= *C. wheeler-hainesii* Rech. f. in Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 101: 353. 1964, **syn. nov.** – Holotype: Iraq, Kurdistan, Penjwin, in cut oak scrub above town, 19.7.1961, *Wheeler-Haines W-2041* (E!; isotypes: E!, K!, W!).
= *C. fursei* Rech. f., Fl. Iranica 90: 247. 1972. – Holotype: Iran, Azerbaijan, 20'E Marivan (Dez Shahpur), among oak scrub in clearings, 6000 ft., 24.7.1962, *Furse 3421* (K!).
= *C. millefontana* Rech. f., Fl. Iranica 90: 248. 1972, **syn. nov.** – Holotype: Iran, Kurdistan, Montes Chehel Cheshmaeh, 44 km NE Marivan (Dezh Shahpur), substr. Tonschiefer, 2000 m, 7.7.1971, *Rechinger 43052* (W!; isotypes: E!, K!, M!).
= *C. caroli-henrici* Attar & Ghahreman in Rostaniha 7 (Suppl. 2): 317. 2006, **syn. nov.** – Holotype: Iran, Kurdistan, Baneh, *Attar & Ghahreman 22455* (TUH).

Note. – We did not see the type material of *Cousinia caroli-henrici*. Instead, we examined herbarium specimens collected from the type locality (*Mehregan 208,* MJG), *Rechinger 49174*, W), which completely match the description of *C. caroli-henrici*.

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Illustration. – Fig. 10A.

Phyllary appendages usually without or rarely with tiny appressed prickles on both sides.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia pergamacea* subsp. *pergamacea, C. wheeler-hainesii, C. fursei, C. millefontana* and *C. caroli-henrici* were described from a relatively small mountain area of Iranian and Iraqi Kurdistan and the southwestern part of Iranian Azarbaijan (Fig. 11). All have imbricate phyllaries with deltoid or deltoid-sagittate appendages and yellow flowers. The size of the appendages varies continuously from small to large (5-17 mm long, 5-15 mm broad). None of these taxa can be maintained as separate.

The dense indumentum and tiny spiny appendages of *Cousinia caroli-henrici* are part of the variation of subsp. *pergamacea*.

Distribution and habitat. – Endemic to NE Iraq and W Iran (Fig. 11H), on stony slopes and mountain sides, usually in oak forests.

Further specimens seen. – Iraq: Sulaymaniyah: In ditione pagi Penjwin, in glareosis serpentinicis jugi Malakawa, 1400 m, 19.-20.6.1957, *Rechinger 10429* (E, M, W); ibid., 1600 m, 19.-20.6. 1957, *Rechinger 12238* (W); Mela Kowa (on Sulaymaniyah-Penjwin highway), 1320 m, 20.6. 1957, *Al Rawi 22433* (K).
Iran: Azarbaijan: In declivibus saxosis vallis 36 km S Mahabad, substr. schist., 8.7.1974, *Rechinger 49060* (B, E, K, M, W); 81-83 km S Mahabad, 1840-1930 m, 16.10.1960, *Pabot 5504* (IRAN); 25 km on road from Sardasht to Baneh, 1400 m, 20.10.1977, *Runemark & Mozaffarian 25936* (TARI); inter Mahabad & Sardasht, 37 km Atrid vers. Sardasht, 1750 m, 8.7.1973, *Zehzad & Siami 3443* (TARI). — Kordestan: Montes Chehel Cheshmaeh, 44 km NE Marivan (Dezh Shahpur), substr. Tonschiefer, 2000 m, 7.7.1971, *Lamond 4577* (E); Baneh, 2000-2200 m, 7.8.1967, *Iranshahr & Terme 12198E = 9181* (IRAN, W); Marivan, Mian Dagh, 2000 m, 13.6. 1972, *Mirzayan & Abae 34035E = 9115* (IRAN); Marivan to Saqqez, 50 km to Saqqez, 2000 m, 6.7.1971, *Terme 9114* (IRAN); Marivan, 1800-2100 m, 4.8.1967, *Iranshah & Terme 12219E = 9006* (IRAN); Marivan to Baneh, 20 km after Marivan, after Chenareh, 1320 m, *Ghahreman & Attar 20557* (M); Saqqez to Baneh, Khan pass, 2100-2150 m, 27.7.1998, *Mozaffarian & Massoumi 78199* (TARI); c. 50 km N of Sanandaj, between Sarabghamish village and Kuh-e Chehelcheshmeh, 2100 m, 30.7.1995, *Assadi 75278* (TARI); 45 km on road from Saqqez to Baneh, 1900 m, 20.10.1977, *Runemark & Mozaffarian 25927* (TARI); Marivan to Saghez, 12 km to Chenareh, [35°32', 46°18'E], 1370 m, 25.6.2003, *Assadi 85036* (TARI); 50 km from Baneh to Sardasht, 1510 m, 30.5.1978, *Runemark & Mozaffarian 29256* (TARI); c. 20 km to Baneh on the road from Marivan (NE2), 1500 m, 25.6.2003, *Assadi 85115* (TARI); Baneh, c. 10 km on the road from Suteh to Sonnateh to Saqqez, after Haji-Mohammadan, 1950-2150 m, 13.7.1991, *Mozaffarian 70058* (TARI); Marivan to Baneh, c. 19 km from Tusiran to Ghamchian, 1900 m, 28.7.1995, *Mozaffarian 74843* (TARI); Marivan to Sanandaj, from old road, Gardaneh Garan, 1400-1850 m, 8.7.1995, *Ghahreman & Mozaffarian 18314* (TUH); 20 km E of Marivan, 1410 m, 16.6.1999, *Ghahreman & Attar 22481* (TUH); 20 km from Marivan to Baneh, after Chenareh, 1320 m, *Ghahreman & Attar 20557* (TUH); 50 km from Baneh to Marivan, 1600 m, 9.7.1995, *Ghahreman & Attar 20672* (TUH); 70 km from Baneh to Marivan, 1900 m, 9.7.1995, *Ghahreman & Attar 19673 & 19672* (TUH); in declivibus austro-occid. jugi Gardaneh-ye Khan Hasan Saralan prope Baneh, 2050 m, 9.7.1974, *Rechinger 49174* (W); Baneh, mountain E of Baneh, 2200 m, 2.8.2001, *Mehregan 208* (MJG).

18b. *Cousinia pergamacea* subsp. ***sardashtensis*** (Rech. f.) Mehregan, **comb. & stat. nov.** ≡ *C. sardashtensis* Rech. f., Fl. Iranica 139a: 139. 1979. – Holotype: Iran, Azerbaijan, Sardasht, in declivibus siccis. substr. schist., [36'09°N, 45'29°E], 1500 m, 9.7.1974, *Rechinger 49113* (W!; isotypes: B!, E!, K!).

Illustration. – Fig. 10B.

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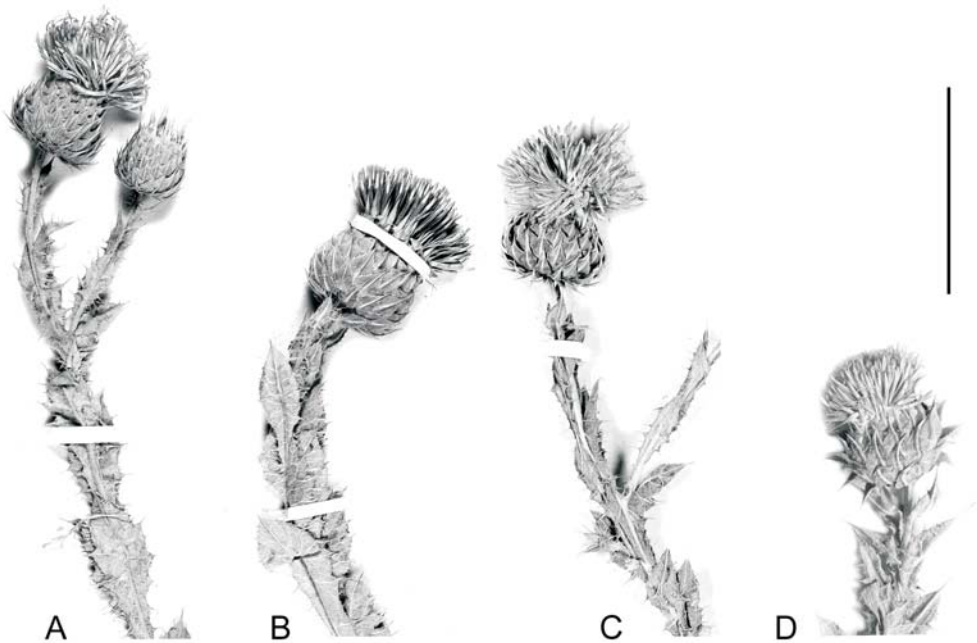

Fig. 10. A. *Cousinia pergamacea* subsp. *pergamacea* (*Rechinger 49060,* B-100158870); B. *C. pergamacea* subsp. *sardashtensis* (*Rechinger 49113,* B-100094011); C. *C. concinna* (*Rechinger 48511,* B-100157182); D. *C. araneosa* (*Terme & al. 13431,* IRAN. – Scale bar: A-D = 5 cm; photographs for A-C by BGBM, D by I. Mehregan.

Phyllary appendages with ± erect and distinct spines on both sides.

Flowering period. – July.

Taxonomic remarks. – *Cousinia pergamacea* subsp. *sardashtensis*, distributed in southern parts of Iranian Azarbaijan, differs from subsp. *pergamacea* only in having spines on both sides of the phyllary appendages.

Distribution and habitat. – Endemic to W Iran (Fig. 11I), on stony slopes and mountain sides, usually in oak forests.

Further specimens seen. – Iran: Azarbaijan: C. 40 km from Mahabad to Sardasht, 1600 m, 13.7.1991, *Mozaffarian 70049* (TARI); inter Mahabad & Sardasht, 37 km Atrid vers. Sardasht, 1750 m, 8.7.1973, *Zehzad & Siami 3443* (W).

19. *Cousinia concinna* Boiss. & Hausskn. in Boissier, Fl. Orient. 3: 513. 1875 ≡ *Arctium concinnum* (Boiss. & Hausskn.) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Lectotype (designated here): Iran, in dumosis Kurdistaniae Persicae inter Masibin & Awiheng, 7-10000', 8.1867, *Haussknecht 568b* (G-BOIS!; isolectotypes: JE!, G-BOIS!).

Note. – The sheet with only a single plant and a handwritten label *"C. concinna"* is here selected as lectotype.

Illustration. – Fig. 10C.

Biennial or perennial, monocarpic, up to 70 cm high, arachnoid-tomentose or ± glabrescent. *Stems* branched from base or higher. *Leaves* leathery or ± herbaceous, glabrescent above and tomentose

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beneath; basal leaves up to 15 × 5 cm including spines, lanceolate to oblong-lanceolate or lyrate, sinuate-lobate to deeply pinnatisect, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, lanceolate to linear-lanceolate, spiny-lobed, cuneate at base, usually long-decurrent to form winged stems. *Capitula* 1.5-2.5 cm broad with appendages, glabrous or glabrescent. *Phyllaries* 100-120; middle ones imbricate, with prominent yellow midrib, their free part constricted at base, expanded above into a concave or flat, erect, deltoid or deltoid-sagittate appendage, as broad as to less than 1.5 times broader than the base; appendage 5-8 mm long, 3-6 mm broad, attenuate into a spine at apex, usually glabrous or ± glabrescent, margins entire. *Receptacular bristles* rough. *Flowers* 40-120; corolla rose, purple, white or yellowish white, 19-24 mm long; anthers rose or purple. *Achenes* 4-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – Similar to *Cousinia pergamacea,* but differs in having smaller phyllaries and usually rose, purple or white but never yellow flowers. The two species are distributed in adjacent areas.

Distribution and habitat. – Endemic to W Iran (Fig. 11J), on stony slopes, in open areas and mountain sides, usually in oak forests.

Further specimens seen. – Iran: Kordestan: 72 km from Sanandaj towards Bijar, 1950 m, 1.7.1971, *Terme 9003* (IRAN); Sanandaj towards Hamadan, pass Salavat Abad, 2400 m, 2.7.1971, *Terme 9004* (IRAN); 42 km S of Sanandaj, Gardaneh Morvarid, 1800-1970 m, 17.6.1987, *Hamzehee 1160* (TARI); 28 km from Sanandaj to Divandarreh, 1930 m, 16.6.1992, *Attar & al. 14296* (TUH); inter Sanandaj & Saqez, 6 km N Divandare, in altoplanitie argillosa, 30.8.1957, *Rechinger 14737* (B, E, K, M, W); Saqqez to Divandarreh, Rashid Abad, 1980 m, 18.7.1997, *Ghahreman & al. 20543* (TUH); Kamyaran to Sanandaj, 20 km to sanandaj, Kerr-e Neck, 1320 m, 11.7.1997, *Ghahreman & Attar 20560* (TUH); 15 km from Sanandaj to Divandarreh, 1320 m, 18.7.1997, *Ghahreman & Attar 20560* (TUH); 3 km Divandarre to Saqqez, 1980 m, 18.7.1997, *Ghahreman & al. 20572* (M, TUH); between Kamyaran and Marivan, 35°06.535'N, 46°33.755'E, 1500 m, 5.7.2005, *Mehregan & Assadi 32* (MJG); between Kamyaran and Marivan, 35°11.563'N, 46°28.008'E, 1815 m, 5.7.2005, *Mehregan & Assadi 33* (MJG); between Kamyaran and Marivan, 35°13.087'N, 46°27.355'E, 1675 m, 5.7.2005, *Mehregan & Assadi 34* (MJG); in saxosis & ad versuras 47 km W Bijar versus Divandarreh, 2000 m, 2.7.1971, *Rechinger 42653* (B, TARI, W); ibid., 1950 m, 2.7.1971, *Lamond 4428* (E); in graminosis siccis jugi prope Salavatabad 25 km E Sanandaj, 2300 m, 3.6.1971, *Rechinger 42752* (W); in jugo Ariz 20 km W Sanandaj, 2200 m, 4.7.1971, *Rechinger 42859* (W); ad versuras 80 km W Sanandaj versus Marivan (Dezh Shahpur), 1700 m, 5.7.1971, *Rechinger 42894* (K, W); in jugo prope Salavatabad E Sanandaj, 2300 m, 28.6.1974, *Rechinger 48500* (B, M, W); Kowleh 65 km N Sanandaj versus Divandarreh, 1950 m, 28.6.1974, *Rechinger 48511* (B, M, W); 11 km to Kamiaran, from Sanandaj, 1800-2000 m, 15.6.1987, *Assadi 60654* (TARI); c. 50 km NW of Sanandaj, mountain region Sarel, 2300 m, 27.7.1992, *Mozaffarian 71596* (TARI); Sanandaj to Marivan, Gardaneh-e Ariz, 2140 m, 28.7.1992, *Mozaffarian 71607* (TARI); Gardaneh-e Salavat Abad, 2100 m, 24.7.1995, *Mozaffarian 74767* (TARI); 11 km to Kamyaran, from Sanandaj, 1700-2200 m, 29.7.1995, *Assadi 75191* (TARI); above Kamyaran, Savaneh village, 1720-1900 m, 30.6.1998, *Assadi 78809* (TARI); between Sanandaj and Divandarreh, before Zaghe Pass, 2200 m, 30.6.1998, *Assadi 78852* (TARI); Kamyaran to Paveh, Palangan village, E slope of Kuh-e Shahu, 1100-2000 m, 22.7.2003, *Mozaffarian 83800* (TARI); 23 km from Sanandaj to Marivan, 35°19'N, 46°58'E, 2100 m, 24.6.2003, *Assadi 84934* (TARI).

20. *Cousinia araneosa* DC., Prodr. 6: 556. 1838 ≡ *Arctium araneosum* (DC.) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Lectotype (designated here): Iran, 1837, *Aucher-Eloy 3495* (G-DC!; isolectotype: P!).

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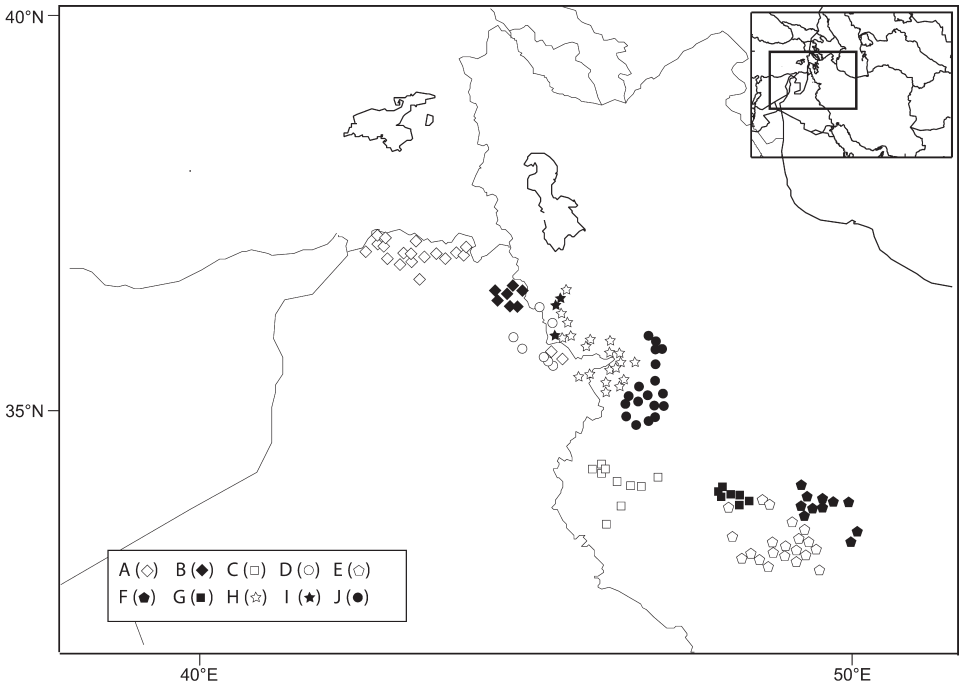

Fig. 11. Distribution of A: *Cousinia odontolepis* subsp. *odontolepis;* B: *C. odontolepis* subsp. *kurdica;* C: *C. noeana;* D: *C. macrolepis;* E: *C. sagittata* subsp. *sagittata;* F: *C. sagittata* subsp. *iranica;* G: *C. chlorosphaera;* H: *C. pergamacea* subsp. *pergamacea;* I: *C. pergamacea* subsp. *sardashtensis;* J: *C. concinna*. – Each symbol indicates the locality of a single collection or several collections made from the same or nearby localities.

