

SYNOPSIS OF THE GENUS *COTA* (ANTHEMIDEAE, ASTERACEAE) IN TURKEY

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ABSTRACT. The morphological features of *Cota* were studied based on our specimens collected between 2005 and 2019 in Turkey and herbarium specimens from various herbaria. As a result of the obtained systematic and floristic findings of the last years, *Cota* now 22 taxa (17 species, 2 subspecies, 3 variety), of which 9 are endemic to Turkey which suggests an endemism rate of about 41%. In this study, *C. coelopoda* var. *longiloba* and *C. coelopoda* var. *bourgaei* are considered a synonym of *C. coelopoda*, and one new lectotypes are designed. Moreover, main synonyms, nomenclatural types, ecological data, diagnostic keys and distribution of taxa are also given for each accepted taxon and morphological characters have been discussed.

1. INTRODUCTION

Asteraceae is represented by the greatest number of taxa in *Angiospermae* from all over the world. It has nearly 1600-1700 genera and ca. 24000 species distributed around the globe except for Antarctica [1]. According to the recent generic conspectus of *Asteraceae*, the tribe *Anthemideae* Cass. consist of 111 genera and ca. 1800 species [2].

Cota J. Gay was earlier classified as a section in the genus *Anthemis* L. in the Flora of Turkey [3]. After the generic and infrageneric concepts of *Anthemis* were changed, *Anthemis* sect. *Cota* was accepted as a genus, *Cota* [4, 5, 6].

Keyword and phrases. Asteraceae, *Cota*, Synopsis, Turkey

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Cota species are mainly distributed in Europe (except north of Europe), North Africa, Caucasia, and Central Asia [7, 8]. Turkey is one of the centers of diversity for the genus *Cota*, with especially widespread in the Mediterranean and Irano-Turanian phytogeographic regions of Turkey [9]. *Cota* is represented by 17 species and 20 taxa, of which 9 are endemic in Turkey [10].

During the revisionary study, *Cota hamzaoglu* Özbek & Vural has been published as a new species for science [11]. The genus *Cota* has been studied from an anatomical, morphological and palynological by authors [9, 12, 13].

The aim of this study is to present the current taxonomic arrangement and distribution of taxa of *Cota* in Turkey, providing synonymy, nomenclatural types, ecological data and diagnostic keys for species identification.

2. MATERIALS AND METHODS

The studied specimens were collected in Turkey between 2005 and 2019. Specimens for morphological studies were dried according to standard herbarium techniques and stored in the Gazi University Herbarium (GAZI). Relevant literature (Grierson & Yavin 1975, Fernandes 1976, Feinbrun-Dothan 1978, Pignatti 1982, Iranshahr 1986, Shishkin 1995, Güner *et al.* 2000) were examined [3, 14-19]. In addition, a large number of herbarium specimens were checked from the ANK, AEF, BOLU, DUOF, EGE, ERC, GAZI, HUB, ISTE, KNYA, and VANF herbaria. The acronyms are according to Thiers 2020+ [20]. Images of the type specimens of some *Cota* species studied were obtained from the Kew (K), Edinburgh (E), Berlin (B), Linnean Herbarium (LINN), Vienna-Herbarium (W), University Vienna Herbarium (WU), and Geneva (G) virtual herbaria. Authors of plant names are written according to International Plant Names Index (IPNI) [21].

3. RESULTS

In the Flora of Turkey, *Anacyclus* L. is represented by four species. These species are *A. clavatus* (Desf.) Pers., *A. latealatus* Hub.-Mor., *A. nigellifolius* Boiss and *A. anatolicus* Behçet & Almanar [22, 23]. As a result of recent molecular phylogenetic study, three *Anacyclus* L. species were transferred from *Anacyclus* to *Cota* (except *A. clavatus*). This study was based on molecular data and using DNA barcoding markers [24]. Therefore, we did not include these three species in the identification key.

Identification key for *Cota* species in Turkey:

1. Perennials.....2
- Annuals11
2. Leaves simple, serrate or shallowly pinnately lobed; phyllaries 2–3-seriate2. *C. euxina*
- Leaves 2–3 pinnatisect; phyllaries 4– seriate.....3
3. Capitula discoid.....4
- Capitula radiate.....8
4. Paleae distinctly longer than disc flowers (8–11 mm).....5
- Paleae as long as disc flowers or slightly longer (4–7 mm).....6
5. Stem and leaves lanate or subglabrous; leaves 2–3 pinnatisect.....7
- Stem and leaves yellowish pilose or sericeous hairs; leaves 2– pinnatisect 9. *C. fulvida*
6. Leaves 2– pinnatisect, oblong–elliptic.....3. *C. virescens*
- Leaves 2–3 pinnatisect, obovate–oblanceolate or elliptic.....1. *C. tinctoria*
7. Stem 12–30 cm; primary segments 3–4 paired, secondary segments 1–3 paired..... 8. *C. hamzaoglui*
- Stem 40–60 cm; primary segments 4–8 paired, secondary segments 4–8 paired..... 7. *C. oxylepis*
8. Ray flowers yellow or cream.....1. *C. tinctoria*
- Ray flowers white.....9
9. Capitula campanulate; basal leaves petiolate.....6. *C. antitaurica*
- Capitula hemispherical; basal leaves not petiolate.....10
10. Paleae narrowly lanceolate; phyllaries dark brown or black, margined ciliate.....5. *C. melanoloma*
- Paleae linear–oblong; phyllaries pale brown, only ciliate at apex 4. *C. triumfettii*
11. Paleae distinctly longer than disc flowers (8–10 mm)..... 13. *C. dipsacea*
- Paleae as long as disc flowers or slightly longer (3–7) mm.....12
12. Ray and disc flowers pink.....17. *C. pestalozzae*
- Ray flowers white or cream; disc flowers yellow.....13
13. Decumbent or prostrate, leaves fleshy.....16. *C. halophila*
- Erect or ascending; leaves not fleshy.....14
14. Stems radiating from base; leaves oblanceolate; 1–2- pinnatisect15. *C. wiedemanniana*
- Stems not radiating from base; leaves ovate, oblong or elliptic, 2-3- pinnatisect.....15
15. Paleae truncate.....14. *C. palestina*
- Paleae acuminate.....16
16. Subglabrous; leaves ovate–oblong or elliptic; achenes distinctly 8–10 ribbed

- on each side.....10. *C. altissima*
 – Pubescent; leaves oblong or oblong–elliptic; achenes with 1–3 ribbed on
 each side.....17
 17. Peduncles becoming thickened, acuminate apex of the paleae is long;
 (2–3 mm); leaves 2–3- pinnatisect 11. *C. coelopoda*
 – Peduncles not becoming thickened or slightly thickened; acuminate apex of
 the paleae is short (1–1.5 mm); leaves 2-pinnatisect..... 12. *C. austriaca*

1. *Cota tinctoria* (L.) J.Gay, Fl. Sicul. Syn. 2: 867 (1855).

1. Capitula discoid.....1c. var. *discoidea*
 – Capitula radiate.....2
 2. Ray flowers yellow.....1a. var. *tinctoria*
 – Ray flowers white or cream.....1b. var. *pallida*

1a. var. *tinctoria*

≡ *Anthemis tinctoria* L., Sp. Pl: 896 (1753). = *Anthemis tinctoria* L. var. *orientalis* Eig et var. *parviflora* Eig, Palestine J. Bot., Jerusalem ser. 1: 211 (1938). = *Anthemis debilis* Fed., Fl. URSS 26: 867 (1961).

Lectotype: Described from Europe (foto Hb. Cliff. 414/2!).

Specimens examined: **A1** Tekirdağ: Gelibolu to Şarköy, 22 km from Şarköy, clearings of *Pinus brutia* forest, 40 m, 05 June 2007, *M.U.Özbek* 2338 (GAZI!); Kırklareli: Demirköy road, between Yenice to Mahyadağ, 26 June 1968, *A Baytop* (ISTE 13983!); Edirne: Keşan to Malkara, 20 km from Malkara, clearing of *Pinus brutia* and *Quercus* forest, 195 m, 22 July 2006, *M.U.Özbek* 2142 (GAZI!); Çanakkale: 20 km from Eceabat to Gelibolu, roadside, 5 m, 22 July 2007, *M.U.Özbek* 2141 (GAZI!); Bozcaada, Latif shrubbery, ca. 20 m, 15 June 1976, *Ö.Seçmen* 1697 & *E.Leblebici* (EGE!); Gökçeada, between Kaleköy to Zeytinli, N. of state farm, ca. 10 m., 18 June 1976, *Ö.Seçmen* 2075 & *E.Leblebici* (EGE!); Balıkesir: Marmara Island, around Saraylar village, 30 m, 13 July 1978, *E.Tuzlacı* (ISTE 40366!). **A2** İstanbul: around Fatih forest, geophysics research area, 14 June 1972, *H.Argöksel* & *E.Tuzlacı* (ISTE 22329!); Bursa: Bursa to Keles, 40 km from Keles, clearings of forest, roadside, 415 m, 28 June 2006, *M.U.Özbek* 2109 (GAZI!). **A3** Ankara: Beypazarı to Nallıhan, İnözü valley, 900–1200 m, *Quercus pubescens* alliance, 26 June 1973, *Y.Akman* 8364 (ANK!). **A4** Ankara: Kızılcahamam, Soğuksu National Parks, around Kuzcapınar, ca. 1300 m, 03 August 1989, roadside, *Ö.Eyüboğlu* 1989 (GAZI!); Kırıkkale: Delice, Büyükavşar village, around Büyükhemit, ca. 1150 m, 16 June 1990, clearings of *Quercus* forest, *C. Birden* 1157 (GAZI!); Çankırı: Atkaracalar, Dumanlı Mt., Bozkuş upland, steppe, 1250–1450 m, 10 July 1992, *A.Duran* 1617 (GAZI!); Karabük: Safranbolu, steppe, ca. 350 m, 21 June 1985,

