

The genus *Anthemis* L. (Compositae) in Iraq: A Synopsis

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Abstract

A synopsis of the 34 species (7 endemic) of *Anthemis* known from Iraq is given, together with a key for their identification. *Anthemis leucanthemifolia*, *A. marismartui* and *A. rascheyana* are the new records for this country. *A. desertisyriaci* and *A. kurdica* have been reduced to the synonymy of *A. wettsteiniana* and *A. marismartui* respectively.

Introduction

The present account of the genus *Anthemis* L. of Iraq began in 1981, when the authors, at the insistence of Mr P. S. GREEN (former keeper of K), and Mr. C. C. TOWNSEND, the then editor of the Flora of Iraq, agreed to work on this little known and confused genus (EIG 1938). Prior to the arrival of the authors at Kew in June 1981 for a period of 6–8 weeks, Mr TOWNSEND had sent a list of the species enumerated from Iraq by AL-RAWI (1964). It contained names of 24 species (incl. *A. nobilis* = *Chamaemelum nobile*) with indication as to the location of their types. Our study, however, revealed the presence of 34 species in Iraq (including 7 endemics and 3 new records). As the publication of the Compositae volume of Flora of Iraq got delayed due to certain reasons, a few species which we had recorded new to Iraq were subsequently published by IRANSHAHR (1986) and who had earlier described 13 new species from Flora Iranica area in 1981 and 1982 including two from Iraq.

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Materials and Methods

The present investigation is based exclusively on herbarium material which has been borrowed from or studied in the following institutions (acronyms according to HOLMGREN et al. 1990): BM, E, F, G, HUI, JE, K, LINN, MPU, SAV and W. The authors wish to express their gratitude to the directors, keepers and curators of these herbaria for making their valuable collections available.

More than 300 specimens were examined for this study which was initially meant to be published in Compositae volume of "Flora of Iraq". The specimens are cited in accordance with the physiographic regions and districts of Iraq delimited by GUEST (1966) in the first volume of "Flora of Iraq".

All the measurements were made directly from herbarium specimens using stereoscope at magnifications varying between $\times 8$ and $\times 20$. Morphological terms used in taxonomic accounts are according to STEARN (1992).

Taxonomic Account

Anthemis L., Sp. Pl.: 893 (1753); Gen. Pl. ed. 5: 381 (1754); BOISS., Fl. Or. 3: 278 (1875); FEDOROV in SCHISCHKIN & BOBROV, Fl. SSSR 26: 8 (1961); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 174 (1975); FERNANDES in TUTIN et al., Fl. Europ. 4: 145 (1976); FEINBRUN-DOTHAN, Fl. Pal. 3: 327 (1976); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 5 (1986); BREMER & HUMPHRIES in Bull. Nat. Hist. Mus. Lond. (Bot.) 23 (2): 132 (1993). Type: *A. maritima* L.

Annual or perennial, hairy herbs with alternate, pinnatisect to variously incised to pinnatifid or rarely entire leaves. Capitula radiate or discoid, pedunculate, solitary or laxly corymbose. Phyllaries (2–) 3 (–4)-seriate, with narrow to broad scarious, entire or lacerate margins. Receptacle convex to conical or hemispherical, paleate all over or in the lower half, rarely naked. Paleae subulate, linear-lanceolate or oblanceolate to spathulate, truncate to acute or acuminate-spinescent with excurrent midrib. Ray florets uniseriate, female, fertile or neuter; limb white or rarely yellow or reddish, basally glabrous or hairy, rarely indurated. Disc florets numerous, 5-lobed, yellow or occasionally reddish-purple, lower half of tube not or much inflated in fruit, rarely hairy, lobes rarely with acute appendages. Anther bases without appendages. Style branches flattened, truncate and penicillate at the apices. Cypselas terete to oblong-obpyramidate, 4–5-angled or dorsiventrally compressed, smooth, tuberculate or sometimes pitted, sulcate and striate-costate, apically beak-less, bald or with a minute dentate-lacerate rim or corona or an adaxial auricle.

A genus of ca. 211 species (BREMER & HUMPHRIES 1993, BREMER 1994), occurring in Europe, SW Asia, N & NE Africa; introduced in other parts of the world.