= *C. kornhuberi* Heimerl in Denkschr., Akad. Wiss. Wien, Math.-Naturwiss. Kl. 50: 62. 1885, **syn. nov.** – Lectotype (designated here): Iran, in declivibus montis Elwend Persiae boreali-occidentalis, 4.7.1882, *Pichler* (W!; isolectotypes: B!, K!, WU!).
= *C. elwendensis* Bornm. in Beih. Bot. Centralbl., Abt. 2, 28: 255. 1911. – Holotype: Iran, Hamadan, in acumine montis Elwend, 8.6.1905, *Strauss s.n.* (JE!).
= *C. ecbatanensis* Bornm. in Österr. Bot. Z. 62: 184. 1912, **syn. nov.** – Lectotype (designated here): Iran, in agro Ecbatanensi (Media), prope Hamadan, in siccis, 23.6.1882, *Pichler s.n.* (B-100093337!; isolectotypes: JE!, K!, W!, WU!).
= *C. medorum* Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 40: 345. 1936. – Lectotype (designated here): Iran, Hamadan (Ecbatana), in declivitatibus montis Elwend (Alwand) supra vicum Silvar, 15.7.1935, *Gauba 643* (B-100093443!; isolectotypes: B!, JE!, K!).
= *C. pichleriana* Bornm. ex Rech. f., Fl. Iranica 139a: 141. 1979 ≡ *C. ecbatanensis* f. *inermis* Bornm. in Repert. Spec. Nov. Regni Veg. 46: 282. 1939. – Lectotype (designated here): Iran, Hamadan, Weg nach Dowlatabad, 31.5.1882, *Pichler s.n.* (W!).
= *C. parsana* Ghahreman, Iranshahr & Attar in Iran. J. Bot. 8: 16. 1999, **syn. nov.** – Holotype: Iran, Hamadan, above Ecbatan Dam, 1800 m, *Ghahreman & Attar 20553* (TUH!; isotype: TUH!).

Note. – There is no plant material on the sheet B-100157214, designated as holotype of *Cousinia pichleriana* by Rechinger. We have selected therefore an isotype at W as lectotype.

Illustration. – Fig. 10D.

Plant up to 100 cm high, arachnoid-tomentose. *Stems* branched from base or higher. *Leaves* leathery, tomentose on both sides; basal leaves up to 40 × 10 cm including spines, oblong-lanceolate, sublyrate-pinnatipartite or sinuate-lobate with spiny-dentate lobes; stem leaves sessile,

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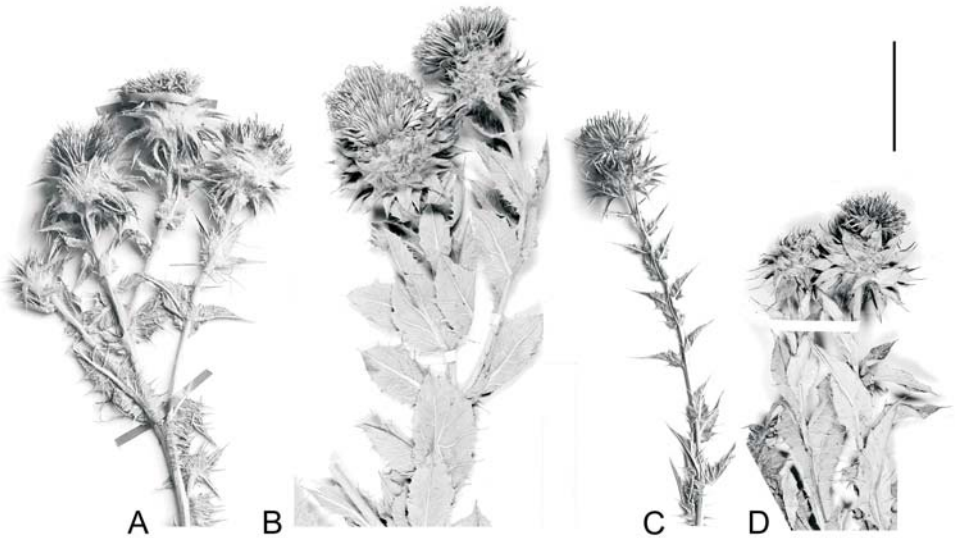

Fig. 12. A: *Cousinia algurdina* (*Rechinger 11465,* E); B: *C. canescens* (*Rechinger 32865,* B-100157229); C: *C. hakkarica* (*Davis 45467,* E); D: *C. macrocephala* (*Fedossejew s.n.,* B-100158871). – Scale bar: A-D = 5 cm; photographs B & D by the BGBM, A & C by I. Mehregan.

gradually smaller and less divided towards the apex, oblong-ovate to lanceolate, spiny-lobed, decurrent to form winged stems. *Capitula* 2.5-7.5 cm broad with appendages, arachnoid-tomentose or ± glabrescent. *Phyllaries* 50-140; middle ones imbricate, rarely imbricate-spreading, usually yellowish, their free part abruptly expanded above into a usually keeled, erect or sometimes recurved, rhomboid-lanceolate, deltoid-lanceolate or spatulate appendage; appendage 10-20 mm long, 9-15 mm broad, attenuate into a spine at apex, arachnoid-tomentose at least along margins, without or with up to 2 spines on both sides. *Receptacular bristles* rough. *Flowers* (40-)50-230; corolla rose, pale rose, purple or white, 19-27 mm long; anthers rose, purple or white. *Achenes* 4-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – The type material of *Cousinia araneosa* was collected by Aucher-Eloy from an unknown locality in Iran. Comparison of the Aucher-Eloy specimens with other material from Iran revealed that similar specimens have been collected only in the Alvand mountain range in province Hamadan (Fig. 16A). This finding is supported by the distribution of Heimerl's *C. kornhuberi,* which we regard as conspecific with *C. araneosa*. All material of *C.* sect. *Cynaroideae* collected from the Alvand mountain range shows continuous variation. Specimens from open areas and lower slopes are relatively small, have smaller and more divided leaves, smaller capitula and phyllaries with longer and sometimes spiny appendages (type material of *C. araneosa, C. ecbatanensis, C. pichleriana* and *C. parsana*), whereas material from higher slopes and alpine altitudes is relatively larger and has larger and less divided leaves, larger capitula with shorter phyllaries (type material of *C. kornhuberi, C. elwendensis* and *C. medorum*).

None of these taxa can be maintained as separate species. *Cousinia elwendensis* was described from an immature specimen. Our field studies along with our study of specimens collected at the type locality showed that the type material of *C. elwendensis* represents a young plant of *C. araneosa*. The type material of *C. ecbatanensis* includes plants with either entire or spiny phyllary appendages. This material was collected in the same area and, as already noted by Bornmüller in the protologue, the margin of the phyllary appendages varies even within a single

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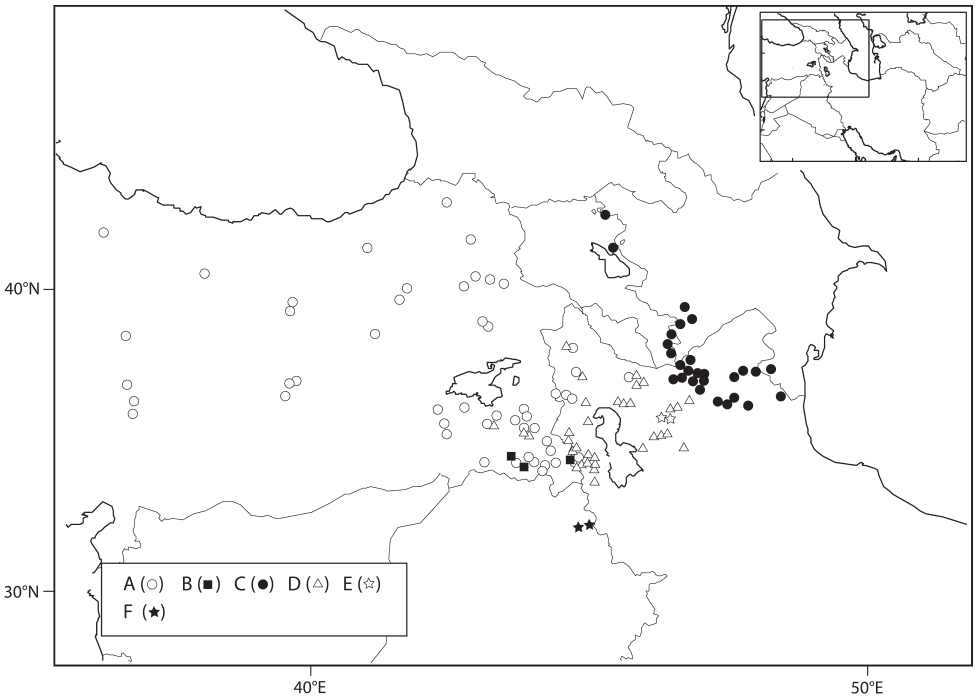

Fig. 13. Distribution of A: *Cousinia canescens;* B: *C. hakkarica;* C: *C. macrocephala;* D: *C. grandis;* E: *C. gilliatii;* F: *C. algurdina*. – Each symbol indicates the locality of a single collection or several collections made from the same or nearby localities.

population. *C. pichleriana* was described by Rechinger based on specimens with entire appendages, and *C. ecbatanensis* sensu Rechinger refers to plants with spiny appendages. *C. parsana* is based on material with spiny appendages collected from Ecbatan Dam, which is also the type locality of *C. ecbatanensis*.

Distribution and habitat. – Endemic to W Iran, province Hamadan (Fig. 16A), in open areas, stony slopes and mountain sides in the Alvand mountain range.

Further specimens seen. – Iran: Hamadan: Mont Alvand, 2900 m, 11.7.1977, *Afzal-Rafii & Zehzad 73-7-77* (G); E of Hamadan, exposed level terrain in clay or granite sand among *Hulthemia,* 1830 m, 9.7.1966, *Archibald 2609* (E, K); Hamadan, aus Ostfuß des Elwend (Alwand), 12.8.1935, *Gauba 641* (B, JE); Hamadan, Elwend (Alwand) Geb. beim Dorf Abasabad, 24.8. 1935, *Gauba 642* (B, W); Tschamane Abr (Wolkanwiese), 7.1935, *Gauba s.n.* (B); Alvande Mts, near Shahrestaneh, 2360 m, 9.7.1997, *Ghahreman & Attar 20550* (TUH); road of Malayer, Ecbatan Dam, 3.6.1999, *Ghahreman & Attar 22371 & 22372* (TUH); Alvand Mts, 1800 m, 10.7.1997, *Ghahreman & al. 20566* (TUH); Ghahavand, 1650 m, 3.7.1988, *Mozaffarian 64477* (TARI); Hamedan to Abbasabad, Gondehin, Kuh-e Almogholagh, 2200-2800 m, 9.7.1988, *Mozaffarian 64965* (TARI); Kuh-e Alvand from Abero and Simin valleys (Kuh-e Kolah Ghazi) 2200-3100 m, 13.7.1988, *Mozaffarian 65047* (TARI); neck mountain between Ganjnameh and Serkan, 2500-2700 m, 23.7.1995, *Mozaffarian 74761* (TARI); Hamedan, Chamane Abr, *Sabeti* 1407 (W); Mt Elwand, 1889, *Strauss s.n.* (JE); Abbas Abad, Kuh-e Alvand, 2100-3300 m, 11.7.1974, *Terme & Moussavi 33898-E* (IRAN, W); Shahnaz (Ecbatan) Dam, Yalfan (montis), 1980-2200 m, 12.7. 1974, *Terme & Moussavi 33982-E* (IRAN, W); 15-20 km from hamadan, Yalfan (Mt), 1950-2200 m, 10.6.1987, *Terme, Delghandi & Karavar 13431* (IRAN); Hamadan to Tuyserkan, 12 km to Ganjnameh, 2100-3300 m, 5.8.1992, *Terme, Moussavi & Tehrani 9056* (IRAN).

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21. *Cousinia keredjensis* Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 36: 328. 1934. – Lectotype (designated here): Iran, Keredj, in declivatibus meridionalibus montis Elburs sparsim quidem sed non raro, 1400-1600 m, 16.6.1934, *Gauba 18* (B-100093387!; isolectotypes: B!, JE!).

Illustration. – Fig. 14A.

Plant up to 60 cm high, white arachnoid-tomentose, ± glabrescent. *Stems* usually branched from the base or higher. *Leaves* leathery-herbaceous, with prominent white midrib and veins, ± arachnoid-tomentose on both surfaces; basal leaves usually petiolate, up to 25 × 5 cm including spines, shortly petiolate, broadly oblong to lanceolate, sinuate-lobate, with spiny-dentate lobes; stem leaves sessile, usually abruptly smaller and less divided towards the apex, oblong, ovate to broadly lanceolate, spiny-lobed, usually long-decurrent to form winged stems. *Capitula* 3.5-6 cm broad with appendages, sparsely arachnoid-tomentose, glabrescent or glabrous. *Phyllaries* 90-140, imbricate, with prominent white midrib; middle ones ± straight or slightly bent outward, their free part abruptly expanded above into a keeled, deltoid-ovate to deltoid-lanceolate appendage; appendage 12-20 mm long, 7-15 mm broad, gradually attenuate into a long spine at apex, usually sparsely arachnoid-tomentose, glabrescent, usually with 2-3 spines at both sides. *Receptacular bristles* smooth. *Flowers* 70-110; corolla pale rose, purple or lilac, 22-27 mm long; anthers concolourous. *Achenes* 4-5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia keredjensis* is similar to *C. araneosa* p.p. and differs mainly in having longer spines at the apex and on the margins of the appendages.

Distribution and habitat. – Endemic to N Iran (Fig. 16B), on rocky slopes.

Further specimens seen. – Iran: Tehran: Karadj, Kuh-e Dashteh, 2000-2500 m, 19.6.1979, *Assadi & Mozaffarian 32774* (TARI); W of Tehran, Suleghun valley, 1500-2000 m, 31.6.1979, *Assadi & Mozaffarian 32627* (TARI); mountain NE of Tehran, Souleghun valley, 1900 m, 19.7.1980, *Assadi, Mozaffarian & Jamzad 33614* (TARI); Karaj, Kuh-e Dashteh, 1600-2300 m, 25.7.1995, *Djavadi 9051* (IRAN); Chalus road, after Sadd-e Amir-Kabir, 1770 m, 20.8.1996, *Djavadi 9050* (IRAN); Sarvedar, Karaj valley, 1500 m, 5.6.1974, *Foroughi & al. 12320* (TARI, W); Keredj, 1500 m, 5.7.1934, *Gauba 18* (B); Keredj, 2200 m, *Gauba 1413* (W); road of Karaj, Kuh-Dashteh, 1550 m, 13.6.1998, *Ghahreman & Attar 21807* (TUH); W of Tehran, Sangan, 24.6.1986, *Jamzad 57089* (TARI); in ditione oppidi Keredj, 1600-2200 m, 30.5.1937, *Rechinger 606* (W); Karaj valley, 2 km S of Khuzan Kala, 1750 m, 18.7.1976, *Runemark, Rezayean & Pak-Tinat 21705* (TARI); above Ariamehr Botanic Garden, Vardavard valley, 1700 m, 17.6.1974, *Wendelbo, Assadi & Shirdelpour 12525, 12526 & 12527* (TARI).

22. *Cousinia kotschyi* Boiss., Diagn. Pl. Orient. Ser. 1: 120. 1846. – Lectotype (designated here): Iran, in collibus aridis ad radices montis Kuh-Daëna in Persia australi, 6.7.1842, *Kotschy 568* (G-BOIS: G-00105149!; isolectotypes: B!, E!, G!, K!, P!, W!).