M.Demirörs 1264 (ANK!). **A5** Samsun: Ladik, above Aslantaş road, mixed forest, 900 m, 22 August 1978, *Ş.Yıldırım* 1212 (HUB!); Kastamonu: Tosya, Seki village, around Seki stream, ca. 1000–1200 m, 10 June 1975, *M.Kılınç* 2095 (ANK!); Amasya: Akdağ, between Suluova to Ladik, above Eğribük village, near Elmatepe, under *Quercus* forest, 1500 m, 24 June 1977, *K.Alpınar* (ISTE 37877!). **A6** Ordu: Fatsa, Yapraklı village, 10 m, 15 August 1978, *B.Yıldız* 2226 (HUB!); Tokat: Artova, Arabacı Musa village, *Cupressus–Salix* forestation area, ca. 1200–1300 m, 11 June 1981, *R. İlarıslan* 1418 (ANK!). **A7** Giresun: Şebinkarahisar to Tamdere, above Asarcık village, roadside, 1790 m, 27 July 2007, *M.U.Özbek* 2657 (GAZI!). **A8** Gümüşhane: pass between Köse and Gümüşhane, 2000 m., N. slope in scrub (igneous), 02 August 1957, *P.H.Davis* 31958 & *Hedge* (EGE!); Bayburt: Bayburt to Aşkale, Kop Mountain, high mountain steppe, 2332 m, 28 July 2007, *M.U.Özbek* 2669 (GAZI!); Erzurum: 27 km from Erzurum to Tortum, 1950 m., Ghalk hills (steppe), 29 July 1966, *P.H.Davis* 47527 (EGE!); Rize: İkizdere, around Tozköy, 1450 m, meadows, 06 August 1986, *A.Güner* 7077 (GAZI!); Artvin: above Artova, ca. 800 m, 26 June 1957, *P.H.Davis* 30038 & *Hedge*, (ANK!). **A9** Artvin: Kaçkar stream, along the streambed, 1850–2400 m, 31 July 1982, *N.Demirkuş* 1679 (HUB!); Kars: Sarıkamış, Karakurt, environs Agop, 1550–1600 m, 14 July 1979, *O.Günes* 1363 (HUB!). **B1** İzmir: Bozdağ to Ödemiş, above Allahdiyen village, rocky slopes, 750 m, 23 June 2007, *M.U.Özbek* 2322 (GAZI!); Çanakkale: 18 km from Ayvacık, clearings of *Pinus brutia* forest, 400 m, 04 June 2007, *M.U.Özbek* 2330 (GAZI!); Manisa: 2 km from Akhisar to Gördes, roadside, 185 m, 27 May 2005, *M.U.Özbek* 1856 (GAZI!); Balıkesir: Edremit, Kaz Mts, rocky slopes, 1500 m, 26 July 1968. *Pamukçuoğlu & Quezel* s.n. (HUB!); 24 km E. of Balıkesir, 300 m, 7 August 1978, *A.Öztürk* 78-186a (VANF!). **B2** Bursa: Uludağ, clearings Karabelen forest, 13 August 1960, *K.Karamanoğlu* s.n. (AEF!); Kütahya: Tavşanlı to Domaniç, around Tunçbilek, meadows, 805 m, 02 June 2007, *M.U.Özbek* 2303 (GAZI!); Afyonkarahisar: Dazkırı, E. of Darıcılar village, steppe, c. 1050 m, 18 June 1984, *Z.Aytaç* 1257 (GAZI!). **B3** Bilecik: Bozüyük, Ahı Dağı, *Pinus nigra* forest, c. 770 m, 04 July 1978. *E.Yurdakulol* et al. (ANK!); Eskişehir: Sivrihisar to Mihallıçık, steppe, 1160 m, 09 June 2005, *M.U.Özbek* 1867 (GAZI!); Ankara: Polatlı to Sivrihisar, around Acıkır, steppe, 705 m, 22 June 2005, *M.U.Özbek* 1885 (GAZI!); Afyonkarahisar: Sincanlı, Kumalar Mt., around Taşoluk, Mandal hill, steppe, 1300–1400 m, 19 July 1997, *E.Akçiçek* 1836 (GAZI!); Konya: 24 km from Akşehir to Gelendost, steppe, 1050 m, 06 July 2005, *M.U.Özbek* 1902 (GAZI!); Isparta: Şarkikaraağaç, Kızıldağ Natural Park, *Cedrus libani* forest, 1250 m, 25 June 1994, *B.Mutlu* 813 (HUB!). **B4** Ankara: Hüseyingazi, steppe, 1400–1500 m, 12 August 2008, *M.U.Özbek* 2768 (GAZI!). **B5** Nevşehir: Göreme, 5 km E. of Göreme, 1110 m, 18 May 1989, volcanic tuff, *M.Vural* 4678 et al. (GAZI!); Aksaray: Hasan Dağı, N.W. of Hasan Dağı, above *Quercus* forest, ca. 1750 m, 12 July 1973, *A.Düzenli* 351 (ANK!); Kayseri: Bakırdağ, between Saraycık to Sarıkaya village, under *Abies*

cilicica forest, 1545 m, 04 August 2007, *M.U.Özbek* 2689 (GAZI!); Yozgat: Natural Park, under *Pinus nigra*, ca. 1500 m, 26 June 1979, *Birand* 53 & *Sayın* (ANK!). **B6** Adana: Tufanbeyli, around Akpınar village, steppe, 1443 m, 04 August 2007, *M.U.Özbek* 2692 (GAZI!); Kayseri: Akkışla, Ganişeyh village, around castle, roadside, 1850 m, 18 July 2007, *M.U.Özbek* 2642 (GAZI!); Kahramanmaraş: Andırın, Geben to Andırın, steppe, 1329 m, 05 August 2007, *M.U.Özbek* 2691 (GAZI!); **B7** Erzincan: Kemaliye, around Sandık village, stony slopes, 1170 m, 02 July 2007, *M.U.Özbek* 2467 (GAZI!); Elazığ: Maden, ca. 1300 m, 02 June 1957, *P.H.Davis & Hedge* s.n. (ANK!); Tunceli: Pertek, ca. 1100 m, 06 June 1957, *P.H.Davis & Hedge* 29152 (ANK!). **B8** Erzincan: Tercan, around Tercan dam, slopes of Çatalkaya hill, steppe, 1440 m, 18 July 2009, *Ö.Güneş* 1017 (DUOF!). **B9** Bitlis: Tatvan, Sorgun, above Van Lake, *Quercus infectoria* shrubs, volcanic base, 1650–1750 m, 09 July 1972, *H.Peşmen* 2961 (HUB!); foot of Nemrut Dağ, 6000 ft., 3 July 1954, *P.H.Davis* 23586 & *C.Folunia* (EGE!); Erzurum: Karaköse to Erzurum 54 km, alpine meadows, 2300 m., 20 July 1956, *H.Birand* 529 & *K.Karamanoğlu* (ANK!); Muş: Malazgirt, Karıncalı village, steppe, 1598 m, 14 July 2007, *L.Behçet* 3296 et al. (VANF!). **C1** Muğla: Datça, Bozdağ (Kocadağ), above Mesudiye village, 700 m, 03 July 1983, *E.Tuzlacı* (ISTE 51522!). **C2** Muğla: Köyceğiz, Ekincik village, around Kürkçüler, 500 m, *Pinus brutia* forest, 19 May 1991, *A.Güner* 9087 et al. (GAZI!). Denizli: Honaz Dağı Natural Park (entrance Cankurtaran), under *Pinus brutia* forest, 1135 m, 10 June 2008, *M.U.Özbek* 2740 (GAZI!). **C3** Antalya: Akseki, Çukurköy, around Istarlas, clearings of macchie, 850–1050 m, 03 June 1996, *A.Duran* 3872 (GAZI!). **C3** Burdur: Gölhisar to Altınyayla 12. km, inner valley, rocky slopes, 665 m, 30 June 2005, *M.U.Özbek* 1898 (GAZI!); Isparta: Sütçüler, between Ayvalı to Darıbüğü, serpentine, 850–1100 m, 06 June 1975, *H.Peşmen* 2160 & *A.Güner* (HUB!); S. of Beyşehir Lake, around Üstünler, under *Quercus*, ca. 1150 m, 20 June 1986, *M.Küçüködük* 459 (KNYA!). **C4** Konya: Bozkır, Sorkun upland, 16 June 1968, *R.Çetik* 1198 et al. (ANK!); Karaman: Pınarbaşı to Kızılyaka, 3 km N.W. of Pınarbaşı, clearings of *Quercus*, 1205 m, 28 June 2005, *M.U.Özbek* 1893 (GAZI!); İçel: 2 km from Sertavul to Mut, steppe, 1430 m, 07 July 2005, *M.U.Özbek* 1905 (GAZI!); Çamlıyayla to Tarsus, around Ulaş village, roadside, 300–400 m, 08 June 2008, *M.U.Özbek* 2722 (GAZI!); Adana: Pozantı to Ulukışla, Gülek Boğazı, stony slopes, 1170 m, 02 July 2006, *M.U.Özbek* 2124 (GAZI!). **C6** Kahramanmaraş: Ahır Dağı, around Yalnızardıç, 1400–1500 m, 27 June 1992, steppe, *H.Duman* 4888 & *Z.Aytaç* (GAZI!); Gaziantep: İslahiye, 150 m E. of Koççağız village, macchie, 990 m, 19 May 2006, *Ş.Çakır* 633 (VANF!). **C8** Mardin: N.E. of 5 km from Mardin, c. 900 m, 26 May 1957, *P.H.Davis* 28608 & *Hedge* (ANK!). **C10** Hakkari: Yüksekova to Şemdinli, Sopatan pass, *Quercus* forest, 1600 m, *T.Ekim* 7973 (GAZI!).

Flowering time: May–September.

Habitat: Steppe, fields, clearings of forest, roadsides, meadows, rocky and stony slopes, s.l.–1830 m.

Distribution: Europe, Caucasia, W. of Syrian, Iran.

1b. var. *pallida* (DC.) Özbek & Vural, Türk. Bitkileri List. 147 (2012).

Type: [Turkey A2 İstanbul] Constantinople, 1822. Olivier (G–DC., photo!).