Key to the Iraqi species of *Anthemis*

1. Rays yellow, sometimes absent 2
- Rays white or cream-coloured 5
2. Annual. Phyllaries glossy, glabrous, pale brown, outer ovate, inner obovate, with a large, $\pm$ orbicular, c. 5×5 mm, translucent appendage 2. *A. scariosa*
- Perennial. Phyllaries neither glossy nor glabrous, sparsely or densely whitish-lanate, without appendages 3
3. Peduncles less than 5 cm long, Cypselas with an entire corona. Outer phyllaries acute, inner ones obtuse to $\pm$ acute and pale or dark-brown to diffuse brown at the apices 23. *A. tinctoria*
- Peduncles more than 5 cm long. Cypselas with an unilateral auricle. Phyllaries narrow, acute at the apices 4
4. Leaves pinnatipartite, lower more or less spathulate, upper ones cuneate, entire or shallowly toothed or lobed at apex 31. *A. pauciloba*
- Leaves bipinnatisect, ovate or oblong, upper leaves pinnatisect 32. *A. kotschyana*
5. Receptacle paleaceous all over 6
- Receptacle paleaceous in the upper half only 33
6. Corolla tube of disc florets hairy 7
- Corolla tube of disc florets glabrous 10
7. Corolla lobes of disc florets ending in a long mucro or apiculum 5. *A. marismartui*
- Corolla lobes of disc florets acute, not ending in a long mucro or apiculum 8
8. Paleae with broad, dark brown margins. Cypselas c. 1 mm long 6. *A. melanacme*
- Paleae without dark-brown margins 9
9. Phyllaries linear-lanceolate, c. 1 mm wide. Paleae narrowly oblong- spathulate, c. 2.5 mm long, deciduous. Rays 9–10 7. *A. microlepis*
- Phyllaries oblong-ovate, 2–3 mm wide. Paleae oblong-lanceolate, c. 3 mm long, persistent. Rays 15–20 20. *A. schizostephana*
10. Inner phyllaries with broad membranous hyaline margins and brown shiny,

- obtuse apical appendages nearly as long as or longer than the lower part 3. *A. hyalina*
- All phyllaries with narrow membranous margins and without apical appendages 11
11. Capitula less than 1 cm across 8. *A. micrantha*
- Capitula usually more than 1 cm across 12
12. Cypselas, all or at least few, auricled at the apices 17
- Cypselas truncate, bald or slightly marginate at the apices 13
13. Paleae purplish-brown at maturity, either all cuspidate to long acuminate or inner short-cuneate and outer long cuspidate 24. *A. melanolepis*
- Paleae not as above 14
14. Cypselas cylindrical or oblong-cylindrical, smooth. Phyllaries glabrous or nearly so 15
- Cypselas obpyramidate, $\pm$ curved, tuberculate. Phyllaries hairy 16
15. Capitula 2.5–4.5 cm across. Paleae almost flat, oblong-spathulate, shortly mucronate at the $\pm$ erose, obtuse-truncate apex 9. *A. leptophylla*
- Capitula less than 2 cm across. Paleae carinate, oblong-lanceolate, mucronate-acuminate at the obtusely denticulate apex 22. *A. rascheyana*
16. Leaves sessile. Peduncles 5–6 cm long. Phyllaries oblong-spathulate, broadly scarious at the apex and margins, all obtuse 19. *A. handel-mazzettii*
- Leaves petiolate. Peduncles 1.5–3 cm long. Phyllaries lanceolate, narrowly scarious on margins and at the apex, acute 10. *A. deserti*
17. Cypselas cylindrical or nearly so 18
- Cypselas obconical or obpyramidate 23
18. Phyllaries with pale-brown scarious margins. Tube of ray florets indurated, persistent on the cypselas. Inner cypselas crowned by unilateral, erose-dentate auricle, as long as or about half as long as cypselas 4. *A. haussknechtii*
- Phyllaries with hyaline, colourless scarious margins. Tube of ray florets neither indurated nor persistent on the cypselas. Auricle less than half as long as cypselas 19
19. Paleae flat 21. *A. homalolepis*
- Paleae carinate 20

20. Paleae $\pm$ oblong-spathulate, $\pm$ truncate and abruptly acuminate, acumen nearly as long as basal part or slightly shorter 25. *A. coelopoda*
- Paleae not as above, acumen very short 21
21. Paleae oblong-obovate. Peduncle ultimately thickened upward 11. *A. gillettii*
- Paleae oblong or oblong-lanceolate. Peduncle not or slightly thickened 22
22. Leaves sessile. Phyllaries pubescent 12. *A. hamrinensis*
- Leaves with pectinate petiole. Phyllaries almost glabrous . 22. *A. rascheyana*
23. Fruiting peduncles thickened upwardly 24
- Fruiting peduncles not or hardly thickened upwardly 29
24. Paleae spathulate or oblong-spathulate 25
- Paleae oblong-lanceolate to oblanceolate 26
25. Receptacle $\pm$ convex-conical. Paleae 2.5–3 mm long, shortly mucronate. Cypselas obconical-turbinate, outer nearly smooth, exauriculate, inner ones tubercled with auricle $1/4$ – $1/2$ of cypsela length 13. *A. wettsteiniana*
- Receptacle hemispherical. Paleae c. 3.5–4 mm long, abruptly contracted apically and bearing equally long slender acumen. All cypselas 4-angled, smooth, rhombic in cross section, auricle minute, entire 26. *A. altissima*
26. Leaves oblong-spathulate to cuneate-obovate, basally pectinate-dentate, entire or crenate-dentate. Phyllaries ciliate, outer linear-lanceolate, inner oblong, c. 8–10 mm long 1. *A. leucanthemifolia*
- Leaves oblong-lanceolate or obovate-oblong, basally not pectinate-dentate. Outer phyllaries triangular, acute, inner obtuse, less than 8 mm long 27
27. Paleae obovate-spathulate, inconspicuously mucronate 14. *A. susiana*
- Paleae lanceolate to oblanceolate, $\pm$ stiffly acuminate 28
28. Disc corollas not or very slightly inflated in fruit, deciduous. Cypselas smooth. Paleae flat, stiffly acuminate 15. *A. arvensis*
- Disc corollas inflated and indurated in fruit. Cypselas tuberculate. Paleae keeled, not stiffly acuminate 17. *A. melampodina*
29. Receptacle hemispherical 30
- Receptacle conical 31