Plant up to 50 cm high, white arachnoid-tomentose, rarely ± glabrescent. *Stems* usually branched from the base or higher. *Leaves* leathery, white arachnoid-tomentose on both surfaces or glabrescent above; basal leaves up to 25 × 6 cm including spines, lanceolate or oblong-lanceolate to linear, sinuate-lobate to deeply pinnatisect, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate to lanceolate, spiny-lobed, usually long-decurrent to form winged stems especially in lower part, sometimes rounded to cuneate at base. *Capitula* 3.5-6 cm broad with appendages, arachnoid-tomentose or glabrescent, rarely glabrous. *Phyllaries* 50-120, with prominent midrib, very variable in form and size, recurved, ± spreading or tightly imbricate; middle ones recurved, ± spreading, spreading-erect or erect, their free part slightly or abruptly expanded above into a usually keeled, flabellate, obovate-deltoid, rhomboid, sagittate, ovate, rhomboid-lanceolate to linear appendage; appendage 10-25 mm long, 3-18 mm

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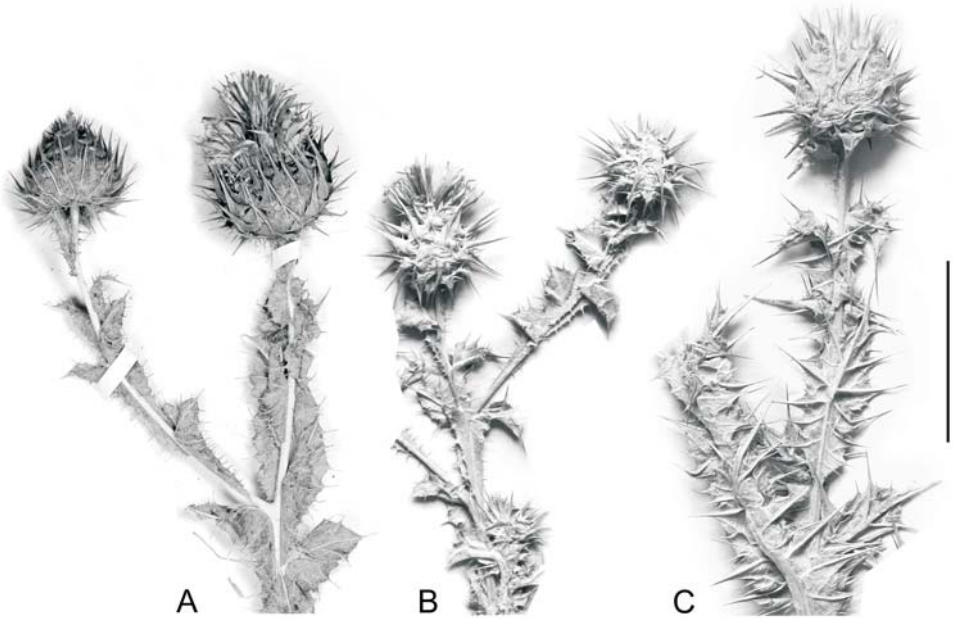

Fig. 14. A: *Cousinia keredjensis* (*Gauba 18,* B-100093387); B: *C. kotschyi* subsp. *kotschyi* (*Stapf 2821,* K); C: *C. kotschyi* subsp. *khansarica* (*Kotschyi 795,* K). – Scale bar: A-C = 5 cm; photograph A by the BGBM, B-C by I. Mehregan.

broad, gradually or abruptly attenuate into a spine at apex, usually arachnoid-tomentose, rarely glabrescent or glabrous, with 1-3 spines at both sides. *Receptacular bristles* rough or smooth. *Flowers* 25-70; corolla purple, yellow, or white, 18-23 mm long; anthers concolourous. *Achenes* 3-4 mm long.

Key to the subspecies of *Cousinia kotschyi*

1. Phyllaries with imbricate, broad appendages (western, northern and northeastern slopes of Dena mountain range) . . . . . subsp. *khansarica*
– Phyllaries with spreading-imbricate to ± spreading, broad to narrow appendages (Kerman, Yazd, and southern slopes of Dena mountain range) . . . . . subsp. *kotschyi*

22a. *Cousinia kotschyi* subsp. ***kotschyi***
= *C. farsistanica* Bornm. in Österr. Bot. Z. 62: 185. 1912, **syn. nov.** – Holotype: Iran, Fars, in monte Kuh Tschah Siah prope Siwaend (nordöstlich von Persepolis), 16.7.1885, *Stapf s.n.* (WU!; isotypes: B!, K!).
= *C. persepolitana* [as *"persepolitanus"*] Attar & Ghahreman in Nordic J. Bot. 23: 589. 2005, **syn. nov.** – Holotype: Iran, Fars, Abadeh to Shirin-Khosro, after Saghad, 2250 m, 15.7.1999, *Ghahreman & Attar 22509* (TUH!; isotype: TUH!).
= *C. pariziana* Parsa, Fl. Iran 10: 110. 1980 [*"C. parviziana"*], **syn. nov.** – Lectotype (designated here): Iran, Kerman, Pariz, 6.1957, *coll. ignot. 10026* (K!; holotype in herb. Parsa, destroyed).

Note. – Type material of *Cousinia pariziana,* collected from the village "Pariz", province Kerman, and deposited at K, was labelled by Parsa as *"C. pariziana"*. The specific epithet *"parviziana"* as printed in Parsa's Flore de l'Iran is a correctable mistake.

Illustration. – Fig. 14B.

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Phyllaries with imbricate, broad appendages; terminal spine not longer than half the capitulum diameter. *Flowers* purple or yellow, rarely white. *Anthers* purple, yellow or white.

Flowering period. – May to August.

Taxonomic remarks. – *Cousinia kotschyi* subsp. *kotschyi* was described from an unknown locality in the large Dena mountain range, which stretches from C and SW Iran towards S Iran and includes parts of the provinces Esfahan, Bakhtiari va Chahar Mahall, Boyer Ahmadi va Kohkiluyeh and Fars. In order to identify the type locality, we compared the type material of subsp. *kotschyi* with other material collected in the Dena mountain range and neighbouring areas. We found that some specimens collected from the southern slopes of Dena (province Fars) best match the type material.

Cousinia kotschyi subsp. *kotschyi* is very variable and widely distributed in S Iran. Capitula vary from having tightly imbricated phyllaries with broad, flabellate to rhomboid appendages and purple flowers (northwestern part of the distribution area, incl. *C. khansarica*) to having spreading or recurved phyllaries with linear appendages and white flowers (eastern to southeastern part of the distribution area; incl. type material of *C. farsistanica* and *C. perspolitana*). None of the species named can be maintained as separate. Type material of *C. pariziana* from SE Iran has very narrow phyllaries but falls within the variation of subsp. *kotschyi*.

Distribution and habitat. – Endemic to S Iran (Kerman, Yazd and Fars (southern slopes of Dena mountain range), (Fig. 16C), on stony slopes and open area.

Further specimens seen. – Iran: Fars: 80 km W of Shiraz, 5 km E of Mian Kotal, 2200 m, 28.6. 1964, *Grant 15866* (W); Dashte Arzhan, E slope of Kuh-e Tasak, from Bonrud and Zanganeh, 2250-3000 m, 11.6.1992, *Mozaffarian 71369* (TARI); Shiraz, Khane-Zenian, Zakherd, 2050 m, 11.6.1992, *Mozaffarian 71362* (TARI); 30 km W of Shiraz, on the road to Kazeroun, 29°40'N, 52°15'E, 1800 m, 25.5.1959, *Wendelbo 835* (W); 13 km from Ardekan (Sepidan) on the road to Yasoudj, 2400 m, 1.8.1978, *Assadi & Mozaffarian 31113* (TARI); Ardekan (Sepidan), 2500 m, 18.7.1983, *Assadi & Abouhamzeh 46302* (TARI); Shiraz, 40 km on the road to Ardekan, 2130 m, 31.7.1978, *Assadi & Mozaffarian 31049* (TARI); NW of Shiraz, open W facing slopes, in clay among limestone boulders, 2740 m, 23.7.1966, *Archibald 2815* (E, K); 15-20 km from Shiraz to Esfahan, 1600-1900 m, 16.6.2002, *Assadi & Ranjbar 82982* (TARI); Bamu protected Area, Darreh Chap, 1650-1900 m, 30.5.1975, *Wendelbo & Foroughi 17528A* (TARI); Parke Bamu, (protected Area), 1750-2000 m, 14.6.1992, *Mozaffarian 71478* (TARI); Shiraz, Kieshalden bei d. Imamzadeh von Sabs Boushan (Sabz-Poushan), 29.5.1885, *Stapf 2383* (K); Shiraz, Füß der Kuh Sabs Boushan (Sabz-Poushan), 29.5.1885, *Stapf s.n.* (K); Ad radices m. Kuh-Delu, pr. u. Schiras,7.1842, *Kotschy s.n.*(P); Shiraz to Pasargad, 2060 m, 3.7.1999, *Ghahreman & Attar22521* (TUH); Kuh Tschah Siah bei SiwendNW Persepolis, 16.7.1885, *Stapf 2821 = 2813* (K); Saadatshahr, Pasargad to Sirbanu, Kuh-e Mousa Khan, 2250-2700 m, 15.6.1992, *Mozaffarian 71524* (TARI); Shiraz to Abadeh, Saadatabad, 28.6.1969, *Terme & Izadyar 14875E* (IRAN, W); 75 km to Abadeh on the road from Shiraz, 2000 m, 16.6.2002, *Assadi & Ranjbar 83017* (TARI); Abadeh, Bavanat, Sourian (Mt), 24.6.1969, *Terme & Izadyar 8771* (IRAN); Abadeh, between Soghad and Shirin-Khosrov, 15 km, 2250 m, 5.7.1999, *Ghahreman & Attar 22508* (TUH); Abadeh, Bovanat, Sourian (montis), 24.6. 1969, *Terme & Izadyar 14876E* (IRAN, W); Abadeh, Eghlid, 2250 m, 10.6.1992, *Mozaffarian 71330* (TARI); before Seadat Shahr, between Surian and Fenjan, 30 km to Surian, 2560 m, 3.7. 1999, *Ghahreman, Attar & Mehdigholi 22514* (TUH); 3 km W of Saadatabad, 1800 m, 22.5. 1964, *Grant 15834* (W); 49 km from Sourmagh towards Dehbid, 2210 m, 29.6.1989, *Zehzad & al. 66869* (TARI); c. 25 km NE of Abadeh-Tashk, between Tujerdi and Bagh-e Safa, 30°11'N, 53°22'E, 2177 m, 15.6.2002, *Assadi&Ranjbar 82977* (TARI); c. 30 km NE of Abadeh-Tashk, between Tujerdi and Bagh-e Safa, 29°53'N, 54°01'E, 2077 m, 15.6.2002, *Assadi & Ranjbar 82960* (TARI); S of Estahbanat, Kuh-e Bash, 1700-2200 m, 7.6.1983, *Mozaffarian 47016* (TARI); 10 km from Sarvestan on the road to Fassa, post Chenar, 1800-1850 m, 29.5.1991, *Jamzad,Taheri & Javidtash 69372* (TARI); 10 km SE of Sarvestan, Posht-e Chenar, 1650-1750 m, 4.6.1983, *Mozaffarian 46727* (TARI); 100 km NE Shiraz, N Tashk, 7.6.1970, *Wsylikowa 14875E* (W); 16 km from Fasa on

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the road to Jahrom, last road, 1800 m, 2.7.1999, *Ghahreman & Attar 22531* (TUH). — YAZD: Ardekan, 10 km from Ardakan to Komhar, 2600-3300 m, 18.7.1983, *Assadi & Abouhamzeh 46338* (TARI); c. 30 km SW of Marvast, Baghe-Shadi, 29°48'N, 54°08'E, 2148 m, 15.6.2002, *Assadi & Ranjbar 82945* (TARI); Harat, Bakhtiary and Baghe Shahdy, 2050 m, 18.6.1997, *Mozaffarian 77801 & 77805* (TARI). — KERMAN: 40 km NE of Sirjan, 2130 m, 7.5.1961, *Pabot 134 c* (G); 63 km to Anar on the road from Shahre Babak, 2200 m, 4.6.1986, *Assadi & Bagosha 56453* (TARI); NE Sirjan, 7.5.1961, *Pabot 6869* (IRAN).

22b. *Cousinia kotschyi* subsp. ***khansarica*** (Attar & Ghahreman) Mehregan, **comb. & stat. nov. =** *C. khansarica* [as *"khansaricus"*] Attar & Ghahreman in Nordic J. Bot. 23: 592. 2005. – Holotype: Iran, "Esfahan, Khansar, 2400 m, 27.6.1997" [probably mislabelled, see Note, below], *Ghahreman & Attar 20037* (TUH!).

Note. – Khansar (Esfahan, Iran) is outside the distribution range of *Cousinia kotschyi,* and our search for more material of this species from Khansar failed. Examination of other specimens from the type locality and neighbouring areas revealed two more sheets collected by the same collectors under the same number (*Ghahreman & Attar 20037,* TUH). These two sheets did not match the description of *C. khansarica* and were identified as *C. silyboides* by us. We found material similar to the type material of *C. khansarica* in a more southern area in province Bakhtiari va Chahar Mahall well inside the distribution range of *C. kotschyi*, where more material was collected by Ghahreman & Attar one day later than the type (*Ghahreman & Attar 20567,* TUH collected on 28.6.1997 at Lordegan, Bakhtiari). Therefore, the correct type locality of *C. khansarica* seems to be somewhere in the province Bakhtiari va Chahar Mahall, most probably Lordegan, and the material was mistakenly numbered with material of *C. silyboides* from Khansar, province Esfahan.

Illustration. – Fig. 14C.

Phyllaries with spreading-imbricate to ± spreading, broad to narrow appendages; terminal spine usually longer than half the diameter of the capitulum. *Flowers* yellow or white. *Anthers* usually white, rarely yellow.

Flowering period. – June to August.

Taxonomic remarks. – All material from the western, northern and northeastern parts of the Dena montain range, including the type material of subsp. *khansarica,* is very similar to *Cousinia kotschyi,* and intermediate forms are frequent (see *C. kotschyi*). We therefore consider it appropriate to reduce the recently published *C. khansarica* to a subspecies of *C. kotschyi*.

Distribution and habitat. – Endemic to Iran, western, northern and northeastern parts of Dena mountain range, province Esfahan, Bakhtiari va Chahar Mahall, Boyer Ahmadi va Kohkiluyeh and Fars (Fig. 16D), on stony slopes and in oak forests.

Further specimens seen. – IRAN: Ad latera in meridiem spectantia m, Kuh-Daena (Dena), 10.7. 1842, *Kotschy 795* (B, E, JE, K, M, P,W). — ESFAHAN: 10 km to Semirom on the road from Shahreza, 2600 m, 14.7.1983, *Assadi & Abouhamzeh 46024* (TARI); Khafr, Kuh-e Dena, 2500 m, 16.8.1972, *Riazi 6765* (TARI); Kuhe Dena, Khafr, 2500 m, 12.8.1972, *Riazi 6765* (IRAN, W); N of Kuh-e Dena, Abmalakh, 2000-2600 m, 5.8.1978, *Assadi & Mozaffarian 31349* (TARI); N-side of Kuh-e Dena, near Noghol, 2500 m, 14.7.1983, *Assadi & Abouhamzeh 46072* (TARI); near Semirom, Abshar, 2300 m, 8.8.1978, *Assadi & Mozaffarian 31587* (TARI). — BAKHTIARI VA CHAHAR MAHALL: 40 km S Gandoman (Dorabun), 1920 m, 8.7.1959, *Pabot XXX IX h & b* (G); Borujen to Dorahan, after Godar-e Kabk, Kuh-e Doudelu, 2300-2700 m, 29.6.1986, *Mozaffarian 57231* (TARI); Falard, 2 km Dalvara, 2000 m, 4.6.1973, *Iranshahr & Moussavi 33924E* (IRAN, W); Goushaki to Gandoman, 5.6.1973, *Iranshahr & Moussavi 33916E* (IRAN, W); Lordegan to Goushaki, 21 km Lorgegan, 1700 m, 5.6.1973, *Iranshahr & Moussavi 33923E* (W); Lordegan, rocky valley of Kuh-e Rig, oppsite to Kuhian and Chellegah, 2000-2400 m, 8.7.1986, *Mozaffarian 57603* (TARI); road from Lordegan to Sarkhon, between Abchenar and Bougar (around

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Karoun river), 1100-1350 m, 28.6.1986, *Mozaffarian 54983* (TARI); 49 km from Sourmagh towards Dehbid, 2210 m, 18.6.1972, *Babakhanlou & Rezaiyan 24079* (TARI); Abadeh, Eghlid, Dasht-e Namdan, neck mountain between Sedeh and Cherkas, 2300-2600 m, 10.6.1992, *Mozaffarian 71348* (TARI); Eghlid, Dasht-e Namdan, road from Daryacheh-e Kaftar to Sirbanu, Kuh-e Baraftab, 2350-2900 m, 15.6.1992, *Mozaffarian 71542* (TARI); Shiraz to Tale khosravi, Chaleh-Kalagh, 24.8. 1949, *Behboudi 1219E* (IRAN, W). — Boyer Ahmadi va Kohkiluyeh: Yasouj, Bizhan pass, 2800 m, 1.7.1999, *Ghahreman, Attar & Mehdigholi 22501* (TUH).

23. *Cousinia lordeganensis* Mehregan, **sp. nov.**
Holotype: Iran, Esfahan, Semirom, Vanak, Cheshmeh-Ghanat, 2100 m, 17.7.2003, *Parishani 246* (B!).

Illustration. – Fig. 15.

Diagnosis. – Verosimiliter biennis vel perennis monocarpica, paucicaulis. Tota planta canescenti-tomentosa. Caulis usque ad 80 cm altus, simplex vel in medio vel supra pauciramosus. Folia omnia coriacea, basalia ambitu oblongo-lanceolata, sinuato-lobata. Capitula usque 3-4 cm diam., 50-70-flora; phyllaria erecto-patentia, 100-120 intermedia c. 15 mm longa, 4-5 mm lata, rhombeo-lanceolata, integra. Corolla alba, antherarum tubus concolorus.

Plant up to 80 cm high, completely canescent-tomentose. *Stems* usually simple or branched from the middle or higher. *Leaves* leathery, silvery arachnoid-tomentose on both surfaces; basal leaves up to 20 × 7 cm including spines, oblong to lanceolate, sinuate-lobate, with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, ovate or oblong to lanceolate, spiny-lobed, long-decurrent to form winged stem. *Capitula* 3-4 cm broad with appendages, densely arachnoid-tomentose. *Phyllaries* 100-120, ± spreading-erect, straight, with prominent midrib; middle ones ± straight, their free part gradually expanded above into a ± keeled, rhomboid-lanceolate appendage; appendage 14-20 mm long, 4-5 mm broad, gradually attenuate into a spine at apex, white-arachnoid-tomentose, smooth at margin. *Receptacular bristles* rough. *Flowers* 50-70; corolla white, c. 25-30 mm long; anthers concolourous. *Achenes* unknown (immature).

Flowering period. – June to July.