Specimens examined: **A2** İstanbul: Aydos hill, 02 July 1974, *E.Tuzlacı* & *Y.Doğantan* (ISTE 20019!); Bursa to Keles, 40 km from Keles, clearings of forest, 415 m, 28 June 2006, *M.U.Özbek* 2108 (GAZI!); Kocaeli: Yuvacık dam, Aksığın–Servetiye road, roadsides, 169 m, 07 July 2006, *N.Aksoy* 6199 (DUOF!). **A3** Ankara: Çayırhan to Beypazarı, gypsum slopes, 560 m, 14 June 2005, *M.U.Özbek* 1883 (GAZI!); Beypazarı, Dedenindoruk hill, steppe, 600 m, 08 May 2008, *E.Ergin* 1653 (DUOF!). **A4** Ankara: Ayaşbeli, Akkaya hill, 1250–1400 m, 27 June 1986, steppe, *M.Vural* 4191 (GAZI!); Çankırı: Tosya, Gavurdağı (Üç Oluklar picnic area), clearings of forest, 1070 m, 06 June 2007, *M.U.Özbek* 2358 (GAZI!); Kastamonu: Ilgaz Mountain, 1830 m, 05 September 1994, clearings of forest, *N.Adıgüzel* et al. 1776 (GAZI!); Bartın: Ulus, between above Çerçi village and Arit road, riverside, 560 m, 14 May 2017, *B.Tunçkol* 4256 (DUOF!). **A5** Kastamonu: Alçıcılar village, c. 900 m, *Pinus nigra* forest, 20 July 1993, *A.A.Dönmez* 3630 et al. (GAZI!). **A7** Giresun: Tirebolu, S.W. of İnköy village, 10–50 m, 03 July 1997, rocky slopes, *H.Duman* 6451 (GAZI!); Trabzon: Çaykara, Ataköy, roadside, 670 m, 27 July 2006, *M.U.Özbek* 2157 (GAZI!). **A8** Rize: Ardeşen, between Fırtına Köprüsü to Bakoz, sandy areas, 100 m, 28 June 1980, *A.Güner* 2860 (HUB!); Erzurum: between Erzurum to İspir, E. of Rizekent village, Hanboğazı stream, *Populus tremula* forest, 2250 m, 14 August 1976, *A.Tatlı* 5309 (HUB!); Artvin: Sarıbudak uplands, *Pinus–Picea* mixed forest, 1850–2000 m, 20 July 1982, *N.Demirkuş* 1607 (HUB!). **A9** Erzurum: Olur, Kekikli village uplands, Şirinönü, 1750–2300 m, 01 August 1984, *N.Demirkuş* 2312a (HUB!); Kars: Sarıkamış to Karakurt 6. km, *Pinus sylvestris* forest, 1950–2000 m, 20 August 1979, *O.Güneş* 1493 (HUB!). **B2** Bursa: Uludağ, above hotels, alpinic steppe, 2050 m, 24 July 2008, *M.U.Özbek* 2761 (GAZI!); Kütahya: Simav, Akdağ, under *Pinus nigra*, 1840 m, 22 June 2012, *M.Altıntaş* 1130 (DUOF!). **B3** Eskişehir: Eskişehir to Kütahya, 35 km from, *Quercus* forest, 960 m, 02 June 2007, *M.U.Özbek* 2300 (GAZI!); Afyonkarahisar: Bayat, Otlugedik, N. slopes, c. 1450 m, 27 June 1975, *M.Vural* 297 (GAZI!, KNYA!); Konya: Sultandağları, above Dereçine village, 1220 m, 10 July 1975, *G.Gökmeci* (ISTE 32878!) **B4** Ankara: Gölbaşı to Haymana, Research and Application Station of Field Crops, steppe, 1037 m, 06 June 2005, *M.U.Özbek* 1864 (GAZI!); Kırıkkale: Keskin, Böbrek Dağı, Müsellim village, N. of Öteyüz, under *Quercus*, 1100 m, 29 June 1991, *Ü.Güler* 1390 (GAZI!). **C3** Antalya: Elmalı to Fethiye, 75 km from Fethiye, rocky slopes, 1170 m, 10 June 2008, *M.U.Özbek* 2732 (GAZI!). **C5** Konya: Ereğli, Aydos Dağı, Sayıntaş, 1700 m, marmoreal rocky slopes, 27 June 1976, *S.Erik* 1681 (HUB!).

Flowering time: June–July.

Habitat: Steppe, fields, 200–2300 m.

Distribution: Greece.

1c. var. *discoidea* (All.) Özbek & Vural, Türk. Bitkileri List. 147 (2012).

≡ *Chamaemelum discoideum* All., Fl. Pedem. 1: 188 (1785). = *Anthemis discoidea* (All.) Willd., Sp. Pl. 3: 188 (1803).

Type: [N. Italy] Pedemonti circa Cuneum, Allioni.

Specimens examined: **A2** İstanbul: Beykoz, Kirazlı, 100 m, macchie, 23 April 2001, *H.Altınözü* 3499 (HUB!). **A3** Sakarya: Geyve, around Bağlarbaşı village, 10 June 1972, *T.Baytop* (ISTE 22364!); Bolu: Kale and Tekneci stream, 1000 m, roadside, 12 July 1990, *İ.Kılınç* 1235 (GAZI!); Düzce: Gölyaka, Kızık pasture, around Soğuksu, 1462 m, 5 May 2011, *N.Aksoy* 5622 (DUOF!); Yığılca, Hasanlar dam, around Orhan Gazi mosque, roadsides, 191 m, 18 May 2008, *N.Güneş* 2245 (DUOF!). **A5** Amasya: Direkli village, around Bayeyn, ca. 700 m, steppe, 21 June 1987, *S.Peker* 1347 (GAZI!). **A9** Kars: Posof, Ilgar Mt. (Çiçek) to Al village, 1580–2730 m, 16 June 1986, *N.Demirkuş* 3579 (HUB!). **C2** Denizli: Acıpayam to Olukbaşı village (Abas village), Geyran uplands, around Güvercin oluğu, conservation areas, 1400–1670 m, 04 July 1997, *Z.Aytaç* 7629 (GAZI!). **C3** Isparta: Sütçüler, Kuzca village, Totabeli, *Pinus nigra* forest, rocky slopes, river edge, 1400–1500 m, 05 June 1975, *H.Peşmen* 2086 & *A.Güner* (HUB!); Antalya: Kemer, Tahtalıdağ, above Çukuryayla, alpine steppe, 1500–2000 m, 28 July 1979, *H.Peşmen* 4466 & *A.Güner* (GAZI!). **C4** Konya: Ermenek, Kazancı town, Yeşilköy, through Göksu river, 700–800 m, 11 April 1984, *H.Sümbül* 2794 (HUB!). **C5** Adana: Pozanti, against Horoz village, rocky and stony slopes, 1290 m, 22 June 2007, *M.U.Özbek* 2432 (GAZI!); İçel: Çamlıyayla (Namrun) to Tarsus, 43 km from Tarsus, rocky slopes, 950 m, 08 June 2008, *M.U.Özbek* 2721 (GAZI!). **C6** Antakya: Antakya to Yayladağ, around Şenköy, 850–900 m, macchie, 24 June 1989, *A.Güner* 7227 (HUB!).

Flowering time: May–August.

Habitat: Roadsides, hillsides, open area of forest, s.l.–1300 m.

Distribution: South Europe, West Syrian.

Note: This species differs from the other perennial *Cota* species by its capitula radiat or discoid, paleae oblong or linear–oblong, ray flowers are yellow, white or cream and leaf segments narrow. It is the most widely distributed species between other *Cota* species growing in Turkey. During our field study, an abnormal specimen (province of İzmir, West Anatolia) was detected with ray flowers similar to disc flowers.

2. *Cota euxina* (Boiss.) Özbek & Vural, Türk. Bitkileri List. 147 (2012).

≡ *Anthemis euxina* Boiss., Fl. Orient., 3: 282 (1875). ≡ *Cota euxina* (Boiss.) Holub, Folia Geobot. Phytotax. 9: 270 (1974). ≡ *Anthemis tinctoria* L. var. *euxina* (Boiss.) Grierson, Notes Roy. Bot. Gard. Edinburgh 33 (3): 428 (1975). ≡ *Cota tinctoria* L. subsp. *euxina* (Boiss.) Oberpr. & Greuter, Willdenowia 33 (1): 41 (2003).

Type: [W. Caucasus]: ad littus marinum Euxini inter Poti et St Nicolaum Abchasiae, Ruprecht (E!).

Specimens examined: A2 İstanbul: Karaburun, E. of Karaburun, sandy places, 0–5 m, 26 August 2007, *M.U.Özbek* 2695 (GAZI!); Ormanlıköy, seaside, 04 October 1967, *A.Baytop* & *G.Atila* (ISTE 12134!); E. of Karaburun, 09 October 1967, *A.Baytop* (ISTE 12217!).

Flowering time: July–October.

Habitat: Sandy places, s.l.–5 m.

Distribution: Georgia.

Note: In the Flora of Turkey, this taxon was evaluated as *Anthemis tinctoria* L. var. *euxina* (Boiss.) Grierson (Grierson & Yavin, 1975). However, it can be easily distinguished from *C. tinctoria* by several noticeable morphological characters. *C. euxina* differs from *C. tinctoria* in having leaves simple, serrate or shallowly pinnately lobed (not pinnatisect), phyllaries 2–3-seriate (not 4-seriate), paleae 4–4.5 mm (not 6–7 mm) and achenes obovate and 1–1.5 mm (neither oblong nor 1.75–2.5 mm). It was re-evaluated at the species level because of these morphological differences [10].

3. *Cota virescens* (Bornm.) Özbek & Vural, Türk. Bitkileri List. 148 (2012).

≡ *Anthemis tinctoria* L. var. *virescens* Bornm., in Notizbl. Bot. Gart. Berlin-Dahlem. 7: 19 (1917). = *Anthemis meinkeana* Rech. f., in Ann. Naturhist Mus. Wien 57: 90 (1949) Ic: Ark. Bot. 5: t.31 (1960). ≡ *Cota tinctoria* L. var. *virescens* (Bornm.) Oberpr. & Greuter, Willdenowia 33: 41 (2003).

Type: [Turkey C5 Adana] Haruniye, published erroneously as Alexandrette (İskenderun), *Meincke* 148.

Specimens examined: C6 Osmaniye: Hasanbeyli, Gökçedağ road, around TV station, clearings of *Quercus* forest, 1280 m, 06 July 2008, *M.U.Özbek* 2753 (GAZI!).

Flowering time: June–July.

Habitat: Clearings of *Quercus* forest, 1220–1520 m.

Distribution: Endemic. East Mediterranean element.

Note: As a result of morphological studies on this taxon, it has been observed some differences, such as branching of the stem, the width of involucre, the shape of leaves and the length of disc flowers. In *C. virescens*, stem unbranched or sometimes 2-branches, whereas much branched in *C. tinctoria*. At the same time in *C. virescens* involucre 1.7–2 cm, while in *C. tinctoria* 1–1.5 cm. Also, in *C. virescens*, leaves 2-pinnatisect, the length of disc flowers 4.5–5 mm, while in *C. tinctoria* leaves 2–3-

pinnatisect, the length of disc flowers 3–4 mm. Because of these permanent and distinctive features, this taxon has been evaluated at the species level [10].

4. *Cota triumfetti* (All.) J. Gay, Fl. Sicul. Syn. 2: 867 (1855).

≡ *Anthemis tinctoria* var. *triumfettii* L., Sp. Pl. 896 (1753) as *triumfelti*. = *Anthemis rigescens* Willd., Hort. Berol. 1 (6): t. 62 (1806). = *Anthemis dumetorum* Sosn., Věstn. Tiflissk. Bot. Sada n.s., 3-4: 160 (1927).

Type: Described from Europe (Hb. Linn. (Stockholm) 355 / 13, photo!).