Etymology. – The specific epithet refers to "Lordegan", where the type was collected.

Taxonomic remarks. – The new species is similar to *Cousinia silyboides* subsp. *zardkuhensis*, but distinguishable from it by having up to 80 cm tall and stronger stems (versus to c. 40 cm), ± spreading-erect (versus not recurved, spreading to erect) phyllaries with ± straight, rhomboid-lanceolate (versus curved, lanceolate) appendages which are entire and slightly constricted at the base (versus spiny at the margin and clearly constricted at the base), and flowers with white (versus purple) anthers.

Distribution and habitat. – Endemic to central SW Iran (Fig. 16G), on rocky slopes.

Further specimens seen. – Iran: Bakhtiari va Chahar Mahall: Gandoman to Lordegan, 1900 m, 30.6.1998, *Ghahreman, Attar & Ghaffari 21884* (TUH); Lordegan, after tunnel Abvanak, 1900 m, 28.6.1997, *Ghahreman & Attar 20567* (TUH).

24. *Cousinia cynaroides* (M. Bieb.) C. A. Mey., Verz. Pfl. Casp. Meer.: 230. 1831 ≡ *Carthamus cynaroides* M. Bieb., Tabl. Prov. Mer Casp.: 195. 1798 ≡ *Onobroma cynaroides* (M. Bieb.) Spreng., Syst. Veg., ed. 3: 392. 1826 ≡ *Arctium cynarodes* (M. Bieb.) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Lectotype (designated here): Azerbaijan, inter Kuba & Schamachi (Shemakha), ex montibus Schirvancir, 1796, *Marschall von Bieberstein s.n.* (LE!).

Illustration. – Fig. 17A.

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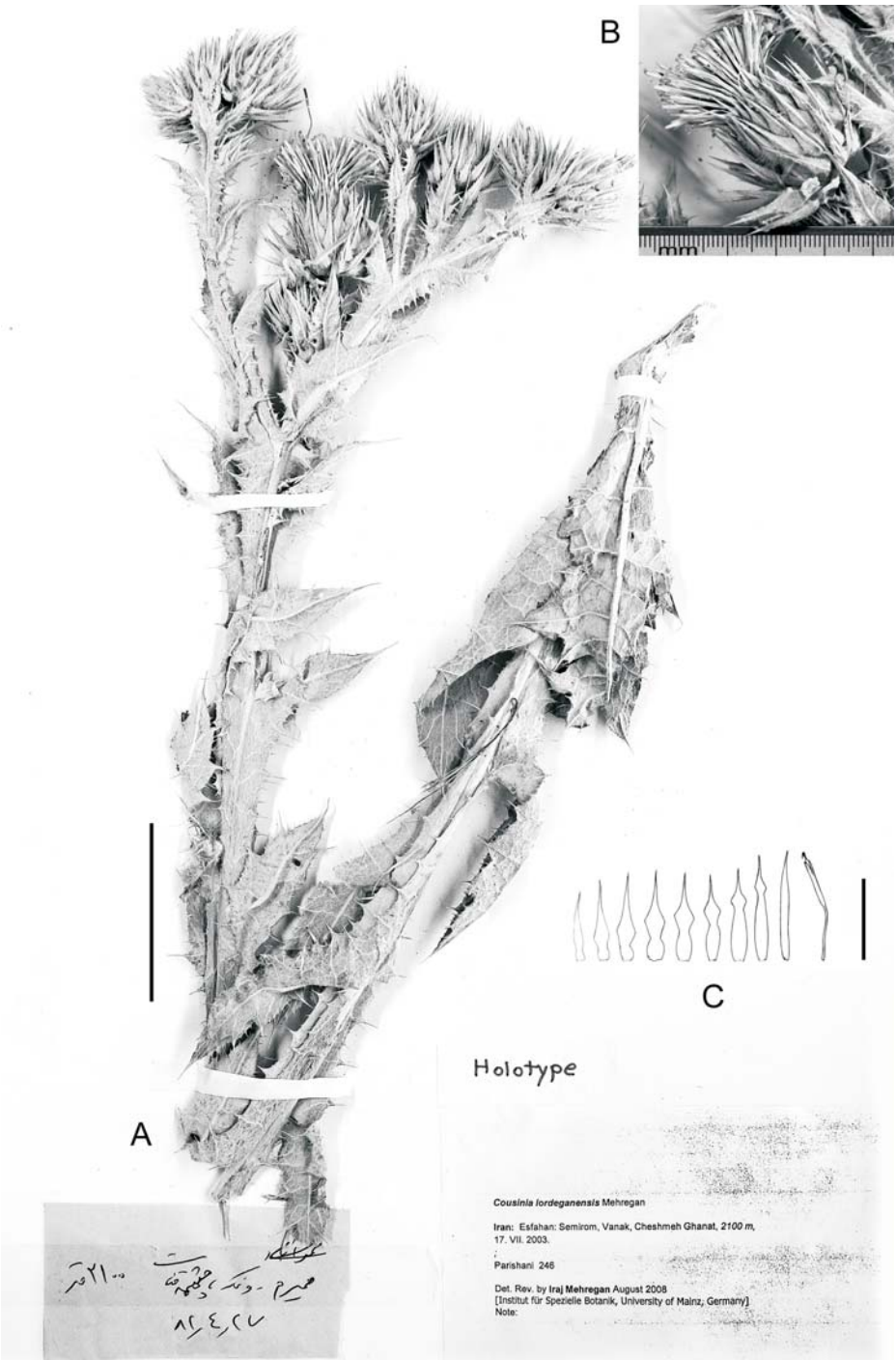

Fig. 15. *Cousinia lordeganensis* (*Parishani 246,* B) – A: habit; B: capitulum; C: phyllaries and flower. – Scale bars: A = 5 cm, C = 20 mm; photograph by I. Mehregan.

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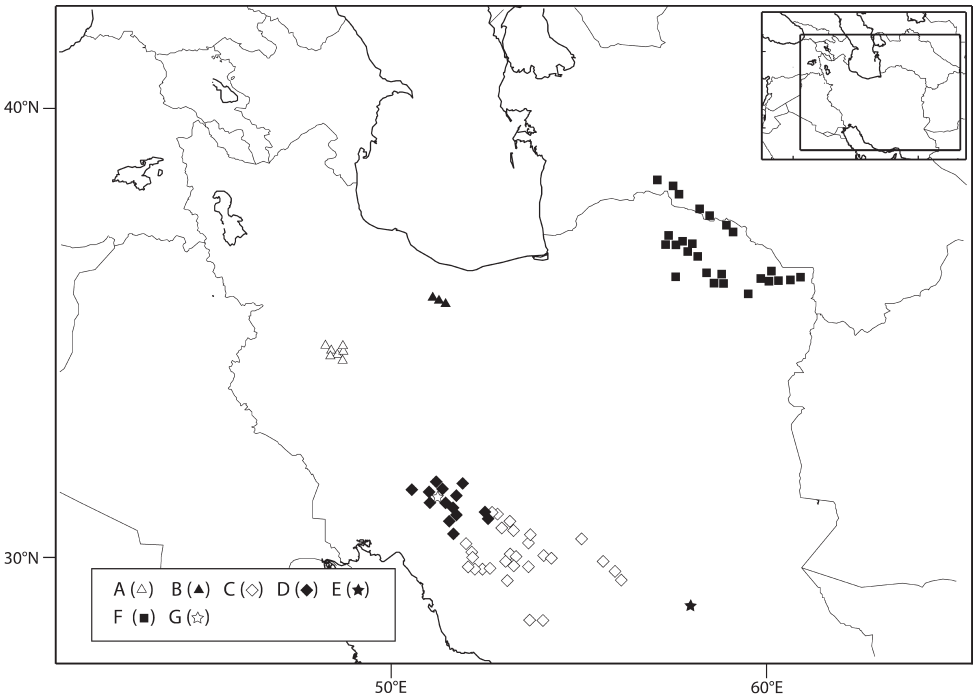

Fig. 16. Distribution of A: *Cousinia araneosa;* B: *C. keredjensis;* C: *C. kotschyi* subsp. *kotschyi;* D: *C. kotschyi* subsp. *khansarica;* E: *C. sarzehensis;* F: *C. verbascifolia;* G: *C. lordeganensis.* – Each symbol indicates the locality of a single collection or several collections made from the same or nearby localities.

Plant up to 45 cm high, densely arachnoid-canescent. *Stems* usually branched from the middle or higher. *Leaves* leathery or ± herbaceous, arachnoid-tomentose on both surfaces or ± glabrescent above and arachnoid-tomentose beneath; basal leaves up to 14 × 4.5 cm including spines, lanceolate to oblong-lanceolate, deeply sinuate-lobate with spiny-dentate lobes; stem leaves sessile, gradually smaller and less divided towards the apex, lanceolate, spiny-lobed, cuneate at base, often long-decurrent to form winged stems. *Capitula* 4-7.5 cm broad with appendages, arachnoid or ± glabrescent. *Phyllaries* 50-70; middle ones spreading, sometimes slightly recurved, their free part expanded above into a keeled, slightly recurved, lanceolate to oblong-lanceolate appendage; appendage 10-27 mm long, 4-8 mm broad, gradually attenuate into a spine at apex, usually arachnoid-tomentose, with 1-4 spines on both sides. *Receptacular bristles* rough. *Flowers* 50-100; corolla yellow, 20-28 mm long; anthers yellow, rarely purple. *Achenes* 4-5 mm long.

Flowering period. – May to July.

Taxonomic remarks. – Similar to *Cousinia calocephala,* distinguishable from it by its densely arachnoid-canescent indumentum.

Distribution and habitat. – Endemic to E Caucasus and NW Iran (Fig. 19G), on dry stony slopes.

Further specimens seen. – Azerbaijan: Talysch, *Meyer s.n.* (G-BOIS, P, W); Caucas, 6.1839, *Hohenacker s.n.* (E); Swant, cauc. in aridis arenisis, saxosis ditionis, 4500', 6.1836, *Hohenacker s.n.* (E, K, M, P, W, WU).
Iran: Azarbaijan: C. 17 km from Ardabil to Nir, 1550 m, 30 .7.1998, *Mozaffarian & Massoumi* 78229 (TARI); Ardebil, Namin, Astara Road, 1450 m, 27.7.1974, *Foroughi & Assadi 13956* (TARI); c. 20 km from Ardebil to Germi, 1320 m, 16.5.1993, *Ghahreman & al. 17488* (TUH); between Ardebil and Sar-e Ain, 1650 m, 22.6.1999, *Attar & Mehdigholi 22569* (TUH); 10 km

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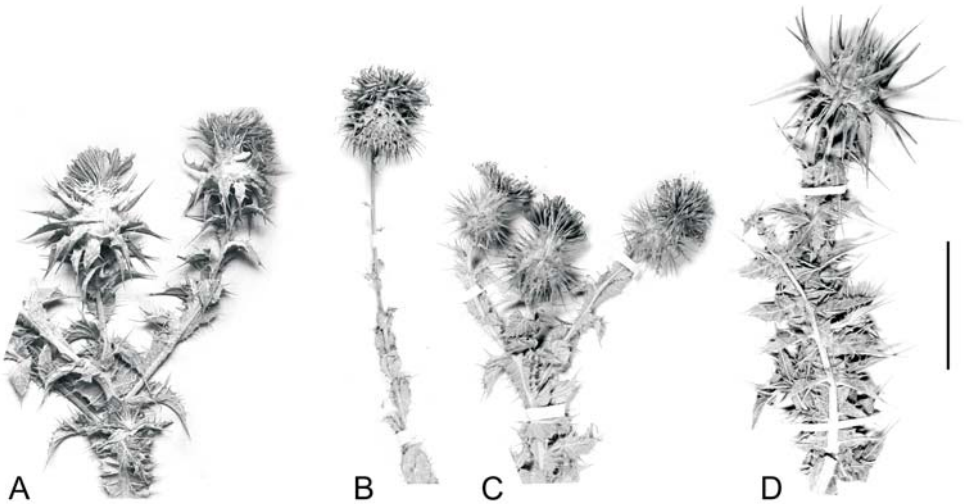

Fig. 17. A: *Cousinia cynaroides* (*Hohenacker s.n.,* K); B: *C. calocephala* subsp. *calocephala* (*Bornmüller 7369,* B-100157210); C: *C. calocephala* subsp. *behboudiana* (*Bornmüller 7369,* B-100157191); D: *C. calocephala* subsp. *astrocephala* (*Strauss s.n.,* B-100157251). – Scale bar: A-D = 5 cm; photograph A by I. Mehregan, B-D by the BGBM.

from Namin to Heyran pass, 1600 m, 22.6.1999, *Ghahreman & Attar 22568* (TUH); 80 km N of Meshkin-Shahr, near Kangar-Lou, 1000 m, 19.7.1999, *Ghahreman & Attar 21967* (TUH).

25. *Cousinia calocephala* Jaub. & Spach, Ill. Pl. Orient. 2: 96, t. 178. 1846 ≡ *Arctium calocephalum* (Jaub. & Spach) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Holotype: Iran, in Hyrcania, *Aucher-Eloy 4817* (P!).

Plant up to 60 cm high, arachnoid-tomentose, ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery or herbaceous, arachnoid-tomentose on both sides, or ± glabrescent above; basal leaves up to 25 × 6 cm including spines, lanceolate to oblong-lanceolate, pinnatisect; stem leaves sessile, usually abruptly smaller and less divided towards the apex, ovate to lanceolate, pinnatipartite to spiny-dentate, usually long-decurrent to form interrupted wings. *Capitula* 1.7-6 cm broad with appendages, arachnoid or glabrescent. *Phyllaries* 60-100; middle ones ± spreading to recurved, rarely imbricate, their free part expanded above into a usually ± flat, straight to recurved, deltoid-lanceolate to linear-lanceolate appendage; appendage 6-32 mm long, 2-6 mm broad, attenuate into a spine at apex, usually glabrous or ± glabrescent, with (0-)2-3(-5) spines on both sides. *Receptacular bristles* rough or smooth. *Flowers* 40-140; corolla purple, rose, yellow or dirty white, 18-30 mm long; anthers purple, rose or white (in dried material). *Achenes* 3-5 mm long.

Taxonomic remarks. – *Cousinia calocephala* is widely and discontinuously distributed in Iran and Turkey. Intermediate forms between *C. calocephala* and *C. adnata, C. vanensis, C. stroterolepis, C. sefidiana, C. sabalanica, C. behboudiana, C. astrocephala* and *C. nana* are frequent, and none of those can be maintained as separate species. We here group the material of *C. calocephala* into three subspecies based on geographical distribution and morphology.

Key to the subspecies of *Cousinia calocephala*

1. Flowers yellow or cream (plants from E Elburz) . . . . . subsp. *behboudiana*
– Not with above combination of characters 2

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2. Phyllaries ± spreading, 2 cm long or more (plants from C Iran, provinces Markazi, Esfahan except western and southern parts and Qom) . . . . . subsp. *astrocephala*
– Not with above combination of characters . . . . . subsp. *calocephala*

25a. *Cousinia calocephala* subsp. *calocephala*
= *C. squarrosa* Boiss., Diagn. Pl. Orient. Ser. 1: 102. 1846 ≡ *Arctium squarrosum* (Boiss.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iran, in valle Schahristonek montis Elburs, 16.7.1843, *Kotschy 551* (G-BOIS: G-00152012!; isolectotypes: G!, P!, W!).
= *C. adnata* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 50. 1865 ≡ *Arctium adnatum* (Bunge) Kuntze, Revis. Gen. Pl. 1: 307. 1891, **syn. nov.** – Lectotype: Iran, Azerbaijan, in montosis inter Bagh & Agh-kent, in Persia boreali, inter Teheran & Tabris, 6.1859, *Bunge & Bienert s.n.* (P!; isolectotype: G-BOIS [fragment]!).
= *C. vanensis* Hub.-Mor. in Notes Roy. Bot. Gard. Edinburgh 32: 55. 1972, **syn. nov.** – Holotype: Turkey, Van, Toprak kale, hill above Van, 1770 m, 306.1949, *Huber-Morath 8921* (G!).
= *C. stroterolepis* Rech. f., Fl. Iranica 90: 250. 1972, **syn. nov.** – Holotype: Iran, Kurdistan, 114 km N Marivan (Dezh Shahpur) versus Saqqes, 1580 m, 7.7.1971, *Rechinger 43086-b* (W!; isotypes: B!, K!, M!).
= *C. sefidiana* (Pau) Rech. f. in Anales Jard. Bot. Madrid 47: 365. 1990, **syn. nov.** ≡ *C. cymbolepis* var. *sefidiana* Pau in Trab. Mus. Nac. Ci. Nat., Ser. Bot. 14: 40. 1918. – Holotype: Iran, Bakhtiari, Kuh Safid, alto Karum, 3000 m, 6.1899, *Martinez de la Escalera s.n.* (MA!).
= *C. sabalanica* Attar, Ghahreman & Assadi in Nordic J. Bot. 20: 699. 2000, **syn. nov.** – Holotype: Iran, Azerbaijan, between Sar-Ayn and Ardebil, 1450 m, 22.6.1999, *Attar & Mehdigholi 22572* (TUH!).

Illustration. – Fig. 17B.

Phyllaries usually recurved. *Flowers* purple, rose, rarely yellow. *Anthers* usually concolourous.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia calocephala* subsp. *calocephala* is very variable and widely distributed in Iran and SE Turkey. Its local populations are continuously connected via intermediate forms.

Distribution and habitat. – SE Turkey, N, NW, C and W Iran (Fig. 19A), on stony slopes.

Selected further specimens seen. – Turkey: Van: 10 km NW of Baskale, hillside, 2500 m, 18.8.1954, *Davis 24526* (ANK, E); 34 km from Gürpinar (Havasor) to Hosap, dry stony hills, 2150 m, 3.7.1966, *Davis 45967* (E, K, W); 50 km S Gürpinar, 2200 m, 22.8.1984, *Sorger 84-74-2* (W); Gevas-Euromit, steppe, 9.7.1954, *Davis 22609* (ANK, E, K); Havasor-Van, steppe hills, 30.7.1954, *Davis 23286 & 23288* (ANK, E, K); Hakkari: Jüksekara-Baskala, 57 km, 37°54'38", 44°04'38", 1950-2000 m, 16.7.2001, *Karaveliogullari ZA-8216* (GAZI).
Iran: Azarbaijan: 10 km from Sarab to Ardebil, 1400-1500 m, 3.7.2003, *Mehregan 85779* (TARI); 35 km from Kivi, Firouz Abad, 1180-1350 m, 17.6.1980, *Mozaffarian & Nowrouzi 34248* (TARI); 45 km on the road from Zanjan to Bijar, 1550 m, 19.10.1977, *Runemark & Mozaffarian 25926* (TARI); between Shahindege and Takab, Kuh-e Gharadash (Aghdash) from Ghezghapan, 1400-2450 m, 4.7.1991, *Mozaffarian 69880* (TARI, TUH); Bostan Abad, Pishiclou to Chiniboulagh, 4 km. Pishiclou, 2150-2350 m, 1.8.1984, *Terme & Moussavi 8846* (IRAN); c. 18 km from deviation Zanjan-Mianeh to Mahneshan, 1800 m, 25 .7.1998, *Mozaffarian & Massoumi 78161* (TARI); Rezaiyeh to Mahabad, 16 km NW of Mahabad, 1280 m, 15.6.1971, *Lamond 4202* (E); Saqqez to Tabriz, c. 11 km N of Saqqez, 1500 m, 8.7.1971, *Lamond 4620* (E); Saqqez, between Sonnate and Divandarre, Kuh-e Ghaleh, neck Munt between Bashmagh and Jafarabad, 2300 m, 14.7.1991, *Mozaffarian 70067* (TARI); Sarab, Landjewan, 2000 m, 26.7.1970, *Izadyar 13732E* (IRAN, W); prope Tabris, 1350-1500 m, 25.6.1924, *Grossheim 2* (B). — Zanjan: 120 km W of Zanjan towards Bidjar, 1500 m, 30.6.1971, *Terme 33989E* (IRAN, W); 140 km SE Zanjan to Hamadan, mountains Takht, 2150-2560 m, 5.7.1974, *Terme & Moussavi 33896E* (IRAN, W);

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20 km from Abhar to Gheidar, after Kine vars, 1950 m, 25.7.1998, *Mozaffarian & Massoumi 78148* (TARI); 57 km SE Zanjan, Col. S Soltanieh, 2070 m, 24.6.1960, *Pabot 3925* (G); 70 km from Zanjan to Bijar, 1700 m, 30.6.1971, *Terme 33998E* (IRAN); 82 km SE Zanjan, 1750 m, 24.6.1960, *Pabot 3963* (TARI); ad versuras 8-22 km SW Zanjan versus Bijar, 1800 m, 30.6.1971, *Rechinger 42364* (TARI). — KORDESTAN: 108 km from Zanjan on the road to Bijar, 1700 m, 30.6.1971, *Lamond 4321* (E); in collibus siccis & ad versuras 11 km N Saqqes, 1550 m, 8.7.1971, *Rechinger 43109* (B, K, W); 40 km from Divandarreh to Saqqez, 2100 m, 11.6.1996, *Mozaffarian 77157* (TARI); Gourbaba-Ali, 2240 m, 5.8.1967, *Iranshahr & Terme 8836* (IRAN); in declivibus argillosis 107-109 km Zanjan versus Bijar, 1700 m, 30.6.1971, *Rechinger 42439* (B, K, W). — HAMADAN: 130 km from Hamadan on the road to Ghazvin, 1850 m, 26.6.1974, *Assadi & Shirdelpour 13220* (W); 137 km from Hamadan on the road to Ghazvin, 2170 m, 18.6.1974, *Assadi & Amini 13621* (W); Gardane Avaj, after Sultan Bolagh, 2300 m, 14.7.1999, *Mozaffarian & Massoumi 79656* (TARI); Kaboutar Ahang, Shirinsou, 1400 m, 27.-30.6.1998, *Djavadi & Ghanbari 20386* (IRAN); Razan to Avadj, 7-8 km to Avadj, 2000-2100 m, 21.7.1999, *Terme, Eskandari & Falsafi 32237* (IRAN); Avaj pass, 1900 m, 9.6.1997, *Ghahreman & Attar 20547* (TUH); Ghazvin to Hamedan, just after Avaj, 2100 m, 7.7.1981, *Assadi & Mozaffarian 36632* (TARI). — MARKAZI: Chelesban, 60 km from Saveh in NWW direction, 2280 m, 25.6.1974, *Assadi & Shirdelpour 13190* (E, W); Aq Bulaq, c. 100 km N Hamedan, [35°36'N, 48°27'E], 15.4.-1.7.1960, *Rioux & Golvan 489* (W); Montes Karaghan, In jugo Soltan Bolagh inter Avej & Razan, 2200-2400 m, 27.6.1974, *Rechinger 48431* (B, W). — LORESTAN: Shoulabad to Sefid-Dasht, after Shoulabad, 1700 m,6.1998, *Ghahreman & Attar 21875* (TUH); Sefid Dasht to Shulabad, 30 km to Shulabad, 1800 m, 26.7.1999, *Attar & Mirtaj* 22607 (TUH); ad Bürüdjerd, 8.1899, *Strauss s.n.* (B, JE). — BAKHTIARI VA CHAHAR MAHALL: 5 km from Farsan to Shahrekord, 1880 m, 28.6.1997, *Ghahreman & Attar 20549* (TUH); Ardal, Dashtak to Cherry, 2100 m, 16.6.1973, *Iranshahr & Moussavi 33917E & 33926E* (IRAN, W); Barrage de Kuh-Rang, 2500 m, 6.7.1959, *Pabot 2165* (IRAN); Bazoft area, 2 km to Samsami, from Shahriari, 2050 m, 17.7.1994, *Zarre 17789* (TARI, TUH); Brojen, Boldaji, Kuh-e Chiro, Bagh-e Chiro, 2200-2600 m, 1.7.1986, *Mozaffarian 57328* (TARI); Darreh Bazoft, Chebed, N slope of Kuh-e Taraz, 1700-2300 m, 12.8.1986, *Mozaffarian 58825* (TARI); Darreh Bazoft, Mavarz, 1750 m, 13.8.1986, *Mozaffarian 58049* (TARI); Zagrog mountains, Kurang (Kouhrang), 8000 ft., 31.7.1965, *Timmis 10* (K). — ESFAHAN: 30 km Daran, Dalan Kuh, Cheshmeh Gorgi, 280-2500 m, 25.6.1974, *Moussavi & Satei 33902E* (IRAN, W); 30 km Daran, Dalan Kuh, Cheshmeh Gorgi, 2200 m, 8.7.1996, *Mozaffarian 77226* (TARI); Akhoreh to Chaghyourt, Kuhe Cyhalin-Darreh, 2420-2700 m, 3.8.1973, *Moussavi & Satei 33906E* (IRAN, W); Fereydoun-Shahr, Choghyourt, 2550 m, 31.5.-4.6.2000, *Djavadi & Ghanbari 29551* (IRAN). — KHUZESTAN: Dehdez to Karun river, around Lirsiah, 1000 m, 17.6.1995, *Mozaffarian 74481* (TARI). — MAZANDARAN: Kandavan, Chaloush-Haraz road, Youish, 1600 m, 11.7.1997, *Ghahreman, Attar & Ghahremani 21221* (TUH); inter Djabun & Firuzkuh, 2200 m, 29.6.1938, *Rechinger 1159* (B, W). — TEHRAN: Near Alamut, [36°23'N, 50°12'E], 1940 m, 26.7.2001, *Attar & Mehdigholi 27629* (TUH); Col de l'Imam Zadeh Hashem, descente sur Ab-e Ali, 2100, 30.6.1974 *Klein 7640* (E); Elburz, above Tehran, 3000 ft(!), 12.7.1959, *Agnew 18 & 15* (E); Abhänge bei Getschesär, 2500 m, 24.8.1934, *Gauba 10* (B); Keredj, Kuh Nemar bei Pasinand, 1900 m, 3.6.1937, *Gauba 1575* (B); Elbursgebirge, auf Hangan, 30.6.1933, *Gauba 46* (B); in valle Lur montium Elburs occid. ad pagum Meidan, 2200 m, 21.6.1902, *Bornmüller 7365* (B); in valle Scheheristanek montium Elburs, 2200 m, 6.-7.6.1902, *Bornmüller 7371 & 7372* (B); Jugi Elbursensis in montanis inter aples Totschal & Demawend prope Feschend, 1800-1900 m, 12.7.1902, *Bornmüller 7367* (B, JE, K, P, W, WU); ibid., in valle Lur ad pagum Getschesär, 2200 m, 4.7.1902, *Bornmüller 7369* (B, E, JE, K, P, W, WU); ibid., ad basin septentr. alpium Totschal, prope Scheheristanek, 2200 m, 10.6.1902, *Bornmüller 7370* (B, P, W, WU) & 10.6. 1902, *Bornmüller 7371* (B, E, JE, P); Totschal, in subalpinus supra Ferasad (Farahzad), 1800- 1900 m, 29.5.1902, *Bornmüller 7366* (B); in ditione oppidi Keredj, in valle fluvi Keredj prope Nissa, 2200 m, 20.8.-1.9.1948, *Rechinger & Rechinger 6726* (B, E, K, M, W); 20 km from Firouz-Kuh to Semnan, 2050 m, 28.7.1996, *Djavadi, Ghaffari & Bakhsheshi 8928* (IRAN); 22 km Firuz Kuh toward Rodehen,

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near Chehel-Cheshmeh, 2300 m, 12.7.1974, *Renz & Iranshahr 16616E* (IRAN, W); 30 km from Tehran on the road to Shemshak, 1930 m, 12.6.1973, *Babakhanlou & Amin 4226* (TARI); 5 km before the pass from Tehran to Chalus, 2400 m, 2.7.1969, *Andersen & Petersen 175* (E, K, W); Alamout, Akbar Abad, 1850 m, 28.7.1970, *Foroughi 747* (TARI); between Tehran and Karaj, Vardasht, 4.7.1977, *Assadi 25427* (TARI); 116 km E Teheran, 2150 m, 11.7.1960, *Pabot 4308* (G). — Semnan: In jugo Baschm, 2400 m, 29. -30.6.1937, *Rechinger 1967* (B, W); 12 km NE of Shahmirzad, 2400 m, 26.7.1982, *Assadi & Mozaffarian 40388* (TARI); 2 km N of Shahmirzad, mountains above the village Sufian, 2400-2800 m, 22.7. 2001, *Assadi & Ranjbar 82042* (TARI); 40 km Shahmirzad to Fulad Mahalleh, 2200 m, 9.7.1974, *Renz & Iranshahr 16629* (IRAN, W); 59 km from Semnan on the road to Sari, 2400-2800 m, 25.7.1976, *Assadi & Massoumi 1536* (TARI); 75 km from Semnan vers Sari, Parvar protected area, 2000-2150 m, 9.8.1978, *Terme, Moussavi & Tehrani 8834* (IRAN); c. 35 km from Firouzkuh to Semnan, 2020 m, 10.7.1998, *Mozaffarian 78040* (TARI); c. 50 km N of Semnan, near Tang-e Parvar, 2200 m, 30.7.1982, *Assadi & Mozaffarian 40756* (TARI); highest pass between Jashm and Shahmirzad, 2900 m, 15.7. 2003, *Assadi 85407* (TARI).

The specimens *Attar 26089* (TUH) from Tehran (Sohanak hills, 1990) and *Alava & Moussavi 8824/3* (IRAN) from Tehran (Karaj, 15 km NE Karaj, Mt Atashgah, 1800-1850 m, 27.6.1974) are intermediate between *Cousinia calocephala* and *C. keredjensis*.

The specimen *Ghahreman, Attar & Ghaffari 21861* (TUH) from Lorestan (Khorramabad, 18 km from Cheshmeh Par to Shoulabad, 2300 m, 26.7.1999) is intermediate between *Cousinia calocephala* and *C. sagittata*.

Djavadi, Ghaffari & Bakhsheshi 8928 (IRAN) and *Assadi 85407* (TARI) from Semnan clearly belong to *Cousinia calocephala* but have middle phyllaries with entire (versus spiny) appendages.

25b. *Cousinia calocephala* subsp. ***behboudiana*** (Rech. f. & Esfand.) Mehregan, **comb. & stat. nov.** ≡ *C. behboudiana* Rech. f. & Esfand. in Ann. Naturhist. Mus. Wien 57: 81. 1950. – Holotype: Iran, Tehran, Damavand, Marounak, 2200 m, 11.7.1948, *Behboudi 169E* (W!; isotype: IRAN!).
= *C. calocephala* var. *albiflora* Bornm. in Bull. Herb. Boissier, ser. 2, 7: 220. 1907. – Holotype: Iran, Tehran, ditionis oppidi Demavend in planitie arida lapidosa, 2200-2300 m, 20.7.1902, *Bornmüller 7369* (B-100157191!).
= *C. calocephala* var. *albiflora* f. *minor* Bornm. in Bull. Herb. Boissier, ser. 2, 7: 220. 1907. – Holotype: Iran, Tehran, ditionis oppidi Demavend in planitie arida lapidosa, 2200-2300 m, 20.7.1902, *Bornmüller 7374* (B-100157192!).
= *C. calocephala* var. *lachnolepis* Bornm. in Repert. Spec. Nov. Regni Veg. 41: 311. 1937. – Type: Iran, Elburs, Demavend, auf der Route Dorf Demawend zum Thar-See, 2500 m, 19.7.1935, *Bornmüller 467* (B-100157196!).

Illustration. – Fig. 17C.

Phyllaries usually ± spreading, ± straight. *Flowers* yellow or cream. *Anthers* concolourous or purple at apex.

Flowering period. – June to August.

Taxonomic remarks. – Differing from subsp. *calocephala* in being smaller and having usually yellow flowers.

Distribution and habitat. – Endemic to eastern Elburz mountain range (Fig. 19, B), on rocky slopes.

Further selected specimens seen. – Iran: Tehran: Demavend, bei Ab-igarm, 1.8.1902, *Brüns s.n.* (B); 10 km S Firouzkuh, Ziba Dasht, 1700 m, 28.5.1973, *Bazargan & Arazm 4085* (TARI); 14 km S of Damavand, Akhorbadin, 1650-1800 m, 22.6.1985, *Mozaffarian 53866* (TARI); 2 km from Ab Ali to Tehran, 2080-2440 m, 16.7.1972, *Dini & Arazm 4188* (TARI); 20 km E of Tehran, 1700 m, 9.7.1960, *Pabot 4047* (TARI); 25 km E of Tehran, 1950 m, 21.6.1972, *Dini & Arazm 4135* (TARI);

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41 km N Tehran (Shemshak), 2000 m, 19.6.1973, *Amin 4165* (W); 70 km E of Tehran, 1900 m, 11.7.1969, *Cronquist 10718* (K, TARI, W); 7km from Lashgarak to Gardaneh Ghouchak, 1850 m, 2.7.1975, *Moussavi 8778* (IRAN); Ab Ali, 2080-2440 m, 17.7.1972, *Dini & Arazm 4144* (TARI); Ab Ali, 12.7.1968, *Bonvan 9827* (TARI); Ab Sard, 10.7.1968, *Bonvan 9580* (TARI); Ab-e Ali, Sarpolak, 17.6.1967, *coll. ignotus 11663* (TUH); c. 20 km NE of Tehran, above the village Afjeh, 2000 m, 4.7.1985, *Assadi & Jamzad 55258* (TARI); c. 5 km from Jajroud to Tehran, 1500-1600 m, 9.7.1998, *Mozaffarian 78004* (TARI); c. 6 km to Damavand, Hesar (Hossainabad), 1800 m, 1.6.1978, *Mozaffarian 32488* (TARI); Damavand, 1700 m, 8.7.1972, *Dini & Arazm 4156* (TARI, W); Jajroud, 1650 m, 21.7.1972, *Arazm 4191* (TARI, W); Jajroud, 1700 m, 22.7.1972, *Dini & Arazm 4103* (TARI, W); Lashgarak toward Gardaneh-e Ghouchak (16 km N Tehran), 1780 m, 2.7.1975, *Moussavi 33814E* (IRAN, W); Lashgarak toward Gardaneh-e Ghouchak (7 km from Lashgarak), 1850 m, 2.7.1975, *Moussavi 33869E* (IRAN, W); Montes Elburz centr., in ditione lacus Thar, 2500 m, *Gauba & Esfandiari 1410* (W); Mt Emamzadeh Hashem, 24.6.2002, *Attar & Mehdigholi 28692* (TUH); near Sorkh-e Hesar, Se Pay-e mountains, 1320 m, 18.6.1990, *Pouladian 21342* (TUH); Shemshak, Emameh, 2000 m, 19.6.1973, *Amin 4165* (TARI); Mazandaran: 4 km S of Renyeh, on E slope Mt Demavand, 2200 m, 27.7.1964, *Grant 16515* (W); near Rine, 2500 m, 16.7.1998, *Ghahreman & Attar 21970* (M, TUH); Rineh to Ab-e Garm-e Larijan, 2100 m, 22.6.1996, *Djavadi & Ghanbari 8857* (IRAN); Haraz road, above Rineh, 2350 m, 26. 9. 1978, *Assadi & Salehi 31755* (TARI); Haraz road, Abgarm-e Larijan, 2090 m, 27.7.1996, *Djavadi & Bakhsheshi 9456* (IRAN); in the pass NW of Tehran, against Amol, Rockside, 2100 m, 5.7.1969, *Andersen & Petersen 232* (E, K, W); ad basin montium prope Reneh, 1400-1500 m, 28.7.1902, *Bornmüller 7364* (B).