Specimens examined: **A1** Kırklareli: Demirköy, between Hamdibey to Yeşilce village, under mixed forest, 362 m, 23 July 2006, *M.U.Özbek* 2149 (GAZI!). **A4** Zonguldak: Gipfelgebiet des steiniger Bergrasen, 21 August 1973, 1970 m, *F.Holtz* (Nr.01.277) & *P.Hanel* (EGE!); Kastamonu: zwischen Kastamonu und Ilgaz, 3 km nördlich des Ilgazdağı geçidi Lichtung im Tannenwald (*Abies nordmanniana*), 19 August 1973, 1650 m, *F.Holtz* (Nr.01.246) & *P.Hanel* (EGE!). **A6** Tokat: Niksar to Akkuş, 12 km from Akkuş, clearings of forest, 990 m, 25 July 2006, *M.U.Özbek* 2153 (GAZI!). **A7** Trabzon: Sümela to Maçka, 10 km from Maçka, under mixed forest, 800 m, 26 July 2006, *M.U.Özbek* 2154 (GAZI!); Giresun: Tamdere to Giresun, Aksu village, around Karagöl, subalpine meadows, 2000 m, 27 July 2007, *M.U.Özbek* 2661 (GAZI!). **A8** Rize: 25 km from İkizdere to Başköy (Cimil), high mountain steppe, 1860 m, 27 July 2006, *M.U.Özbek* 2163 (GAZI!); 2 km from Çamlıhemşin to Ayder, roadside, 485 m, 28 July 2006, *M.U.Özbek* 2168 (GAZI!); 2 km from Çamlıhemşin, Ayder to Kavrun uplands, clearings of forest, roadside, 1440 m, 28 July 2006, *M.U.Özbek* 2170 (GAZI!); İkizdere, around Başköy (Cimil), high mountain meadows, 2100 m, 29 July 2007, *M.U.Özbek* 2688 (GAZI!); Çaykara to Rize, Uzungöl, roadside, 1150 m, 28 July 1994, *N.Gören* (ISTE 68083!); Erzurum: Tuzla– Tortum, around Ban village, 09 August 1981, *N.Demirkuş* 1211 (HUB!); between Erzurum to İspir, W. of Rizekent village, Hanboğazı stream, *Populus tremula* forest, 2250 m, 14 August 1976, *A.Tatlı* 5309 (HUB!; KNYA!); Bayburt: between Bayburt to Aşkale, Kop pass, c. 2350 m, 16 August 1984, *Ö. Seçmen* et al. (EGE!). **A9** Artvin: Ardanuç to Ardahan, 5 km from Bülbülan upland, high mountain steppe, 2300 m, 29 July 2006, *M.U.Özbek* 2176 (GAZI!); Kars: Arpaçay, Gülyüzü to Zinzal, 2020 m, 21 July 2000, mountain meadows, *M.Vural* 8254 et al. (GAZI!); Hanak, Çat village, valley of Kımılık stream, 2050–2100 m, meadows, 11 August 1983, *A.Güner* 5321 & *B.Yılmaz* (HUB!); Sarıkamış to Karakurt 10 km, around Halibey bridge, *Pinus sylvestris* forest, 2000 m, 13 July 1979, *O.Güneş* 1329 (HUB!); Göle, 30–40 km from Kars, Balçeşme meadows, 15 August 1981, *N.Demirkuş* 1293 (HUB!); **B9** Van: Muradiye, Derviş upland, Hacı Cave, *Populus* alliance, 08 July 2001, 2400–2500 m, *O.Karabacak* s.n. (EGE!).

Flowering time: May–August.

Habitat: Roadside, rocky slopes, under mixed forest, clearings of forest, sub-alpine meadows, high mountain steppe, 400–2134 m.

Distribution: Spain, France, Switzerland, Italy, Romania, Caucasus.

Note: As stated in the Flora of Turkey, *C. triumfettii* is similar to *C. tinctoria* but usually stem about 60 cm and branched fastigiate above. Also, leaves longer (3–4 cm) with flat and not infolded segments [3].

5. *Cota melanoloma* (Trautv.) Holub, Folia Geobot. Phytotax. 9 (3): 270 (1974).

1. Stem and leaves greyish–green; primary segments 3–4 paired, upper leaves obovate–oblong.....5a. subsp. *melanoloma*
– Stem and leaves green; primary segments 5–6 paired, upper leaves ovate.....
.....5b. subsp. *trapezuntica*

5a. subsp. *melanoloma*

≡ *Anthemis melanoloma* Trautv., Bull. Soc. Imp. Naturalistes Moscou 41 (1): 461 (1868). = *Anthemis extrarosularis* Freyn & Sint., Oesterr. Bot. Z. 44: 146 (1894).

Type: [Turkey B8 Erzurum] in montibus Ssaganlug, Lagowski (photo E!).

Specimens examined: **A4** Kastamonu: Ilgaz Dağı, Küçük Hacet, alpine, 2500 m, 02 August 2005, *M.U.Özbek* 1918 (GAZI!). **A8** Rize: İkizdere, Around Başköy (Cimil), 2200 m, meadows, 24 July 1984, *A.Güner* 6066 (GAZI!); Çamlıhemşin, Yukarı Amlaket upland, 2300 m, meadows, 10 August 1984, *A.Güner* 6611 & *M.Vural* (GAZI!); İkizdere, Gülyayla to Cihantepe, 2400–2500 m, meadows, 25 July 1985, *A.Güner* 6588 & *M.Vural* (GAZI!); Erzurum: İspir to Erzurum, 1 km N. of Gölyurt pass, 2220 m, 18 July 1984, *Max Nydegger* (ISTE 19282!); Bayburt: Bayburt to Aşkale, Kop Dağı, 2332 m, 28 July 2007, high mountain meadows, *M.U.Özbek* 2666 (GAZI!). **A9** Erzurum: Horasan, 7 km N. of Sıçankale village, around Çarıykı, 01 July 1974, *A.Yürül* s.n. (EGE!); Ardahan: Bülbülan to Kutul uplands, 15 July 1981, *N.Demirkuş* 1156 (HUB!); Posof, around Doğrular village, 1800–2200 m, 30 July 1985, *N.Demirkuş* 3140 (HUB!); Posof, Ilgar meadows (Çiçek Dağı), 2000–2400 m, 04 August 1982, *N.Demirkuş* 1752 (HUB!); Ardahan: Ardanuç to Ardahan 5 km, rocky slopes, 1050 m, 29 July 2006, *M.U.Özbek* 2173 (GAZI!); 15–20 km from Ardanuç to Ardahan, under *Quercus*, 1360 m, 29 July 2006, *M.U.Özbek* 2175 (GAZI!). **B7** Sivas: Divriği, Mursal village, 1800–2200 m, serpentine steppe, 17 August 1996, *A.A.Dönmez* 4929 (HUB!); Tunceli: Pülümür, Sülbüs Dağı, clearings of *Quercus* forest, 1600–2000 m, 17 June 1980, *Ş.Yıldırım* 3375 (HUB!); Pülümür to Mutu, 1840 m, *Hub.–Mor.* 11193 (ANK!).

Flowering time: July–August.

Habitat: Volcanic and limy slopes, high mountain meadows, clearings of mixed forest, open area of *Quercus* forest, 1050–2600 m.

Distribution: Russia.

5b. subsp. *trapezuntica* (Grierson) Oberpr. & Greuter, Willdenowia 33 (1): 40 (2003).

≡ *Anthemis melanoloma* Trautv. subsp. *trapezuntica* Grierson, Notes Roy. Bot. Gard. Edinburgh 33 (3): 411 (1975).

Type: [Turkey A8 Trabzon] Bayburt to Of, 3 km N. of pass top, 2400 m, Stainton & Henderson 6179 (holo E!).

Specimens examined: A7 Trabzon: Sümela to Maçka, 10 km from Maçka, under mixed forest, 800 m, 27 July 2006, *M.U.Özbek* 2154 (GAZI!); Soğanlı pass to Çaykara 3. km, high mountain meadows, 2275 m, 28 July 2007, *M.U.Özbek* 2679 (GAZI!). A8 Rize: İkizdere, Başköy (Cimil), around Çermaniman peak, high mountain meadows, 2610 m, 29 July 2007, *M.U.Özbek* 2687 (GAZI!); Çamlıhemşin, between Yukarı Kavrun to Pornag to Arçevit, alpinic steppe, 2200–3000 m, 10 August 1980, *A.Güner* 2944 (HUB!). A9 Artvin: Ardanuç, Kurdevar Dağı, 2800 m, 29 July 1982, *N.Demirkuş* 1634 (HUB!); Ardahan: Bülbülân to Kutul uplands, road through, 13 July 1981, *N.Demirkuş* 1107b.(HUB!).

Flowering time: July–August.

Habitat: Volcanic and limy slopes, high mountain meadows, clearings of mixed forest, 800–3000 m.

Distribution: Endemic. Euro–Siberian element.

Note: This species differs from the other perennial *Cota* species by its phyllaries all dark-margined and paleae narrowly lanceolate. Also, stems are generally unbranched and 1-capitulate.

6. *Cota antitaurica* (Grierson) Holub, Folia Geobot. Phytotax. 11 (1): 83 (1976).

≡ *Anthemis antitaurica* Grierson, Notes Roy. Bot. Gard. Edinburgh 33: 211 (1974).

Type: [Turkey B6 Adana] d. Saimbeyli, Bozoğlan Dağı above Obruk Yayla, 2000–2100 m, rocky slopes, rare, 07 July 1952, *P.H.Davis* 19746 (holo. K!).

Specimens examined: B6 Adana: Saimbeyli – Tufanbeyli, Bozoğlan Mt., above Obruk highland, Karlıktepe, rocky slopes, 1650–1900 m, 20 June 2008, *B. Bani* 6120 (GAZI!); ibid., 1800–1850 m, 05 July 2008, *M.U.Özbek* 2752 (GAZI!).

Flowering time: June–July.

Habitat: Rocky slopes, 1600–1900 m.

Distribution: Endemic. Irano–Turanian element.

Note: *Cota antitaurica* is only known from the type locality. After 1952, it was collected for the second time by Dr. Barış Bani (*B.Bani* 6120). This species differs from the other perennial *Cota* species by its campanulate involucre, densely white-lanate indumentum, petiolate basal leaves and narrowly dark-margined phyllaries.

7. *Cota oxylepis* Boiss., Diagn. Pl. Orient. ser. 2, 5: 109 (1856).

≡ *Anthemis oxylepis* Boiss., Fl. Orient. 3: 282 (1875).

Lectotype: [Turkey. C5 Niğde] supra Bulgarmaden, *Balansa* (K!); **paralectotype:** [Turkey. İçel] Gullek Boghas, 1160 m, (1853), Kotschy s.n. (K!).

Specimens examined: C5 Niğde: Ulukışla, Maden village, around Bulgar maden, stony slopes and screes, 2100 m, 25 July 2007, *M.U.Özbek* 2655 (GAZI!); *ibid.*, 26 July 2007, *M.Vural* 10066 et al. (DUOF!).

Flowering time: July.

Habitat: Stony slopes and screes, 1160–2134 m.

Distribution: Endemic. Irano–Turanian element.

Note: This local endemic species differs from the other perennial *Cota* species by its paleae longer than disc flowers and discoid capitula. *C. oxylepis* is closely related to *C. hamzaoglu*, but it differs from *C. hamzaoglu* by its subglabrous to sparsely lanate (not densely lanate) indumentum of the lower surface of the leaf lamina, primary segments of the lamina in 4–8 pairs (not 3 or 4 pairs), secondary segments in 4–8 pairs (not 1–3 pairs), and achenes 3–3.5 mm long (not 2–2.5 mm long).

8. *Cota hamzaoglu* Özbek & Vural, Turkish J. Bot. 35 (4): 331–336 (2011).

Holotype: [Turkey A2 Bursa] Uludağ, above hotels, between cable cars and old wolfram mine, 2050–2100 m., among *Juniperus* and *Vaccinium* subalpine shrubs, 31.07.2009, *M.U.Özbek* 2812 & *M.Vural* (holo. GAZI!; iso. BOZOK Hb!., BULU!, HUB!, ANK!).

Paratype: *ibid.*, 2100 m, 29 July 2006, *Hamzaoğlu* 4403 et al. (BOZOK Hb!., BULU!, HUB!, ANK!).

Specimens examined: A3 Ankara: Nallıhan, Karacasu village, Sarıçal Dağı, under *Pinus nigra* forest, 1460 m, 05 July 2010, *G.Turgut* 1390 (GAZI!); *ibid.*, 07 August 2010, *M.U.Özbek* 2827 (GAZI!); *ibid.*, *Juniperus communis* subsp. *nana*, clearings of *Pinus nigra* forest, 1650 m, 07 August 2010, *M.U.Özbek* 2829 (GAZI!). B2 Kütahya: Gümüşdağı, around Radar station, clearings of *Pinus nigra*, 1822 m, 09 July 2019, *M.U.Özbek* 3156 (GAZI!); Gediz, Murat Dağı, from the ski center to the summit, serpentine, 2050 m, 02 August 2015, *Koç* 2128 & *Hamzaoğlu* (GAZI!). B3 Bilecik: Bozüyük, between Çiçekliyayla and Karagöl, clearings of *Pinus nigra*, 1779 m, 07 July 2019, *M.U.Özbek* 3155 (GAZI!); Eskişehir: Gölcük Plateau, Türkmen Mountain, 1650 m, July 2011, *A.Ocak* et al. s.n. (GAZI!).

Flowering time: July–August.

Habitat: *Juniperus* and *Vaccinium* subalpine shrubs, clearings of *Pinus nigra*, 2050–2100 m.

Distribution: Endemic, Euro–Siberian element.

Note: *Cota hamzaoglu* differs from *C. fulvida* by its sparsely lanate (not sericeous) indumentum, leaf lamina 1–2.5 cm long, 0.5–1 cm wide (not 1.5–5 cm long, 0.75–1.5 cm wide), primary segments of the lamina in 3 or 4 pairs (not 4–6 pairs), and secondary segments in 1–3 pairs (not 4–8 pairs) [11].

9. *Cota fulvida* (Grierson) Holub, Folia Geobot. Phytotax. 11 (1): 83 (1976).

≡ *Anthemis fulvida* Grierson, Notes Roy. Bot. Gard. Edinburgh 33 (2): 213 (1974).

Type: [Turkey B3 Afyon] Sultandagh in jugis alpinis supra Engeli (Engilli), 1850 m, 28 June 1899, *Bornmüller* 4656 (holo. E!, iso. K! W!).

Specimens examined: C3 Isparta: Yenişarbabemli, above Melikler pastures, clearings of *Quercus vulcanica* and *Pinus nigra* forest, dry stream bed, 1680–1800 m, 27 August 2012, *M.U.Özbek* 2852 & *M.Arslan* (GAZI!).

Flowering time: June–July.

Habitat: Under *Pinus nigra* forest and *Juniperus communis* subsp. *nana*, clearings of *Quercus vulcanica* and *Pinus nigra* forest, 1680–1850 m.

Distribution: Endemic. Irano–Turanian element.

Note: *Cota fulvida* was collected for the first time by Bornmueller in 1899. Field studies were carried out between 2006 and 2010, but it could not be collected. In 2012, it was collected from another locality (Isparta) except its type locality. In *C. fulvida* the paleae is longer than the disc flowers and also it has discoid capitula, such as *C. oxylepis* and *C. hamzaoglu*. However it differs from these species by its sericeous indumentum, primary segments of the lamina in 4–6 pairs, and secondary segments in 4–8 pairs.

10. *Cota altissima* (L.) J. Gay, Fl. Sicul. Syn. 2: 867 (1855).

≡ *Anthemis altissima* L., Sp. Pl. 2: 893 (1753) emend. Sprengel. Syst. Veg. 3: 594 (1826). = *Anthemis cota* L., Sp. Pl. 2: 893 (1753) emend. Vis. Fl. Dalm. 2: 78 (1847).

Type: Described from Italy (Hb. Linn. 1016/3, photo!).

Specimens examined: A1 Çanakkale: 5 km from Gelibolu, fields, 20 m, 05 June 2007, *M.U.Özbek* 2334 (GAZI!); Truva, roadside, 50 m, 04 June 2007, *M.U.Özbek* 2332 (GAZI!); Gökçeada, s.l, 18 June 1976, *Ö.Seçmen* 2057 & *E. Leblebici* (EGE!); Tekirdağ: Eriklice village, *Olea europae* garden, 10 m, 05 June 2007, *M.U.Özbek* 2339 (GAZI!); Balıkesir: 5 km from Gömeç to Burhaniye, roadside, 70 m, 04 June 2007, *M.U.Özbek* 2329 (GAZI!). A2 İstanbul: Kartal to Yakacık, 17 May 1950, *A.Berk* s.n. (HUB!); Bakırköy, 16 June 1950, *A.Berk* s.n. (HUB!). A3 Bolu: Mudurnu, Adapazarı to Mudurnu old way, 475 m, 24 May 2009, *S.S.Kanoğlu* 1579 & *A.Kaya* (DUOF!). A5 Amasya: Yukarı Baraklı village, around Boyarlık, ca. 850 m, steppe, 01 October 1987, *S.Peker* 1742 (GAZI!). A8 Artvin: Ardanuç, ca. 500 m, 27 June 1957, *P.H.Davis* 3017 & *Hedge* (ANK!). B1 İzmir: Kemalpaşa to Ulucak, fire area, 25 May 1970, *S.Oflas* 14 (EGE!); Gümüldür, 26 May 1964, *Regel* s.n. (EGE!); Kemalpaşa, around Ovacık village, ca. 690 m, 17 June 1977, *Ö.Seçmen* 1146 (EGE!). B7 Elazığ: around Fırat University, 1100 m, 29 June 1974. *N.Çelik* s.n. (HUB!); Erzincan: İliç, Bağıştaş, edge of Karasu, 870 m, 17 May 1980, *Ş.Yıldırım* 2774 (HUB!). C2 Denizli: between Çivril to Işıklı, fallow fields, ca.

800–830 m, 06 June 1983, *Y.Gemici* 1936 et al. (EGE!); 15 km S. of Denizli, meadows, ca. 540 m, 05 June 1974, *C.Ödemiş* s.n. (EGE!). **C3** Antalya: Kemer, Ovacık, ca. 1100–1200 m, *P.H.Davis* 15191 (ANK!); Aksu, ca. 20 m, 15 April 1966, *G.Öğuz* s.n. (EGE!). **C4** Konya: Ermenek, Kazancı town, wetland, 1150 m, 18 June 1983, *H.Sümbül* 1962 (HUB!); Ermenek, Danan village, around Ayaplı, through Göksu river, 600 m, 15 September 1983, *H.Sümbül* 2482 (HUB!; BOLU!). **C5** Adana: 2 km from Adana to Karataş, roadside, 15 m, 06 May 2007, *M.U.Özbek* 2257 (GAZI!); Düziçi (Haruniye), Yukarı Hacılar district, Ağhüsneler street, landside, 630 m, 01 June 2006, *M.U.Özbek* 2004 (GAZI!); İçel: Çamlıyayla (Namrun), around Namrun castle, roadside, 20 June 2007, *M.U.Özbek* 2398 (GAZI!). **C6** Osmaniye: Hasanbeyli, around radar station, clearings of *Quercus* forest, 1300 m, 21 June 2007, *M.U.Özbek* 2403 (GAZI!); Antakya: İskenderun, Akarca village, Amanos Mts., landside, 385 m, 02 June 2006, *M.U.Özbek* 2006 (GAZI!); Arsuz, around Kale village, clearings of forest, roadside, 0–5 m, 07 June 2008, *M.U.Özbek* 2713 (GAZI!); Hassa, Akbez town, Yeniyapan village, landside, 685 m, 02 June 2006, *M.U.Özbek* 2010 (GAZI!); Kahramanmaraş: Engizek Dağı, around Aksu district, 1000–1100 m, 12 June 1987, fields, *H.Duman* 1388 (GAZI!); Gaziantep: İslahiye, 2 km E. of Edilli village, riverside, 630 m, 20 May 2006, *Ş.Çakır* 726 (VANF!). **C7** Şanlıurfa: Siverek to Hilvan 30 km., around Küllaplı village, steppe, 620 m, 11 June 1980, *A.Güner* 2283 & *M.Koyuncu* (HUB!); Siverek, 16 June 1962, *Regel* s.n. (EGE!). **C8** Diyarbakır: 5 km S. of Diyarbakır, c. 650 m, 31 May 1957, *P.H.Davis* 28755 & *Hedge* (ANK!); Diyarbakır to Silvan, fields, 24 June 1954, *P.H.Davis* 22102 (ANK!).

Flowering time: April–June.

Habitat: Roadside, fields, steppe, clearings of *Quercus* forest, ruderal areas, s.l.–1300 m.

Distribution: South Europe, Russia, Central Asia, Iran, Palaestina.

Note: This species differs from the other annual *Cota* species by its paleae acuminate, inner phyllaries short ciliate and leaves ovate–oblong or elliptic. During our field study, an abnormal specimen (province of Şanlıurfa, South-eastern Anatolia) was detected with ray flowers similar to disc flowers.

11. *Cota coelopoda* (Boiss.) Boiss, Diagn. Pl. Orient. ser. 2 (3): 21 (1856).

≡ *Anthemis coelopoda* Boiss., Diagn. Pl. Orient. ser. 1 (11): 12 (1849). = *Cota bourgaei* Boiss. Fl. Orient. 3: 284 (1875). = *Anthemis cota* L. var. *brevicuspidata* Eig, Palestine J. Bot., Jerusalem ser. 1: 204 (1938). = *Anthemis cota* L. var. *longicuspidata* Eig, loc. cit. (1938). = *Cota coelopoda* (Boiss.) Boiss. var. *bourgaei* (Boiss.) Özbek & Vural, Türk. Bitkileri List. 146 (2012). = *Cota coelopoda* (Boiss.) Boiss. var. *longiloba* (Grierson) Özbek & Vural, Türk. Bitkileri List. 147 (2012).

Lectotype: [Turkey B1 İzmir] in planitiebus circa Smyrnam (İzmir), *Boissier* s.n. (G!); **paralectotype:** (C2 Aydın) circa Gheyra (Karacasu), *Boissier* s.n. (G! K!).