25c. *Cousinia calocephala* subsp. ***astrocephala*** (Hausskn. & Bornm.) Mehregan, **comb. & stat. nov.** ≡ *C. astrocephala* Hausskn. & Bornm. in Beih. Bot. Centralbl., Abt. 2, 30: 160. 1906. – Lectotype (designated here): Iran, Sultanabad, in monte Schahsinde, 18.7.1902, *Strauss s.n.* (B-100157251!; isolectotype: JE!).
= *C. cynaroides* var. *viridior* Bornm. in Beih. Bot. Centralbl., Abt. 2, 32: 406. 1914. – Lectotype (designated here): Iran, in m. Kuh-i-Kohrud, 6.1908, *Strauss s.n.* (B-100157223!; isolectotype: JE!).
= *C. nana* Attar, Ghahreman & Assadi in Nordic J. Bot. 20: 698. 2000, **syn. nov.** – Holotype: Iran, Arak, Mayghan, Davoudabad, 1650 m, 12.7.1985, *Mozaffarian 64185* (TARI!).
[– *C. bornmuelleri* auct. non C. Winkl.: Rech. f., Fl. Iranica 90: 231. 1972].

Note. – The type locality of *Cousinia nana* given in the protologue as "9-10 km E of Aybak-Abad towards Davood Abad, 1650 m" does not match the type label but refers to herbarium material collected by Akhani under no. *14347* (TUH).

Illustration. – Fig. 17D.

Capitula large. *Phyllaries* usually ± spreading, with ± straight appendages; appendages 2 cm or longer. *Flowers* purple or white. *Anthers* usually purple.

Flowering period. – (May-) June and July (-August).

Taxonomic remarks. – *Cousinia calocephala* subsp. *astrocephala* is distributed in C Iran and differs from subsp. *calocephala* in having larger capitula with usually ± straight appendages.

Distribution and habitat. – Endemic to C Iran, provinces Markazi, Esfahan and Qom (Fig. 19C), on rocky slopes.

Further specimens seen. – Iran: Esfahan: 6.2001, *Pour-Mohammadi 27609* (TUH); Ardestan, Yaryan, 2550 m, 8.7.1971, *Foroughi 1864* (TARI); Delijan, 1420 m, 27.10.1971, *Sabeti, 2901* (TARI); Kashan, Ghamsar towards Ghohroud, road to Esfahan, after Reza-Abad, 3100 m, 5.6.1999, *Assadi, Jamzad & Azizian 80046* (TARI); Kuh-e Karkas (Kuh-i Kargiz), in declivibus supra Tar, 33°27'N, 51°48'E, 27.5.1974, *Rechinger 46553* (W); Natanz, Karkas mountain,

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3000-3300 m, 26.6.1975, *Foroughi & Assadi 18086* (TARI); Natanz, Tameh, 2000 m, 20.6.1988, *Hashemi & Badiei 34279* (IRAN); near Meymeh, 1600 m, 1.7.1997, *Ghahreman, Attar & Sheikh 20542* (TUH); near Meymeh, 2200 m, 29.6.1999, *Ghahreman & Attar 22491* (TUH); Varian, near Ardestan, 2000 m, 25.6.1975, *Foroughi & Assadi 18042* (TARI); inter Sultanabad & Kaschan, ad Dschekab, 6.1899, *Strauss s.n.* (B); Kashan (Mooteh protected region), Muteh (Mooteh), 1950 m, 30.5.1974, *Rechinger 46814* (W); Natanz, Karkas mountain, 2700 m, 9.7.1972, *Foroughi 4376* (TARI, W); Karmejegan, 50 km S of Qom, Karmojgan, 1900 m, 12.6.1974, *Amin & Bazargan 18960* (TARI, W). — Markazi: 83 km from saveh on the road to Hamedan, 1850 m, 26.6.1974, *Assadi & Shirdelpour 13194* (E, TARI, W); 86 km from saveh on the road to Tafresh, 2000 m, 24.6.1974, *Assadi & Shirdelpour 13145* (E, TARI, W); between Mashad-Ardahal and Narragh, 2150 m, 25.7.2000, *Ghahreman, Attar & Mahdigholi 25108* (TUH); bifurcation of Tafresh and Dastgerd, 30 km to Tafresh, 1870 m, 17.6.1998, *Ghahreman, Attar & Ghaffari 21811* (IRAN, TUH); Saveh, beginning of the road, Nubaran to Kahlou to Tafresh, 1635 m, 23.6.1993, *Mozaffarian 72072* (TARI); Tafresh, Gardaneh-e Noghreh Kamar, 1750 m, 24.6.1993, *Mozaffarian 72092* (TARI); Tehran to Arak, c. 30 km to Arak, near Ebrahim Abad, "Haftad Gholeh Protected Area", 1800-2200 m, 25-26.5.2000, *Zarre & al. 682* (M); Arak, Haftad-Gholleh, Chek Ab, 2100-2500 m, 12.6.1984, *Mozaffarian & Massoumi 47862* (TARI); Mahallat, Bagher Abad, Tang-e Badam, 1900-2100 m, 14.6.1984, *Mozaffarian & Massoumi 47990* (TARI); Saveh, begining of the road, Nubaran to Kahlou to Tafresh, 1635 m, 23.6.1993, *Mozaffarian 72072* (TARI); Tafresh, neck mountain of Noghreh-Kamar, on the road to Ashtian, 2200-2400 m, 16.6.1984, *Mozaffarian & Massoumi 48159* (TARI); Arak (Sultanabad), ad stationem viae ferrae Nungird inter Sultanabad & Kum (Qom), 16.7.1948, *Rechinger & Rechinger 5791* (G, W); in declivibus siccis ad viam 62 km NE Arak versus Qom, 1350 m, 18.6.1974, *Rechinger 48272* (B, E, K, M, W); W of Kavir-e Meyghan, 5 km NE of Meyghan village, near the margin of Arak salt lake, 11.6.1985, *Akhani 867* (TARI); N of Kavir-e Meyghan, 9-10 km E of Aybak-Abad towards Davood Abad, 1650 m, 12.7.1990, *Akhani 14347* (TUH). — Qom: Ferdow, Margheh-Peymal, 2480 m, 3.7.1984, *Moussavi & Tehrani 34278* (IRAN).

Specimen *Mozaffarian 63784* (TARI) from Markazi province (Arak, Anjadan, 2000-2400 m, 7.7.1985) is an intermediate form between *C. calocephala* subsp. *astrocephala* and *C. sagittata*. Specimen *Ghahreman & Attar 22532* (TUH) from Esfahan province (near Meymeh, 2200 m, 30.6.1999) is intermediate between *C. calocephala* subsp. *astrocephala* and *C. silyboides*.

26. *Cousinia lurorum* (Bornm.) Bornm. in Repert. Spec. Nov. Regni Veg. 40: 346. 1936 [as "var. *typica*"] ≡ *C. calocephala* var. *subintegriloba* Bornm. in Beih. Bot. Centralbl., Abt. 2, 28: 255. 1911 ≡ *C. cymbolepis* var. *subintegriloba* (Bornm.) Bornm. in Beih. Bot. Centralbl., Abt. 2, 32: 407. 1911. – Holotype: Iran, Kermanshah, bei Sahneh, 3.6.1909, *Strauss s.n.* (B-100093391!).
= *C. lurorum* var. *recurvata* Bornm. in Repert. Spec. Nov. Regni Veg. 40: 347. 1936. – Lectotype (designated here): Iran, Kermanshah, ad pagum Sahne (route Kengower-Kermanschah), 3.6.1909, *Strauss 612* (B-100158892!; isotype: JE!).
= *C. lurorum* var. *lancigera* Bornm. in Repert. Spec. Nov. Regni Veg. 40: 348. 1936. – Lectotype (designated here): Iran, Kermanshah, Sungur, Kuh-i-Emrullah, 3.6.1908, *Strauss s.n.* (B-100158893!; isolectotypes: B!, JE!).
= *C. sanandajensis* Rech. f., Fl. Iranica 90: 235. 1972, **syn. nov.** – Holotype: Iran, Kurdistan, 30'E of Sanandaj, very dry bare, earthy fallow, 5500 ft, 20.6.1962, *Furse 3304* (K!; isotypes: E!, W!).
= *C. dalahuensis* Attar & Ghahreman in Iran. J. Bot. 8(2): 264. 2000, **syn. nov.** – Holotype: Iran, Kermanshah, Gahvareh, Tang-e Khamoush, 1500 m, 4.7.1996, *Attar & Mirtajodini 19918* (TUH!); paratype: Iran, Kermanshah, Mahidasht region, Bujan pass, 1300 m, *Attar & Mirtajodini 19929* (TUH!).

Illustration. – Fig. 18A.

Plant up to 40 cm high, arachnoid-tomentose, or ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery-herbaceous, arachnoid-tomentose on both sides, or ± glabrescent above;

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basal leaves up to 10 × 3 cm including spines, lanceolate to oblong-lanceolate, sinuate-dentate to pinnatipartite; stem leaves sessile, usually gradually smaller and less divided towards the apex, lanceolate to linear-lanceolate, usually spiny-lobed, long-decurrent to form interrupted winged stems. *Capitula* 1.5-3.5 cm broad with appendages, ± arachnoid, glabrescent. *Phyllaries* 60-100, inflated-imbricate or ± spreading; middle ones ± straight or slightly recurved, with prominent midrib, their free part slightly or abruptly expanded above into a slightly keeled, ± erect or slightly recurved, deltoid to lanceolate appendage; appendage 5-10 mm long, 2-5 mm broad, attenuate into a spine at apex, arachnoid-tomentose, or ± glabrescent, without or with 1(-2) tiny spine(s) on both sides. *Receptacular bristles* rough. *Flowers* usually 30-70; corolla purple or pink, 17-20 mm long; anthers concolourous. *Achenes* 4-5 mm long.

Flowering period. – June and July.

Taxonomic remarks. – *Cousinia lurorum, C. sanandajensis* and *C. dalahuensis,* characterised by small capitula (1-1.5 cm in diam. excl. phyllaries) and distributed in the mountains of W Iran, are connected through many intermediate forms. Phyllaries are variable and usually have spreading-erect, rarely recurved or appressed, deltoid to lanceolate appendages.

Distribution and habitat. – Endemic to W Iran, provinces Kermanshah, Hamadan and Kordestan (Fig. 19D), on stony slopes.

Further specimens seen. – Iran: Kermanshah: Kuh-e Parow (Siruleh), 1200-2200 m, 17.8.1973, *Moussavi & Satei 33912-E* (IRAN); ad Songur, in monte Küh-i Emrullah, 3.6.1908, *Strauss s.n.* (B). — Hamadan: Assadabad, 1750 m, 5.1960, *Arefi 11670* (TARI); Assadabad pass, 2400 m, 28.6.1998, *Assadi 78730* (TARI); Gardaneh Assadabad , 2250-2750 m, 11.7.1976, *Javid & Amin 33291* (TARI); Gardaneh Assadabad, 2500 m, 5.1960, *Attar & al. 14200* (TUH); Gardaneh Assadabad, 2100 m, 15.7.1997, *Ghahreman & al. 20571* (TUH); Gardaneh Assadabad to Kuh-e Gharavol Khaneh, 2500-2700 m, 10.7.1988, *Mozaffarian* 64994 (TARI); Assadabad, 2000 m, 10.7.1977, *Zehzad & Rafii 409* (W); Assad Abad pass, 20.6.1956, *Sabeti 62* (W), 1.6.1956, *Sabeti 34013E* (W); Mahidasht, Bouzhan, 1450 m, 15.7.1997, *Ghahreman & al. 20568* (TUH); Songhor, Mt Dalakhani, 2300 m, 31.7.2001, *Mehregan s.n.* (TUH). — Kordestan: Ad radices montis Hamzeh Arab, SE Bijar, 2000 m, 1.7.1971, *Rechinger 42513* (W); Divandarreh to Bijar, 1710 m, 18.7.1997, *Ghahreman & Attar 20559* (TUH); Foot of Kuh-e Hamzeh arab, Bijar to Hamedan, 2000 m, 1.7.1971, *Rechinger 4404* (E); Kuh-e Hamzeh arab, 2100-2550 m, 7.7.1968, *Iranshahr 13131E* (IRAN, W); near Bijar, 6500 ft., 28.7.1968, *Sayer 26* (K); Sarab, 6 km NE of Gol Tappeh, rocky and SE facing valley near Sarab, 2194 m, 14.8.1973, *Calder 26* (E); in saxosis (Tonschiefer) 6 km SE Bijar, ad viam versus Hamadan ducentem, 2000 m, 30.6.1971, *Rechinger 42472* (B, M, W).

27. *Cousinia purpurea* C. A. Mey. in Candolle, Prodr. 6: 555. 1838 ≡ *Arctium purpureum* (C. A. Mey.) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Azerbaijan, in locis lapidosis eremi salsi Armenia inter Nakitschiwan & Kok, 1832, *Szovits s.n.* (G-DC!; isolectoypes: P!, LE).

Illustration. – Fig. 18B.

Plant up to 45 cm high, arachnoid-tomentose, ± glabrescent. *Stems* branched from the base or higher. *Leaves* leathery, white-arachnoid-tomentose beneath and green and ± glabrescent above; basal leaves up to 15 × 5 cm including spines, petiolate, oblanceolate to oblong-lanceolate, sinuate-dentate to pinnatipartite; stem leaves sessile, usually gradually smaller and less divided towards the apex, ovate to oblong, spiny-lobed to spiny-dentate, long-decurrent to form interrupted winged stems. *Capitula* 1.7-4 cm broad with appendages, ± arachnoid, glabrescent. *Phyllaries* 60-110; middle ones spreading-erect, with prominent yellow midrib, their free part expanded above into a usually keeled, slightly recurved or apically horizontal, ovate to lanceolate appendage; appendage 5-12 mm long, 3-5 mm broad, attenuate into a spine at apex, usually

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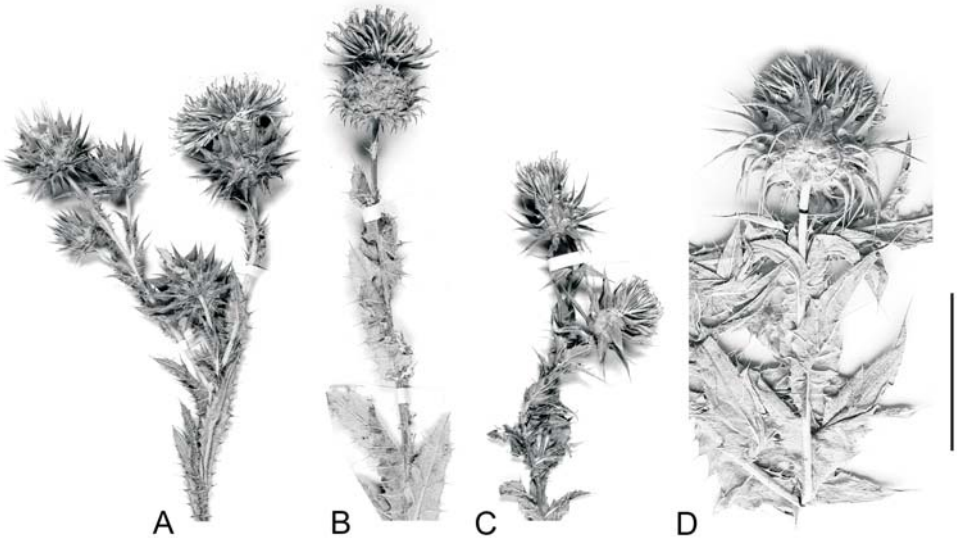

Fig. 18. A: *Cousinia lurorum* (*Rechinger 48472,* B-100158845); B: *C. purpurea* (*Grossheim s.n.,* B-100158853); C: *C. bobekii* (*Rechinger 49031,* B-100157257); D: *C. sarzehensis* (*Assadi & al. 2103,* E). – Scale bar: A-D = 5 cm; photographs A-C by the BGBM, photograph D by I. Mehregan.

glabrous or ± glabrescent, usually with 2 spines on both sides. *Receptacular bristles* rough. *Flowers* usually 30-60; corolla purple, 20-30 mm long; anthers concolourous. *Achenes* 4-5.5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia purpurea* is similar to *C. calocephala* and is characteristic in having phyllaries with typically ovate to lanceolate appendages.

Distribution and habitat. – Endemic to the S Caucasus, probably introduced to NW Iran (Fig. 19E), on dry slopes.

Further specimens seen. – Armenia: Ararat distr., 2 km NE of Vedi village, between villages Urtsadz ant Azizkend, 39°51'N, 44°41'E, 985 m, 18.6.2002, *OPTIMA 2003-11399* (B, W); Ararat distr., 8 km NE of Vedi village, between villages Urtsadz ant Azizkend, 39'57°N, 44'53°E, 1220 m, 20.6.2002, *OPTIMA 2004-02646* (M, W); in valle fluvii Razdan prope pagum Arzni, in clivis argillosis stepposis, 1250-1300 m, 18.7.1975, *Greuter 13023* (E, G); Erivan, in decliv. siccis, 20.7.1919, *Grossheim s.n.* (B, G, K); Vajk distr., village Martiros, mountain steppe, 28.7.1986, *Gabrieljan & al. 33* (G, W).

28. *Cousinia bobekii* Rech. f., Fl. Iranica 90: 238. 1972. – Holotype: Iran, Azerbaijan, Haydarabad ad ripam austro-occidentalem lacus Urmia (Rezayieh), 10.9.1956, *Bobek 89* (W!; isotype: E!).

Illustration. – Fig. 18C.