Specimens examined: **A4** Kastamonu: Ilgaz Dağı, Çatören village, clearings of forest, 1230 m, 06 June 2007, *M.U.Özbek* 2351 (GAZI!). **B1** Manisa: 6 km from Kula to Salihli, Alaşehir–Denizli crossroad, *Pinus* plantation area, 98 m, 02 May 2007, *M.U.Özbek* 2216 (GAZI!); 5 km from Sarıgöl to Buldan, roadside, 640 m, 03 June 2007, *M.U.Özbek* 2311 (GAZI!); İzmir: Kemalpaşa, entrance of Sarılar village, under *Olea europae*, 185 m, 28 May 2006, *M.U.Özbek* 1986 (GAZI!); Kemalpaşa, Ovacık köyü, around Forest Management of Bayındır, meadows, 785 m, 29 June 2006, *M.U.Özbek* 2111 (GAZI!); between Tire to İncirliova, 2 km from Kazımpaşa fountain, landside, 930 m, 28 May 2006, *M.U.Özbek* 1982 (GAZI!); Kemalpaşa, around Ovacık village, roadside, 750 m, 28 May 2006, *M.U.Özbek* 1985 (GAZI!); Bozdağ, around Ovacık village, roadside, 1170 m, 27 May 2006, *M.U.Özbek* 1976 (GAZI!); Gölcük, Gölcük to Ödemiş, former road, slopes, 820 m, 27 May 2006, *M.U.Özbek* 1977 (GAZI!); Salihli to İzmir road, parting of the way Ödemiş to Bozdağ, roadside, 120 m, 27 May 2006, *M.U.Özbek* 1971 (GAZI!). **B3** Isparta: Şarkikaraağaç, entrance of Kızıldağ Natural Park, 1300 m, 01 June 1996, *B.Mutlu* 1399 (HUB!). **B4** Ankara: Kazan, roadside, 09 June 2005, *M.U.Özbek* 1881 (GAZI!). Kırıkkale: Keskin, Böbrek Dağı, Köprüköy, cemetery, steppe, 550 m, 22 June 1991, *Ü.Güler* 1736 (GAZI!). **B5** Aksaray: between Taşpınar to Hasan Dağı, roadside, 1075 m, 28 June 2005, *M.U.Özbek* 1890 (GAZI!); Hasan Dağı, slopes of N.W, Türkmenlik, sparsely *Quercus* forest, ca. 1450 m, 15 June 1973, *A.Düzenli* 353 (ANK!); Niğde: 11 June 1952, *P.H.Davis* 18851 & *R.Çetik* (ANK!); Nevşehir: Ürgüp, ca. 1200–1300 m, *P.H.Davis* 19127 & *R.Çetik* (ANK!). **B7** Erzincan: Kemaliye, 13 km from Salihli to Bağıştaş, rocky and stony slopes, 1270 m, 04 July 2007, *M.U.Özbek* 2525 (GAZI!); İliç, Bağıştaş, edge of Karasu, 870 m, 17 May 1980, *Ş.Yıldırım* 2773 (HUB!); İliç, above Çöpler village, Munzur Mts., Çal Mt., 1300–2000 m, 30 May 1979, *Ş.Yıldırım* 1823 (HUB!); Sivas: Divriği, Dumluca Mt., 30 May 1968, *T.Baytop* (ISTE 12887!); Tunceli: Ovacık, Karagöl Valley, stony slopes, 1300 m, 07 July 1980, *Ş.Yıldırım* 3494 (HUB!); Tunceli–Pülümür 16 km, ca. 1000 m, 07 June 1957, *P.H.Davis* & *Hedge* 29218 (ANK!). **B9** Muş: Malazgirt, around of Karıncalı village, steppe, 1509 m, 29 May 2006, *L.Behçet* 655 et al. (VANF!). **C2** Denizli: Honaz Dağı, between Honaz to Menteş, fields, 16 May 1973 *E.Tuzlacı* (ISTE 24695!). **C3** Burdur: Dinar to Burdur 20. km, clearings of *Quercus* and *Pinus nigra* forest, 1115 m, 11 June 2008, *M.U.Özbek* 2747 (GAZI!); Tefenni to Burdur 18.km, steppe, 1115 m, 10 June 2008, *M.U.Özbek* 2737 (GAZI!); Isparta: Karabağlar, near Eğridir, 01 June 1955 *A.Baytop* & *T.Baytop* s.n. (HUB!); 2–3 km. S.W. of Gönen, steppe, ca. 500 m, *H.Peşmen* 3954 & *B.Yıldız* (HUB!); Karabağlar, near Eğridir, 01 June 1955, *Hub.–Mor.* (ISTE 4322!). Antalya: Korkuteli to Elmalı, entrance of Çukurelma village, roadside, 1130 m, 10 June 2008, *M.U.Özbek* 2731 (GAZI!). **C4** Konya: Divanlar village, fields, ca. 1150 m, 26 June 1983, *H.Dural* 1464 (KNYA!). **C5** Konya: Ereğli, Aydos Dağı, Delimahmutlu, karasirt, 1600 m, 26

June 1976, *S.Erik* 1527 (HUB!); Ereğli, Aydos Dağı, İvriz, rocky slopes, 1500 m, 15 May 1977, *S.Erik* 1828 (HUB!); İçel: Çamlıyayla (Namrun), around Namrun castle, roadside, 20 June 2007, *M.U.Özbek* 2397 (GAZI!); Gözne, Darisekisi village, 20 June 2007, *M.U.Özbek* 2391 (GAZI!); Niğde: 5 km from Ulukışla to Pozantı, *Cedrus* afforestation area, 1250 m, 28 June 2005, *M.U.Özbek* 1891 (GAZI!); near Ulukışla, 18 June 1971, *T.Gözler* (ISTE 20489!). **C6** Kahramanmaraş: Süleymanlı, between Ilıca to Beşer, 800 m, 14 June 1981, *B.Yıldız* 2703 (HUB!); Osmaniye: Düziçi (Haruniye), Mezdağı road, around Soğucak upland, roadside, 1150 m, 06 July 2008, *M.U.Özbek* 2756 (GAZI!); Düziçi (Haruniye), Hacılar district, landside, 21 June 2007, *M.U.Özbek* 2406 (GAZI!); Düziçi (Haruniye), Mezdağı road, around Soğucak highland, roadside, 1150 m, 06 July 2008, *M.U.Özbek* 2756 (GAZI!); Gaziantep: İslahiye, 500 m. NW of Koçağız village, 1080 m, 29 June 2006, *Ş.Çakır* 905 (VANF!). **C7** Şanlıurfa: Siverek to Hilvan 30 km, around Küllaplı village, steppe, 620 m, 11 June 1980, *A.Güner* 2283 & *M.Koyuncu* (HUB!).

Flowering time: May–July.

Habitat: Steppe, fields, roadside, 70–2000 m.

Distribution: Former Yugoslavia, Bulgaria, Greece, North Syrian, North Iran.

Note: According to Flora of Turkey and A Checklist of the Flora of Turkey this species has been evaluated as three variety [3,10]. In *Cota coelopoda* var. *coelopoda*, leaves 2(–3)-pinnatisect, secondary segments rather broad, 1–2 mm broad and involucre 0.5–1 cm broad. In *C. coelopoda* var. *longiloba* and *C. coelopoda* var. *bourgaei* leaves are (2–)3-pinnatisect, secondary segments narrow and 0.5–1 mm broad. *C. coelopoda* var. *longiloba* differs from *C. coelopoda* var. *bourgaei* by its involucre 1.5–2 cm broad (not 1–1.5 cm broad) and secondary segments of leaves slender, 6–8 mm (not 2–5 mm). Because of these small morphological differences, we think that this species cannot be considered as separate taxa.

12. *Cota austriaca* (Jacq.) Sch. Bip., Oesterr. Bot. Wochenbl. 4: 155 (1854).

≡ *Anthemis austriaca* Jacq., Fl. Austriac. 5: 22 (1778). = *Anthemis zangelana* Sosn. ex Grossh. loc. cit. (1949).

Type: Described from Austria.

Specimens examined: **A1** Tekirdağ: Şarköy, 5 km from Gölcük, open area of *Quercus* forest, 300 m, 05 June 2007, *M.U.Özbek* 2343 (GAZI!); between Tekirdağ to Hayrabolu 19 km, fields, *A.Baytop* & *N.Özhatay* (ISTE 19819!); around Çorlu, 20 May 1969, *G.Ertem* (ISTE 15174!); Edirne: Keşan to Malkara, 20 km from Malkara, roadside, 75 m, 22 July 2006, *M.U.Özbek* 2143 (GAZI!); Sarayıçi, 14 July 1981, *G.Çakırer* & *H.Çakırer* (ISTE 47022!); between Keşan to İpsala, 19 May 1970, *A.Baytop* & *F.Öktem* (ISTE 17955!); Kırklareli: between Çakıllı to Vize, 11 June 1968, *A.Baytop* (ISTE 13201!); Kırklareli, roadside, 08 June 1977, *E.Palaoglu* (ISTE 38059!); Çanakkale: Truva, roadside, 50 m, 04 June 2007, *M.U.Özbek* 2333 (GAZI!). **A2** Bursa: Bursa to Keles, 2 km from Soğukpınar, clearings of *Quercus*

forest, 840 m, 21 July 2006, *M.U.Özbek* 2139 (GAZI!). **A3** Ankara: Ayaş to Beypazarı, roadside, 560 m, 16 May 2005, *M.U.Özbek* 1823 (GAZI!); Beypazarı, Kumkaya, 28 April 1986, *N.Özsoy* 1008 (GAZI!); Bolu: Hamzabey road, 08 June 2000, *N.Sümer* 1168 (BOLU!); Yeniçağ, lakeside, 07 June 2001, *N.Sümer* 1702 (BOLU!). **A4** Ankara: Kızılcahamam, around Kargasekmez, steppe, 11 May 2007, *M.U.Özbek* 2280 (GAZI!); Ayaşbeli, Akkayatepe, 1250–1400 m, 27 June 1986, steppe, *M.Vural* 4194 (GAZI!); Çubuk II Dam, 18 May 1986, ca. 1100–1200 m, *F.Demircioğlu* 1091 (GAZI!); Ayaşbeli, Akkayatepe, 1200 m, 27 June 1986, fallow fields, *M.Vural* 4206 (GAZI!); Çubuk, Karagöl, steppe, 1530 m, 04 August 1974, *S.Erik* 678 (HUB!); Ayaş Mts., Ayaşbeli, *Astragalus microcephalus* and *Astragalus lycius* alliance, ca. 1150 m, 19 May 1975, *Y.Akman* 3072 (ANK!); Kırıkkale: Delice, between İmirli to Cingeyli village, fields, 900 m, 03 June 1990, *A.A.Dönmez* 2334 & *A.Güner* (HUB!); Delice, Samsun road, 700 m, 29 April 1989, *A.A.Dönmez* 1243 (HUB!). **A8** Rize: Rize, coastal road, 10 m, roadside, 25 May 1985, *A.Güner* 6428 (HUB!); Dinek Mt., between Balıışeyh–Kılevli, 900 m, 27 May 2001, *S.A.Demir* 1045 (BOZOK!). **B1** Balıkesir: 12 km from Akhisar to Balıkesir, meadows, 185 m, 27 May 2005, *M.U.Özbek* 1851 (GAZI!); İzmir: Kemalpaşa, around Ovacık village, roadside, 750 m, 29 June 2006, *M.U.Özbek* 2112 (GAZI!); Kemalpaşa, entrance of Sarılar village, under *Olea europae*, 185 m, 29 June 2006, *M.U.Özbek* 2114 (GAZI!); Kemalpaşa, from Yukarıkızılca to Mahmut Dağ, bushes, 250–300 m, 3 May 1991, *A.Aksoy* 13 (ERC!); Kemalpaşa, from Cumali to Mahmut Dağ, fire area, 650–700 m, 4 July 1991, *A.Aksoy* 564 (ERC!). **B2** Balıkesir: Bandırma, between Tatlısu to Şahinburgaz, *Cistus* alliance, 21 May 1976, *Y.Akman* 9232 (ANK!); Yeşilhisar village, Savaştepe, 05 July 1980, *G.Çakırer* & *H.Çakırer* (ISTE 45274!); Afyonkarahisar: Afyonkarahisar to Uşak road, meadows, 1030 m, 02 May 2007, *M.U.Özbek* 2210 (GAZI!); Uşak: Banaz, edge of railway, meadows, 925 m, 02 May 2007, *M.U.Özbek* 2212 (GAZI!); roadside, 660 m, 02 May 2007, *M.U.Özbek* 2213 (GAZI!); Kütahya: Tavşanlı to Domaniç, entrance of Tunçbilek, meadows, 805 m, 02 June 2007, *M.U.Özbek* 2301 (GAZI!); Simav to Selendi, 5 km from Çıkırıkcı, open area of *Cistus*, limestone soils, 1050 m, 03 June 2007, *M.U.Özbek* 2309 (GAZI!). **B3** Eskişehir: Ankara to Eskişehir, 15 km from Eskişehir, around organized industry, afforestation area, roadside, 900 m, 02 June 2007, *M.U.Özbek* 2298 (GAZI!); Kütahya road, 16 June 1968, *A.Pamukçuoğlu* s.n. (HUB!); Karakütük fire tower, ca. 1700 m, 30 June 1970, *T.Ekim* 54 (ANK!); Konya: Akşehir, Vahapgazi (Kesikbaş), 1040 m, 27 May 1974, *G.Dökmeci* & *Y.Doğantan* (ISTE 28607!); Sultandağları, above Engili village, around Harlak, 1350 m, 07 July 1975, *G.Dökmeci* (ISTE 32707!); Doğanhisar, around Kartaltepe, ca. 1650 m, 10 June 1979, *H.Ocakverdi* 464 (KNYA!). **B4** Ankara: Ankara to Şereflikoçhisar, 20 km from Şereflikoçhisar, edge of Tuz Lake, 910 m, 31 May 2007, *M.U.Özbek* 2295 (GAZI!); Beytepe, Maslak valley, steppe, 950 m, 26 May 1975, *S.Erik* 1165 (HUB!);