Plant up to 40 cm high, arachnoid-tomentose or glabrescent when mature. *Stems* branched from the base or higher. *Leaves* leathery-herbaceous, arachnoid-tomentose on both surfaces, glabrescent above and arachnoid-tomentose beneath or glabrescent on both surfaces; basal leaves up to 20 × 6 cm including spines, oblong-lanceolate, deeply pinnatipartite to pinnatisect; stem leaves sessile, gradually smaller and less divided towards the apex, oblong-ovate to linear-lanceolate, spiny-lobed to spiny-dentate, cuneate at base, short- to long-decurrent to form wings. *Capitula*

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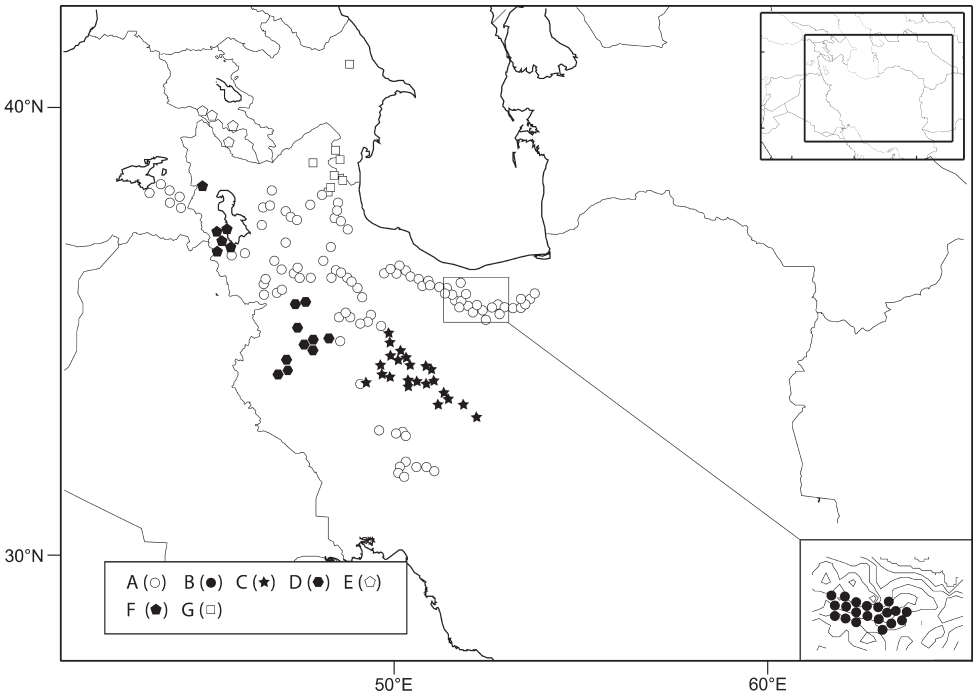

Fig. 19. Distribution of A: *Cousinia calocephala* subsp. *calocephala;* B: *C. calocephala* subsp. *behboudiana;* C: *C. calocephala* subsp. *atsrocephala;* D: *C. lurorum;* E: *C. purpurea;* F: *C. bobekii;* G: *C. cynaroides*. – Each symbol indicates the locality of a single collection or several collections made from the same or nearby localities.

3-6.5 cm broad with appendages, arachnoid or ± glabrescent. *Phyllaries* 50-95; middle ones spreading or slightly incurved, their free part expanded above into a usually keeled, ± straight or slightly incurved, ovate- or rhomboid-lanceolate to linear-lanceolate, rarely sagittate-lanceolate appendage; appendage 9-25 mm long, 2-7 mm broad, attenuate into a spine at apex, arachnoid-tomentose, ± glabrescent or glabrous, with 1-2 tiny spines on both sides. *Receptacular bristles* smooth. *Flowers* 40-110; corolla yellow or dirty yellow (brown in dried material), 17-21 mm long; anthers purple or pale. *Achenes* 3-4.5 mm long.

Flowering period. – June to August.

Taxonomic remarks. – *Cousinia bobekii* is similar to *C. calocephala* but differs by bright yellow corollas and purple anthers.

Distribution and habitat. – Endemic to NW Iran (Fig. 19F), on open areas and rocky slopes.

Further specimens seen. – Iran: Azarbaijan: S. loc., *Ghahreman & Attar 22501* (TUH); 34 km S of Rezaiyeh, inter Balansh & Reshekan (Bashakan?), 1300 m, 15.6.1971, *Iranshahr 8797* (IRAN); 40 km from Ghotour to Khoy, 1400 m, *Ghahreman & Attar 22008* (TUH); Piranshahr to Oshnavieh, 1400 m, 14.6.1999, *Ghahreman & Attar 22489* (TUH); Uromiyeh to Oshnavieh, 1800 m, 14.6.1999, *Ghahreman & Attar 22456* (TUH); Uromiyeh to Oshnavieh, Darreh Khoroshow, 1400-1650 m, 4.7.1991, *Delghandi & Abbasi 15185* (IRAN); Urumieh, road from Darr-e Ghasemlu to Oshnavieh, viviation to Zeiveh, 1800 m, 12.7.1991, *Mozaffarian 70031* (TARI); 20 km NW Naqadeh versus Oshnoviyeh, 1450 m, 8.7.1974, *Zehzad & Siami 3605* (M, TARI, W); 34 km S of Rezaiyeh, inter Balanish & Bashakan, 1350 m, 15.6.1971, *Lamond 4171* (E), *Rechinger 42121* (B, K, W); ad litus occidentale lacus c. 20 km E Rezaiyeh,

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1340 m, 30.7.1974, *Rechinger 48628* (B, M, W); ad versuras ad meridiem lacus Rezaiyeh ab Haydarabad austro-occidentem versus, 1400 m, 15.6.1971, *Rechinger 42144* (W); in declivibus siccis inter Oshnoviyeh & Naqadeh, 1500 m, 8.7.1974, *Rechinger 49031* (B, E, K, M, W); inter Naqadeh & Mahabad, *2.6.1974, Siami 2262* (W); lake Rezaiyeh, SW side, [37°02.5'N, 45°28'E], 1300 m, 12.6.1962, *Jacobs 6862* (E, K, W).

29. *Cousinia sarzehensis* Attar, Ghahreman & Assadi in Nordic J. Bot. 20: 697. 2000. – Holotype: Iran, Kerman, 40 km from Jiroft on road to Kerman, Kuh-e Sarzeh, 2100-2500 m, 13.6. 1977, *Assadi & Miller 25326* (TARI!).

Illustration. – Fig. 18D.

Plant up to 50 cm high, arachnoid-tomentose, ± glabrescent. *Stems* branched from the middle or higher. *Leaves* ± herbaceous, arachnoid-tomentose on both surfaces, glabrescent above; basal leaves unknown; stem leaves sessile, gradually smaller and less divided towards the apex, oblong to lanceolate, spiny-lobed to spiny-dentate, cuneate at base, usually long-decurrent to form winged stems. *Capitula* 6-9 cm broad with appendages, arachnoid, glabrescent. *Phyllaries* 90-100; middle ones spreading or slightly recurved, their free part expanded above into a usually keeled, slightly recurved, rhomboid-lanceolate appendage; appendage 20-38 mm long, 5-12 mm broad, attenuate into a spine at apex, arachnoid or ± glabrescent, with (1-)2 tiny spine(s) on both sides. *Receptacular bristles* rough. *Flowers* 70-100; corolla pale purple, 20-23 mm long; anthers concolourous. *Achenes* 4-6 mm long.

Flowering period. – June.

Taxonomic remarks. – *Cousinia sarzehensis* is a distinct species without close similarities to other species from the area, including *C. kotschyi* and *C. onopordioides*.

Distribution and habitat. – Endemic to SE Iran (province Kerman; Fig. 16E), on rocky slopes.

Further specimens seen. – Iran: Kerman: Kuh-e Jebal Barez, Kuh-e Sarzeh, 5 km NE of Garraghan, E of road from Jiroft to Deh Bakri, rocky limestone slopes, [28°55'N, 57°56'E], 2000 m, 13.6.1977, *Assadi, Edmondson & Miller 2103* (E, W).

30. *Cousinia onopordioides* Ledeb. in Eichwald, Pl. Casp. Cauc.: 40. 1835. – Lectotype (designated here): Turkmenistan, in littore orientale Djupkaragan (Tjukkaragan) maris Caspii, *Eichwald & Karelin* (LE!; isolectotypes: K! , P!).
= *C. albicaulis* Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 128. 1860 ≡ *Arctium albicaule* (Boiss. & Buhse) Kuntze, Revis. Gen. Pl. 1: 307. 1891. – Lectotype (designated here): Iran, in valle Nika pr. Radkann, 19.7.1848, *Buhse 1046/6* (P!).
= *C. grandiceps* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 54. 1865 ≡ *Arctium grandiceps* (Bunge) Kuntze, Revis. Gen. Pl. 1: 307. 1891, **syn. nov.** – Lectotype (designated here): Iran, Chorassan (Khorassan), inter Schahrud & Nischapur, in montosis ad austrum ab urbe Sebsewar in provincial Chorassan sitis, 6.1858, *Bunge & Bienert s.n.* (P!; isolectotypes: K!, P!).
= *C. bornmuelleri* C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 235. 1897, **syn. nov.** – Lectotype: Iran, Kerman, in monte Kuh-i-Dschupar, 3400 m, 10.6.1892, *Bornmüller 3456* (B-100088389!; isolectotypes: B!, JE!).
= *C. sabzevarensis* Rech. f., Fl. Iranica 139a: 134. 1979. – Holotype: Iran, Khorassan, montes Yoghatay, in jugo 20 km N Sabzevar, 1750 m, 16.6.1975, *Rechinger 53669* (W!).
[– *Onopordon polyacanthum* Ledeb. in Eichwald, Pl. Casp. Cauc.: 3. 1831, nom. nud. ≡ *Arctium polyacanthum* (Eichw.) Kuntze, Revis. Gen. Pl. 1: 307. 1891, nom. nud.]
[– *C. karelini* Less. [in Karelin] in Bull. Soc. Imp. Naturalistes Moscou 1839: 159. 1839, nom. nud. ≡ *Arctium karelini* (Less.) Kuntze, Revis. Gen. Pl. 1: 308. 1891, nom. nud.]

Note. – (1) *Onopordon polyacanthum* was published by Ledebour without a description or diagnosis and was later in the same publication cited by him as a synonym for *Cousinia onopordioides*. (2) *C. karelini* "Less." was listed by Karelin without a description or diagnosis.

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Illustration. – Fig. 20A.

Plant up to 100 cm high, tomentose. *Stems* branched from the base. *Leaves* leathery, tomentose on both sides, rarely ± glabrescent; basal leaves up to 30 × 9 cm including spines, narrowly oblanceolate to linear, pinnately-lobed, lobes with spiny-dentate margin and a larger terminal spine; stem leaves sessile, gradually smaller and less divided towards the apex, lanceolate to ovate, spiny-lobed, rounded to cuneate at base, decurrent for up to 10 cm. *Capitula* 6-10 cm broad with appendages, usually arachnoid-tomentose, rarely glabrous. *Phyllaries* 40-100; middle ones spreading, rarely spreading-incurved or -recurved, their free part expanded above into a (cordate-) ovate-lanceolate to narrowly lanceolate appendage; appendage 25-40 mm long, 7-15 mm broad, attenuated into a long spine at apex, with 3-4 smaller spines on both sides. *Receptacular bristles* rough or smooth. *Flowers* 80-200; corolla purple to purplish-lilac, 35-50 mm long; anthers concolourous or pale. *Achenes* 5-8 mm long.

Flowering period. – May to August.

Taxonomic remarks. – *Cousinia onopordioides* is a morphologically rather uniform and distinct species widely distributed in semi-deserts and arid areas of NE and E Iran, W and S Turkmenistan, Afghanistan and W Pakistan (Rechinger 1972). Reports of *C. onopordioides* from the Caucasus may refer to misidentified specimens of *C. macrocephala*. The species shows some variation mainly in capitulum morphology, including number and dimensions of the phyllaries and flower number. Also, the indumentum sometimes can be highly reduced or absent. Tscherneva (1962) and Rechinger (1972) treated *C. albicaulis* as a synonym of *C. onopordioides*. Rechinger (1979) regarded *C. albicaulis,* known only from its type locality, as a separate species. In our opinion this is not justified and the morphology of this species falls within the variation of *C. onopordioides*.

Cousinia grandiceps, C. bornmuelleri and *C. sabzevarensis* were described by Bunge based on collections from within the distribution range of *C. onopordioides*. The separation of *C. grandiceps* from *C. onopordioides* based on the lower number of phyllaries (40-50) and the higher number of flowers (170-180) in *C. grandiceps* is not justified. The figures fall within the range of variation in *C. onopordioides*. *C. bornmuelleri* was based on material with closed capitula from SE Iran, province Kerman. New collections from the neighbourhood of the type locality of *C. bornmuelleri* (e.g., *Esfandiar & Pour-Mohammadi 20545* (TUH)), which completely match the morphology of the type material of *C. bornmuelleri,* clearly belong to *C. onopordioides*. The only difference between the types of *C. sabzevarensis* and *C. onopordioides* is the absence of an indumentum in the former. However, this can also be found within *C. onopordioides*.

Distribution and habitat. – Turkmenistan, Iran, Afghanistan and Pakistan (Fig. 21), in open areas, scrublands and on rocky slopes.

Selected further specimens seen. – Turkmenistan: In montibus prope Tschuli, 1400 m, 1.6.1897, *Litwinow 194-A* (E, JE); Krasnowodsk, 3.7.1880, *Becker 62* (K); Krasnowodsk, in saxis mont. ad Ufra, 21.10.1900, *Sintenis 1310* (B); Uschtscheje Baba-so, 25.6.1942, *Kultiasov 122 (*W).
Iran: Tehran: 17 km from Firouzkuh towards Semnan, 2050 m, 13.6.1996, *Djavadi & Ghaffari 9466* (IRAN); 20 km S of Damavand, between Tamisiun and Aselun, 1550-1650 m, 22.6.1985, *Mozaffarian 53885* (TARI); Firouzkuh, close to Mahabad, between Mahabad and Anzehn, 2000 m, 16.8.1985, *Mozaffarian 54253* (TARI); Kuh-e Shahr Abad, 2000-2400 m, 1.8.1985, *Mozaffarian 54890* (TARI); inter Firuzkuh & jugum Baschm, 1900-2200 m, 29.-30.6.1937, *Rechinger 1966* (B, W); Montes Elburs orient., prope Abr, 1800 m, *Gauba & Sabeti 1477* (W); Damghan to Shahroud, Gharieh-e Tazareh, 30 km N of Mehman-Doust, Kuhhay-e Sefid-Shekar, 2700-3000 m, 22.7.1975, *Moussavi & Karavar 13429* (IRAN); Firouzkuh to Semnan, E side of Bashm pass, 2200 m, 18.7.1974, *Wendelbo & Cobham 13675* (TARI, W); Gorgan to Shahroud, Tchehel-Dokhtar, 30.7. 1968, *Ershad 9160* (IRAN); in jugo Khosh Jaila (Khogh Yeilagh),

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Fig. 20. A: *Cousinia onopordioides* (*Bornmüller 3456,* B-100088389!); B: *C. verbascifolia* (*Rechinger 55613,* B-100158869). – Scale bar: A-B = 5 cm; photograph provided by the BGBM.

c. 70 km ab oppido Shahrud orientem versus, 2000 m, 17.6.1948, *Rechinger & al 5495* (K, W). — Semnan: 15 km N of Shahroud, Nekarman, 2000 m, 10.7.1976, *Assadi & Massoumi 21061* (TARI); Shahpasand to Shahroud, between Noodeh and Khosh Yeilagh, 1250 m, 22.6.1974, *Wendelbo & Foroughi 12861* (TARI, W); Kavir protected region, Siah Kuh, in ditione regugii Karvan-Sarai Shah Abbas, 34°44'N, 52°10'E, 1300 m, 20.4.1975, *Rechinger 50138* (W); N of Semnan, above Chashm, 2700 m, 23.7.2001, *Assadi & Ranjbar 82078* (TARI); Nezva, Shahmirzad (Bashm) Kuh, S slopes, N of Shahmirzad, 35°48'N, 53°19'E, 2300 m, 11.7.1959, *Wendelbo 1379* (IRAN, W); Shahkuh, in desert "Shah Kuh, Mazenderan", 16.6.1940, *Koelz 16264* (E); Shahmirzad, Garm-Cheshmeh (5 km NW of Shahmirzad), Kuh-e Bashm, 2200-2400 m, 20.7.1975, *Moussavi & Karavar 9162* (IRAN); Shahroud towards Bastam, Mojen, Sange Bon, Shah-Kuh (mountains), 2100 m, 10.8.1988, *Moussavi, Delghandi & Tehrani 9173* (IRAN); Shahrud, in alaeo lapidosis fl. Shahrud, 1400 m, 20.-26.7.1948, *Rechinger & Rechinger* 5318 (W); mountains NWW of Shahroud, above the village Mojen, 2300 m, 24.7.2001, *Assadi & Ranjbar 82156* (TARI); Mujen, 2050 m, 11.7.1998, *Mozaffarian 78066 & 78067* (TARI); N slopes of Kuh-e Shahvar from Mighan and Turne to Panarvan, 1600-2500 m, 13.7.1998, *Mozaffarian 78115* (TARI); Touran protected area, Nahar valley, upper part, Kuh-e Peyghambar, 1400 m, 19.7.1976, *Freitag 13709* (TARI); Kuh-e Peyghambar, 35°43'N, 56°45'E, 1300 m, 1.5.1975, *Rechinger 50892* (W). — Golestan: On the road from Azadshahr to Khosh-Yeylagh, 1600 m, 20.7.2003, *Assadi 85642* (TARI); 49 km from Shah-Pasand on the road to Shahroud, 1400 m, 21.7.1976, *Assadi & Massoumi 21509* (TARI); 69 km from Shah-Pasand on the road to Shahroud, 1950 m, 21.7.1976, *Assadi & Massoumi 21510* (TARI); c. 35 km from Semnan on the road to Sari, 2100 m, 25.7.1976, *Assadi & Massoumi 21534* (TARI). — Khorassan: C. 40 km N of Ghuchan on the road to Darreh Gaz, 1800 m, 18.7.1976, *Assadi & Massoumi 21430* (TARI); 40 km from