Kırıkkale: Keskin, Böbrek Dağı, Çilkili village, around S. of Kızılözü, 600 m, 21 June 1992, *Ü.Güler* 1711 (GAZI!); Dinek Dağı, between Balışeyh to Kılevli, roadsides, 900 m, 27 May 2001, *S.A.Demir* 1045 (ERC!); Konya: Akşehir to Konya, 30 km from, around Bahçecik village, steppe, 19 June 2007, *M.U.Özbek* 2378 (GAZI!). **B5** Kayseri: Yahyalı, around Eskidut, ca. 2500 m, 05 July 1982, *N.Demirkuş* 1978 (HUB!). **B7** Erzincan: İliç, around Yakuplu village, 1200 m, 31 May 1979, *Ş.Yıldırım* 1869 (HUB!). **C1** Aydın: Eski Çine road, Çine valley, around Kayırlı dere, rocky slopes, 200 m, 23 April 2006, *M.U.Özbek* 1932 (GAZI!). **C2** Muğla: 38 km from Muğla to Kale, Çakmak village, roadside, 835 m, 30 May 2006, *M.U.Özbek* 1997 (GAZI!). **C3** Burdur: 10 km from Karamanlı to Burdur, steppe, 1100 m, 04 May 2007, *M.U.Özbek* 2239 (GAZI!); Karamanlı to Burdur 10. km, steppe, 1100 m, 04 May 2007, *M.U.Özbek* 2283 (GAZI!); Karamanlı to Tefenni, roadside, 1130 m, 29 June 2005, *M.U.Özbek* 1897 (GAZI!); Isparta: 20 km from Akşehir to Gelendost, steppe, 1535 m, 06 July 2005, *M.U.Özbek* 1901 (GAZI!); Antalya: Akçay to Elmalı 6. km, roadside, 1060 m, 31 May 2006, *M.U.Özbek* 1999 (GAZI!). **C4** Konya: Seydişehir, around mine, under *Juniperus excelsa*, ca. 1550 m, 16 June 1981, *H.Ocakverdi* 1981 (ANK!); Obruk to Kızıltepe, 1250 m, 15 June 1982, *H.Dural* 978 (KNYA!); Sarayköy to Takkalı Hill, E. of slopes, ca. 1400 m, 30 May 1979, *H.Dural* 92 (KNYA!); S. of Kadınhanı, *Hordeum vulgare* fields, ca. 1100 m, 27 May 1982, *R.Çetik* 1979 et al. (KNYA!); Karaman: Pınarbaşı to Kızılyaka, 3 km N.E of Pınarbaşı, clearings of *Quercus* forest, 1205 m, 28 June 2005, *M.U.Özbek* 1894 (GAZI!). **C5** Niğde: between Çiftehan to Alihoca village, rocky slopes, 1300 m, 22 June 2007, *M.U.Özbek* 2445 (GAZI!); Kamlı, Asar upland, landside, 1290 m, 22 June 2007, *M.U.Özbek* 2446 (GAZI!); Melendiz Dağları, Okçu village, N.W of slopes, ca. 1700 m, 04 July 1986, *B.Eyce* 639 (KNYA!); Adana: Pozantı to Ulukışla, 35 km. from Ulukışla, roadside, 1060 m, 04 June 2006, *M.U.Özbek* 2019 (GAZI!). **C7** Şanlıurfa: 20 km from Şanlıurfa to Akçakale, fields, 380 m, 08 May 2007, *M.U.Özbek* 2277 (GAZI!); Ceylanpınar, 5 km from Beyazkule to Viranşehir, 04 May 1995, 550 m, roadside, *N.Adıgüzel* 1996 (GAZI!). **C8** Mardin: Kızıltepe, fields, ca. 600 m, 26 May 1967, *P.H.Davis* 28656 & *Hedge* (ANK!).

Flowering time: April–June.

Habitat: Steppe, fields, roadsides, clearings of forest, meadows, s.l.–2500 m.

Distribution: Central and East Europe, Balkans, Crimea, Russia, Iran.

Note: *Cota austriaca* and *C. coelopoda* are closely related species, but it differs usually a more slender plant with leaves that are only 2-pinnatisect (not becoming 3-pinnatisect as in *C. coelopoda*), and on peduncles that become only slightly swollen at maturity (not peducles thickened). Moreover, *C. austriaca* acuminate apex of the paleae is always shorter than *C. coelopoda*.

13. *Cota dipsacea* (Bornm.) Oberpr. & Greuter, Willdenowia 33 (1): 40 (2003).

Type: [Turkey C1 İzmir] in montis Mesogis (Aydın Da.) pontibus superioribus, *Bornmueller* 1906: 9643 (photo B!).

≡ *Anthemis dipsacea* Bornm, Mitth. Thüring. Bot. Vereins n.s. 23: 23 (1908). Ic: Bornm., op. cit. 24: 71, f 5 (1909).

Specimens examined: B1 İzmir: Bozdağ, Gündalan upland, steppe, 1300–1500 m, 03 June 2007, *M.U.Özbek* 2317 (GAZI!); ibid., serpentine, 1515 m, 29 June 2006, *M.U.Özbek* 2115 (GAZI!); Armutlu to Bayramlı, *Pinus brutia* forest, 410 m, 04 June 2007, *M.U.Özbek* 2323 (GAZI!); Bozdağ – Ödemiş, supra Allahdiyen village, rocky slopes, 1000 m, 27 May 2006, *M.U.Özbek* 1972 (GAZI!); Bozdağ – Ödemiş, 10 km from Bozdağ, calcareous places, 1000 m, 27 May 2006, *M.U.Özbek* 1974 (GAZI!); Tire to İncirliova 20 km, hillsides, 1020 m, 27 May 2006, *M.U.Özbek* 1980 (GAZI!).

Flowering time: April–June.

Habitat: Mountain steppe, among dwarf scrub, serpentine, clearings of *Pinus brutia* forest, 410–1515 m.

Distribution: Endemic, Mediterranean element.

Note: This endemic species differs from the other annual *Cota* species by its paleae distinctly longer than disc flowers.

14. *Cota palaestina* Reut. ex Unger & Kotschy, Ins. Cypern: 240 (1865).

≡ *Anthemis palestina* (Reut ex Kotschy) Reut ex Boiss., Fl. Orient. 3: 283 (1875). = *Anthemis melanolepis* Boiss., Fl. Orient. Suppl. 297 (1888).

Lectotype: Lebanon prope Berthrum (Beirut), *Gaiillardot* 2416 (in Grierson in Notes R.B.G. Edinb. 33: 216 (1974)).

Specimens examined:

C4 İçel: Anamur, 14 June 1976, *Y. Akman & Quezel* 6183 (ANK!). C6 Antakya: St Peter (Pierre) Church, dried–up stream bed, 180 m, 02 June 2006, *M.U.Özbek* 2009 (GAZI!); ibid., 115 m, 07 May 2007, *M.U.Özbek* 2276 (GAZI!); ibid., 115 m, 09 April 2008, *M.U.Özbek* 2703 (GAZI!); ibid., 08 June 2008, *M.U.Özbek* 2715 (GAZI!); Antakya, St. Peter's Church, 150–300 m., edge of fields, 27 April 1957, *P.H.Davis & Hedge* 27239 (ANK!); Gaziantep: İslahiye, 3 km W. of Koççağız village, 680 m, 5 May 2007, *Ş. Çakır* 1216 (VANF!).

Flowering time: April–May.

Habitat: Hillsides, macchie, fields, dried–up stream bed, s.l.–900 m.

Distribution: Syrian, Lebanon, Palaestina, Cyprus. East Mediterranean element.

Note: Because of truncate paleae this species differs from the other annual *Cota* species.

15. *Cota wiedemanniana* (Fisch. & C.A.Mey.) Holub, Folia Geobot. Phytotax. 9 (3): 270 (1974).

≡ *Anthemis wiedemanniana* Fisch. & C.A.Mey., Index Seminum.[St. Petersburg (Petropolitanus)] 2: 27 (1836).

= *Anthemis ormenioides* Boiss., Diagn. Pl. Orient. ser. 1(4): 5 (1844). = *Cota ormenioides* Boiss., Diagn. Pl. Orient. ser. 2 (3): 21 (1856).

Type: [Turkey] in Natolia, Wiedemann (LE?).