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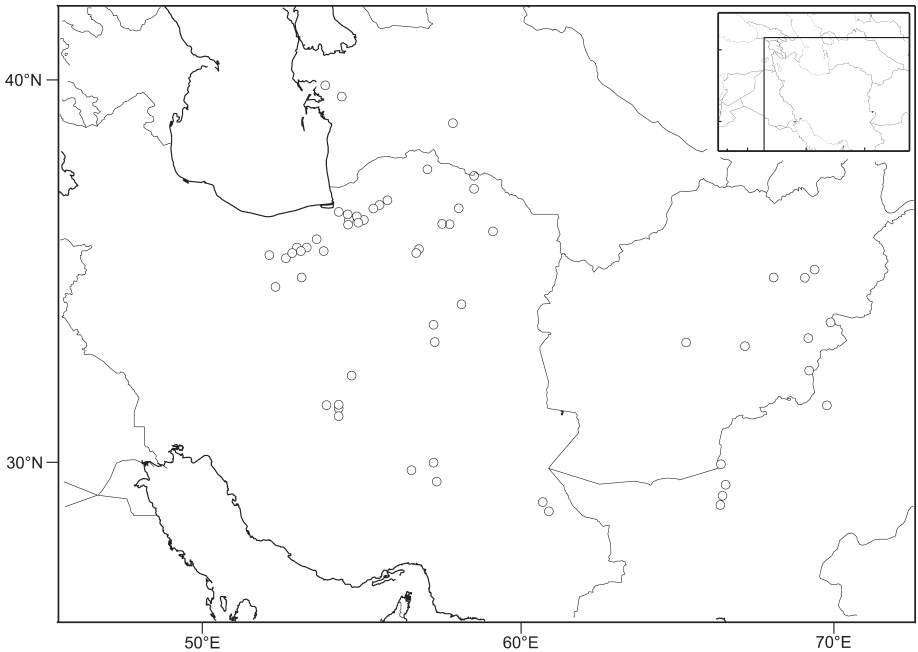

Fig. 21. Distribution of *Cousinia onopordioides*. – Each symbol indicates the locality of a single collection or several collections made from the same or nearby localities.

Boshrouyeh to Tabas, 1380 m, 30.6.2002, *Mozaffarian 81210* (TARI); 60 from Tabas to Birjand, Deyhuk, 1370 m, 3.6.1998, *Ghahreman, Attar & Sheikh 21735* (TUH); Bushruyeh, Sorond to Khoda Afarid, 1500 m, 1.7.2002, *Mozaffarian 81212* (TARI); c. 28 km S of Sabzevar on the road to Kashmar, 1500 m, 13.7.1976, *Assadi & Massoumi 21233* (TARI); Esfarayen vers. Sabzevar, 5-20 km Sabzevar, 17.6.1975, *Terme 33971E* (W); Ghouchan to Bajgiran, on the road of Dare-Gaz, 1800 m, 5.7.1998, *Ghahreman & Attar 21923* (TUH); in saxosis montium 27 km S Bejestan, [34°32'N, 58°08'N], 1700-1750 m, 10.5.1975, *Rechinger 51556* (W); inter Shahrud & Nischapur, pr. Sibzewar,6.1858, *Bunge & Bienert s.n.* (K, P); Khaur, on dry slope, 6.8.1940, *Koelz* 16835 (E, W); Montes Yoghasty, in jugo 20 km N Sabzevar, 1750 m, 16.6.1975, *Rechinger 53665* (W); On the road of Ferdous to Tabas, 1100-1250 m, 4.6.1978, *Rajamand & Bazargan* 31960 (TARI); Pir, 1200 m, *Gabriel 29* (W). — Yazd: Ardakan, Hamane, Kuh-e Hamaneh, 2000 m, 1.6.1996, *Mozaffarian 77574* (TARI); Khormiz, 5 km SW of Mehriz, NE of Kuh-e Khoseh, 31°33'N, 54°22'E, 1700 m, 27.5.1977, *Aryavand & al. 1484* (E, TARI); Mehriz, Darre Damghan, 2100-2500 m, 9.7.1996, *Mozaffarian* 77630 (TARI); Shirkuh, Deh-Bala, 10000-11000 ft., 12.8.1939, *Davis 798* (W); Shirkuh, Deh-Bala, 2750 m, 20.5.1977, *Rajamand & Bazargan 33112* (TARI); Taft, diviation of Dehbala-Tezerjan to Dehbala, 2130 m, 30.6.2002, *Mozaffarian 81209* (TARI); Taft, neck mountain between Aliabad and Dehshir, 2550 m, 11.7.1996, *Mozaffarian 77682* (TARI); Tezerjan, 2410 m, 4.7.1972, *Foroughi 4386* (TARI). — Kerman: *coll. ignotus 22050* (TUH); Bardsir to Sarkhoun, 1600 m, 17.6.1997, *Esfandiar & Pour-Mohammadi 20545* (TUH); Kuh-e Laleh-Zar, Mt Hezaran, 23.6.1996, *coll. ignotus s.n.* (TUH); Mt Jupar, 2800 m, 17.8.1997, *Mirtajaldini 21345* (TUH); Zereshk valley, 6.1999, *Pour-Mohammadi 24423* (TUH). — Sistan va Baluchestan: Taftan Mt, S-slope, above the village of Torshab, 1900-2300 m, 11.3.1977, *Runemark, Assadi & Sardabi 22626* (E, TARI); Taftan mountain region, Kharestan, 2200 m, 27.5.1985, *Mozaffarian 53007* (TARI); Taftan mountain region, Tamendan valley, 2300-2500 m, 30.5.1985, *Mozaffarian 53184* (TARI).

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Afghanistan: *Griffith 3324* (K, P), *Griffith 395* (K); 1879-1880, *Johnston 64* (K). — Ghazni: O-Hänge des Arghandab-Taleb, 5 km O Sange Masha, 2470 m, 27.6.1978, *Podlech* 31845 (M); 50 km a Kabul versus Gardez, 33°37'N, 69°09'E, 1900 m, 28.6.1965, *Rechinger 31487* (W), *Lamond 2142* (E); Balaqala (an der Strasse von Malestan nach Sange Masha), 2650 m, 14.8.1970, *Podlech 19384* (W); Loman (Lomar) inter Qarabagh & Sang-i Masha, 2400 m, 30.6.1962, *Rechinger 17432* (B, W). — Kapisa: Mittleres Panjir-Tal, Darrah-i Zuria nördlich von Safed Jir, 2600-3400 m, 24.8.1965, *Podlech 12584* (K, M, W). — Paktia: Ghafurkhel, 14 km N of Gardez on the road toward Kabul, 2650 m, 2.7.1970, *Podlech 18522* (W). — Parvan: Panjshir valley, near Safed Jir, dry slopes, 2200 m, 27.7.1962, *Hedge & Wendelbo 5529* (E). — Urgun: Urgun, in declivibus saxosis, [32°52'N, 69°07'E, 2200-2300 m, 10.6.1967, *Rechinger 35881* (E, W).
Pakistan: Baluchistan: 1851, *Stochs 1044* (K, P); *coll. ignotus 1044* (K); 1.6.1952, *Croakshauk 304* (K); 9.6.1956, *Diek-Feddie 20* (K); 1891-94, *Elliott s.n.* (K); 6000 ft., 17.7.1957, *Nasir 28447* (K); Kalat, 6700', 20.6.1957, *Jafri & Akbar 1930* (B, K). — Quetta: Hazarganji-Chitan National Park, 15.6.1997, *Rafiq & Hayat HG-97-292* (W); in jugo Khojak, 30°54'N, 66°29'E, 2300 m, 8.5.1965, *Rechinger 29070* (W); Ziarat, 7-8000', 15.6.1962, *Stewart 523* (W); Pil, Rift, 6500 ft, 21.6.1888, *Lace 3878* (E); Urak-Tal, 15 miles W of Quetta, 5.1958, *Repp s.n.* (W).

31. *Cousinia verbascifolia* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 52. 1865 ≡ *Arctium verbascifolium* (Bunge) Kuntze, Revis. Gen. Pl. 1: 308. 1891. – Lectotype (designated here): Iran, in apricis lapidosis prope Nischapur in provincia Chorassan, 7.1858, *Bunge & Bienert s.n.* (P!; isolectotypes: K!, P!).
= *C. monocephala* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 52. 1865 ≡ *Arctium monocephalum* (Bunge) Kuntze, Revis. Gen. Pl. 1: 308. 1891, **syn. nov.** – Lectotype (designated here): Iran, in montosis prope Achmet-Abbad orientem versus ab urbe Mesched in provincial Chorassan, 1958-59, *Bunge & Bienert s.n.* (P!).
= *C. lyrata* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 7, 9: 53. 1865 ≡ *Arctium lyratum* (Bunge) Kuntze, Revis. Gen. Pl. 1: 308. 1891, **syn. nov.** – Lectotype (designated here): Iran, in lapidosis montium inter Sebsewar & fodinas Calaiti Maadan provinciae Chorassan, 16.6.1858, *Bunge & Bienert s.n.* (P!; isolectotypes: K!, LE, P!).
= *C. caesia* C. Winkl. in Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 238. 1897. – Holotype: Turkmenistan, prope pagum Bami, 19.5.1896, *Lipsky 1007* (LE!).

Note. – *Cousinia verbascifolia, C. lyrata* and *C. monocephala* were published simultaneously and all three are valid names. *C. monocephala* was based on a small and incomplete specimen and in comparison with *C. lyrata,* material of *C. verbascifolia* is more instructive. Therefore the other two names have been sunk in the synonymy of this latter one.

Illustration. – Fig. 20B.

Plant up to 45 cm high, arachnoid-tomentose. *Stems* simple or branched from the base. *Leaves* herbaceous or ± leathery, tomentose to ± glabrescent above and densely tomentose beneath; basal leaves up to 15 × 10 cm, lyrate, with spiny-dentate margin; stem leaves gradually smaller and less divided towards the apex, ovate to broadly-lanceolate, rarely oblanceolate, spiny-lobed to -dentate, cordate to cuneate at base, decurrent for up to 5 cm. *Capitula* 3-10 cm broad with appendages, usually arachnoid-tomentose. *Phyllaries* 40-70; middle ones spreading to spreading-incurved, their free part expanded above into a cordate or ovate to lanceolate appendage; appendage 10-40 mm long, 7-15 mm broad, attenuate into a long spine at apex, with 2-6 smaller spines on both sides. *Receptacular bristles* rough or smooth. *Flowers* 50-150; corolla pink, rose or purple, 20-35 mm long; anthers concolourous or pale. *Achenes* 5-7 mm long.

Flowering period. – May to July.

Taxonomic remarks. – Variation in material of *Cousinia verbascifolia*, *C. lyrata*, *C. monocephala* and *C. caesia* is continuous. Accordingly, none of these three species can be regarded as distinct. *C. verbascifolia* is very variable in size and form of the capitula and phyllaries. Basal and

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cauline leaves show little variation and are a good diagnostic character especially in comparison with the sympatric *C. onopordioides*.

Distribution and habitat. – Endemic to Kopetdagh (NE Iran and S Turkmenistan; Fig. 16F), open areas, scrublands and stony slopes.

Further specimens seen. – TURKMENISTAN: Aschchabad Gouvern., neben Dorf Nochur (nach Süden von Bocharden), steiniger Abhang, 9.7.1982, *Schroeter 26* (B); Bakharden, ad locum "Podzemnoie ozero" dictum, 300 m, 16.9.1976, *Vasak s.n.* (W); in montibus prope Tschuli, 1.6. 1897, *Litwinow 194* (B, E, P); Aschabad, in montibus supra pagum Firusa, 17.6.1900, *Sintenis 597* (B, E, K), Aschabad, in montibus supra pagum Nephton, 2.6.1900, *Sintenis 442* (B).
IRAN: KHORASSAN: Shah Jahan Protected Area, Dashte Shah Jahan, in artemisietis argillosis ad pagum Hessari, 1300 m, 16.6.1975, *Rechinger 53586* (B, M, W); in declivibus saxosis inter Gardaneh Perimus S Bojnurd & Esfarayen, substr. calc., 1700-1800 m, 15.6.1975, *Rechinger 53572* (E, W); environs de Sarakhs, 300 m, 24. & 25.6.1956, *Schmid 6264* (E, W); 18 km N of Mashhad on the road to Kalat-e Naderi, 1000 m, 17.7.1976, *Assadi & Massoumi 21349* (TARI); 25 mile Mashhad versus Kalat Naderi, prope Mohamadieh, 1000 m, 21.7.1972, *Iranshahr & Zargani 33860E = 9340-IRAN* (IRAN, W); 30 km from Mashhad on the road to Neyshabour, 1100 m, 14.7.1976, *Assadi & Massoumi 21281* (TARI); 53 mile W Sarakhs, 900 m, 14.7.1972, *Terme 33935E = 9341-IRAN* (W); 66 km N on mashhad on the road to Kalat-e naderi, 1150 m, 18.7.1976, *Assadi & Massoumi 21398* (TARI); 75 km on the road from Mashad to Sarakhs, between Abrovan and Mozduran, 850 m, 24.5.1977, *Runemark & Sardabi 23313* (TARI); 92 km from Sabzevar on the road to Neyshabour, 1300 m, 13.7.1976, *Assadi & Massoumi 21241* (TARI); Bojnurd vers. Esfarayen, Gardaneh-e Perimus, 1300-1400 m, 21.7.1975, *Terme 33955E = 9339-IRAN* (IRAN, W); Dargaz, 15 km, Yaghel village, 380 m, 11.6.1988, *Vafaee 287* (TARI); Darregaz, Nokhandan, Durungar and Sangsurakh, 860 m, 1.7.1999, *Mozaffarian & Massoumi 79145* (TARI); Esfarayen to Sabzevar, Hesari to Shahe-Jahan, 1300 m, 17.6.1975, *Terme 33968E = 9343-IRAN* (W); Shah Jahan mountains, Mt Tourken from deep gorge close to Noushirvan village, 1400-2500 m, 8.6.1984, *Mozaffarian 48564* (TARI); Fariman to Shahan, Garmak, 1400 m, 12.7.1972, *Iranshahr 33948E = 9344-IRAN* (W); Ghouchan to Sabzevar, near bifurcation of Sabzevar-Neyshabour, 1600 m, 7.7.1998, *Ghahreman & Attar 21931* (TUH); Mashad to Sarakhs, Abravan, 1000 m, 4.7.1998, *Ghahreman & Attar 21907* (M, TUH); Mashad-Sarakhs road, the hills E of Mozduran, 850 m, 21.5.1959, *Merton 3906* (K); Mashhad towards Sarakhs, 65 km to Sarakhs, 600 m, 13.6.1996, *Terme, Delghandi & Karavar 15193* (IRAN, TUH); Mashhad towards Sarakhs, Mozduran, 900-1000 m, 1.7.2001, *Djavadi & Ghanbari* 29247 (IRAN); mountains N of Neyshabour, 1450-1600 m, 16.6.1981, *Assadi & Mozafarian 35974* (TARI); mountains NW of Neyshabour, above Mirabad, 1600-1900 m, 17.6.1981, *Assadi & Mozaffarian 36042* (TARI); Sarakhs, 500 m, 4.7.1998, *Ghahreman & Attar 21912* (TUH); SE Fariman, between Shahan-Garmab and Tappeh Naderi, 35°58'N, 59°22'E, 1429 m, 16.5.2003, *Assadi & Amirabadi 84541* (TARI); in collibus aridis 89 km a Mashhad versus Sarakhs, 800 m, 24.5.1977, *Rechinger 55613* (B, M, W); Abdollah Kivi 43 km NE Soltanabad versus Quchan, 1400 m, 17.6.1975, *Rechinger 53713* (W); Tus, in aridis planitis, 8.-9.6.1948, *Rechinger 5249* (B, IRAN, K, W).

Taxa excluded from *Cousinia* sect. *Cynaroideae*

Cousinia beckeri Trautv. in Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 457. 1886. – Holotype: Turkmenistan, Kopet-Dagh, Kisil-Arwat, 1883, *Becker 246* (LE!).

Cousinia beckeri is excluded from *C.* sect. *Cynaroideae* because of its chromosome number of $2x = 18$ (versus $2x = 24$; Ghaffari & al. 2000) and the morphology of its phyllaries, which have unusually narrow, linear-lanceolate appendages.

Cousinia squarrosa var. ***integrifolia*** Bornm. in Bull. Herb. Boissier, ser. 2, 7: 220. 1907. – Holotype: Iran, in valle Scheheristanek montium Elburs, 12.6.1902, 2200 m, *Bornmüller 7373* (B-100157200!).

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Cousinia squarrosa var. *integrifolia* was described from material with unopened capitula and identified by us as *C.* (sect. *Sphaerocephala*) *chamaepeuce* Boiss.

Cousinia subinflata Bornm. in Österr. Bot. Z. 63: 291. 1913. – Holotype: Iran, ditionis oppidi Nehawend in monte Kuh Gerrü, 2.8.1908, *Strauss s.n.* (JE!; isotype: B!).

Cousinia subinflata is an intersectional hybrid between *C. chlorosphaera* and *C. orthoclada* Hausskn. & Bornm. of *C.* sect. *Pugioniferae* Bunge.

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