Specimens examined: **A3** Ankara: Beypazarı, Sarıyer Dam, meadows, 470 m, 16 May 2005, *M.U.Özbek* 1824 (GAZI!). **A4** Ankara: Kızılcahamam, around Kargasekmez, steppe, 11 May 2007, *M.U.Özbek* 2281 (GAZI!); Kızılcahamam Soğuksu Natural Park, around Vel hill, 1350–1400 m, 30 May 1990, clearings of forest, *M.U.Özbek* 1478 (GAZI!); between Kazan to Örencik village, 830–900 m, dried-up river bed, 16 June 1989, *A.Güner* 7163 (HUB!); Ayaş Mts., Çamıllı village, steppe, 26 May 1975, *Y.Akman* 6563 (ANK!); Mürtet plain, 15 May 1960, *R.Çetik & P.H.Davis* 20293 (ANK!); Etlik, 14 May 1928, *Müller* 69 (ANK!); Cebeci, 20 June 1932, *W.Kotte* 573 (ANK!). Kırıkkale: Keskin, Sarkın village, Kırklaryediler Dağı, 1400 m, steppe, 19 June 1993, *A.A.Dönmez* 3272 (HUB!); 5 km S. of Sulakyurt, steppe, 1000 m, 25 May 1990, *A.A.Dönmez* 2026 (HUB!) Dinek Dağı, between Balışeyh–Kılevli, roadsides, 900 m, 27 May 2001, *S.A.Demir* 1046 (BOZOK!). **A5** Çorum: Osmancık, around Tepeköy, ca. 800 m, 15 June 1975, *M.Kılınç* 3000 (ANK!). **B1** İzmir: Bozdağ, around Ovacık village, roadside, 1170 m, 27 May 2006, *M.U.Özbek* 1975 (GAZI!); Gölcük to Ödemiş, former road, slopes, 820 m, 27 May 2006, *M.U.Özbek* 1978 (GAZI!); Kemalpaşa, Ovacık village, around Management of Bayındır Forest, meadows, 785 m, 28 May 2006, *M.U.Özbek* 1984 (GAZI!); Manisa: Manisa Dağı, 750 m, 27 May 1980, *A.Baytop* (ISTE 44523!). **B2** Manisa: Alaşehir, after 5 km from Kozluca village, clearings of forest, 1080 m, 03 June 2007, *M.U.Özbek* 2313 (GAZI!); Kütahya: Simav to Selendi, 5 km from Çıkrıkçı, clearings of *Cistus*, limestone soils, 1050 m, 03 June 2007, *M.U.Özbek* 2308 (GAZI!). **B3** Eskişehir: Türkmen Mt., Türkmenbaba tomb, ca. 1800 m, 24 July 1976, *T.Ekim* 2199 (ANK!); Isparta: Şarkikaraağaç, Kızıldağ Natural Park, between forest house to entrance of park, mixed *Cedrus libani* and *Quercus coccifera* forest, 1100–1250 m, 27 May 1994, *B.Mutlu* 526 (HUB!); Afyonkarahisar: Kumalar Mt., between Taşoluk to Şuhut, Sarıyer top, rocky slopes, 1400–1500 m, 24 June 2000, *E.Akçiçek* 2751 (GAZI!); Emirdağ, around Kemerkaya to Özburun, steppe, 1340 m, 30 July 1993, *Z.Aytaç* 6347 et al. (GAZI!); Konya: Akşehir, Sultan Dağları, around Cankurtaran, 1500 m, meadows, 19 June 2007, *M.U.Özbek* 2369 (GAZI!). **B4** Konya: Akşehir to Konya, 30 km from Konya, around Bahçecik village, steppe, 1200 m, 19 June 2007, *M.U.Özbek* 2376 (GAZI!); Ankara: Polatlı, around Acıkır, 840–850 m, 06 July 1990, steppe, *Z.Aytaç* 3083 & *H.Duman* (GAZI!); Bala, Beynam, 19 May 1969, *Ö.İnceoğlu* (HUB!); Beytepe, steppe, 04 July 1976, *S.Erik* 1469 (HUB!); Polatlı, around Yenikent, 20 km from Ankara, ca. 900 m, 08 June 1984, *Y.Akman* 12936 (ANK!); Kırıkkale: Keskin, Böbrek Mt., N.E. of Müsellim village, steppe, 1400 m, 02 June 1991, *Ü.Güler* 1143 (GAZI!); Dinek Dağı, between Balışeyh to Kılevli

village, 900 m, 27 May 2001, *S.A.Demir* 1046 (ERC!). **B5** Kayseri: Develi, 10 June 1971, *A.Baytop* (ISTE 20295!); Aksaray: N. of Hasandağ, clearings of *Quercus* forest, ca. 1400 m, 13 June 1973, *A.Düzenli* 352 (ANK!). **B6** Kahramanmaraş: Göksun, Ericcek village, Yonca river, 1500 m, wet meadows, 19 June 1981, *B.Yıldız* 2994 (HUB!); Malatya: Gölbaşı, 04 June 1968, *A.Pamukçuoğlu* s.n. (HUB!). **B7** Erzincan: İliç, edge of Karasu, fields, 900 m, 28 April 1980, *Ş.Yıldırım* 2715 (HUB!); Kemah, Maksutuşağı village, edge of Karasu, 1100–1300 m, 29 May 1979, *Ş.Yıldırım* 1727 (HUB!); Tunceli: Pülümür, Kuzdere hill, 1500–1700 m, 14 June 1980, *Ş.Yıldırım* 3088 (HUB!). **B9** Bitlis: Tatvan, Sorgun, above Van Lake, *Quercus infectoria* shrubs, 1650–1750 m, 09 July 1972, *H.Peşmen* 2964 (HUB!); Van: Zeve Campus of Yüzüncü Yıl University, ruderal steppe, 1670 m, 7 May 2014, *A.Öztürk* s.n. (VANF!); Ağrı: Patnos, Top Dağı, field edge, 1600 m, 23 June 2007, *H.Emcik* 1068 (VANF!). **C3** Burdur: Tefenni to Burdur 18. km, steppe, fields, 1115 m, 10 June 2008, *M.U.Özbek* 2737 (GAZI!). **C4** Konya: Şereflikoçhisar, around Tuz Lake, roadside, steppe, 18 June 1986, *S.Erik* 3838 & *İ.Verter* (HUB!); Konya to Sarayönü 13 km, edge of fallow fields, 30 May 1956, *H.Birand* s.n. (ANK!); 14 km from Konya–Beyşehir, around stony mine, ca. 1400 m, 08 June 1979, *H.Dural* 99 (KNYA!); Obruk to Kızıltepe, 1200 m, 15 June 1983, *H.Dural* 979 (KNYA!); Karaman, above Kızılyaka district, *Quercus ithaburensis* alliance, ca. 1375 m, 20 June 1984, *M.Serin* 1910 (KNYA!); Ulumuksine village, *Pinus nigra* plantation area, ca. 1500 m, 08 June 1989, *A.Tatlı* 890 et al. (KNYA!); W. of Sille to Büyükgevele hill, roadside, ca. 1350 m, 16 June 1979, *H.Dural* 97 (KNYA!). **C5** Konya: Ereğli, Aydos Dağı, around Dedeman mine, *Juniperus* forest, 1600 m, 01 June 1978, *S.Erik* 2952 (HUB!); Ereğli, Aydos Dağı, Burna, *Pinus nigra* forest, 1600 m, 18 May 1977, *S.Erik* 1989 (HUB!). **C6** Kahramanmaraş: Göksun, 1 km S. of Mürsel village, steppe, 1450 m, 20 June 2006, *Z.Aytaç* 8987 et al. (DUOF!). **C8** Mardin: 19 km from Mardin, *Quercus brantii* forest, rocky slopes, ca. 930 m, 23 May 1956, *H.Birand* 86 (ANK!); Mardin to Diyarbakır 24 km, ca. 1000 m, 27 May 1957, *P.H.Davis* 20838 & *Hedge* (ANK!).

Flowering time: May–June.

Habitat: Limestone slopes, steppe, meadows, roadside, clearings of forest, 400–1800 m.

Distribution: Russia, Iran.

Note: This species can be easily distinguished from the other species within the genus. Leaves is 1–2-pinnatisect and stems are usually much branched and radiating from base.

16. *Cota halophila* (Boiss. & Balansa) Oberp. & Greuter, Willdenowia 33 (1): 40 (2003).

≡ *Anthemis halophila* Boiss. & Balansa., Fl. Orient. 3: 285 (1875). = *Anthemis alexandrettae* Eig, Palestine. J. Bot. Jerusalem Ser. 1: 211 (1938).

Type: [Turkey C5 İçel] in arenis maritimis Ciliciae ad Mersina, *Balansa* 1095 (iso. E!).

Specimens examined: C6 Antakya: İskenderun, Arsuz, Kale village, sands and sandy soil near seashore, 0–5 m, 07 May 2007, *M.U.Özbek* 2271 (GAZI!); ibid., 0–5 m, 09 April 2008, *M.U.Özbek* 2700 (GAZI!).

Flowering time: April.

Habitat: Sands and sandy soil near seashore, s.l.–5 m.

Distribution: Endemic. East Mediterranean element.

Note: Because of decumbent or prostrate and with fleshy leaves this endemic species differs from the other *Cota* species.

17. *Cota pestalozzae* Boiss., Diagn. Pl. Orient. ser. 2 (3): 21 (1856).

≡ *Anthemis pestalozzae* Boiss., Diagn. ser. 1(11): 12 (1849).

Type: [Turkey C2/3 Antalya] prope Elmalu, 1846, *Pestalozza* (photo G!).

Specimens examined: C3 Antalya: Manavgat to Akseki, 8 km from Akseki, calcareous slopes, 920 m, 20 May 2007, *M.U.Özbek* 2288 (GAZI!); Akçay, Gömbe, around Çukurbağ village, rocky slopes, 1470 m, 31 May 2006, *M.U.Özbek* 1998 (GAZI!); Manavgat to Akseki, 8 km from Akseki, calcareous slopes, 950 m, 31 May 2007, *M.U.Özbek* 2000 (GAZI!); Akseki, Otluk Dağı, Otlukbeli hill, among shrubs, 07 May 1995, 1300–1400 m, *A.Duran* 2227 (GAZI!); Akseki, Çimi village, meadows, 1500 m, May 1984, *A.Güner* 5611 & *M.Koyuncu* (GAZI!); Akseki, Geyran upland, N. of Kocaoluk, stony slopes, 1400 m, 02 June 1996, *A.Duran* 3835 (GAZI!). C4 Konya: Akseki to Seydişehir, 30 km from Seydişehir, Alacabel pass, rocky slopes, 1825 m, 20 May 2007, *M.U.Özbek* 2290 (GAZI!); ibid, 31 May 2007, *M.U.Özbek* 2002 (GAZI!); ibid., *A.cilicica* forest, 1650–1750 m, 19 June 1997, *Z.Aytaç* 7565 (GAZI!); Konya to Karaman, Kızılyaka district, Ortagüney hill, *Juniperus excelsa* forest, ca. 1600 m, 25 May 1984, *M.Serin* 1911 (KNYA!); Karaman: Ermenek, between Ermenek to Anamur, limestone cliffs, 1370 m, 12 May 2010, *E.Ergin* 2257 et al. (DUOF!); İçel: Anamur, around Güngören village, *Pinus brutia* forest, 1200 m, 20 May 1995, *A.A.Dönmez* 4517 (HUB!).

Flowering time: May–June.

Habitat: Limestone screes, 800–1850 m.

Distribution: Endemic, Mediterranean element.

Note: This species can be easily distinguished from the other species within the genus. Ray and disc flowers are violet-pink.

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