30. Peduncles up to 3 cm long. Paleae oblong- spathulate to subcordate-emarginate, with 1–1.5 mm long mucro. Cypselas with denticulate auricle ..27. *A. brevicuspis*
- Peduncles more than 3 cm long. Paleae oblong, irregularly fimbriate at the apex with a short mucro. Cypselas truncate with a very short unilateral rim at the apex 16. *A. plebeia*
31. Cypselas smooth, with a thickened undulating rim at the apex (sometimes with a lacerate hyaline auricle) 15. *A. arvensis*
- Cypselas tuberculate all over or on dorsal side alone, auriculate 32
32. Leaf lobules approximate. Peduncles gradually slightly thickened in fruit. Cypselas tuberculate all over. Auricle lobes not acute 17. *A. melampodina*
- Leaf lobules remote. Peduncles hardly thickened in fruit. Cypselas tuberculate on dorsal side only. Auricle deeply divided into triangular, acute lobes 18. *A. zoharyana*
33. Cypselas smaller than the persistent paleae 34
- Cypselas as long as or longer than the deciduous paleae 35
34. Phyllaries glabrous. Disc florets with glandular-punctate, $\pm$ compressed corolla tube 30. *A. corymbulosa*
- Phyllaries hairy. Disc florets with $\pm$ inflated, eglandular corolla tube 37
35. Fruiting peduncles distinctly thickened and strongly arcuate. Ray florets fertile. Paleae cuspidate at tips. Cypselas $\pm$ tetragonous, distinctly 10-ribbed, occasionally tubercled 36
- Fruiting peduncles neither thickened nor arcuate. Ray florets sterile. Paleae bristly at tips. Cypselas $\pm$ cylindrical-turbinate, obscurely 8–10-ribbed, tuberculate 29. *A. cotula*
36. Peduncles 2–4 cm long. Phyllaries persistent. Paleae narrowly linear-lanceolate 33. *A. tubicina*
- Peduncles more than 5 cm long. Phyllaries deciduous. Paleae setaceous-subulate 34. *A. odontostephana*
37. Cypselas auriculate 38
- Cypselas exauriculate 39
38. Auricle $1/3$ – $1/2$ as long as cypselas, entire to obscurely lobed or divided into a few triangular lobes 40

- Auricle very short, divided into a few obtuse lobes
.....28.b. *A. pseudocotula* ssp. *pseudocotula* var. *radiata*
- 39. Apex of cypselas oblique, slanting outwards
.....28.d. *A. pseudocotula* ssp. *rotata* var. *rotata*
- Apex of cypselas rounded, not slanting outwards
.....28.e. *A. pseudocotula* ssp. *rotata* var. *rotundata*
- 40. Auricle entire or obscurely lobed
.....28.a. *A. pseudocotula* ssp. *pseudocotula* var. *pseudocotula*
- Auricle divided into a few triangular lobes
.....28.c. *A. pseudocotula* ssp. *pseudocotula* var. *massadensis*

Sect. *Anthemis*

Annual or perennial herbs. Paleae oblong to oblanceolate, persistent. Cypselas obconical or obpyramidal, slightly compressed dorsiventrally, usually twice or three times as long as broad.

Represented in Iraq by 19 species.

1. *A. leucanthemifolia* BOISS. et BL. in BOISS., Diagn. Pl. Or. Nov. Ser. 2, 3: 20 (1856); BOISS., Fl. Or. 3: 296 (1875); EIG in Palest. J. Bot. Jer. ser. 1: 163 (1938); TÄCKHOLM, Stud. Fl. Egypt, ed. 2. 574 (1974); FEINBRUN-DOTHAN, Fl. Pal. 3: 328. Pls. 547, 548 (1978); MOUTERDE, Nouv. Fl. Lib. Syr. 3: 408. Pl. CCXXIII, n. 1 (1983). Type: Hab. in arenosis maritimis Palestinae ad Joppem, KOTSCHY 651 as *A. indurata* (G. holo.).

Herb, sparsely crisped hairy, up to 40 cm tall, with erect or ascending branches from the base. Leaves simple, slightly fleshy or not, oblong-spathulate to cuneate-obovate, pectinate dentate at the base, entire or crenate-dentate or lobed at the apices, or uni- to bipinnatisect, if pinnately dissected then lobes and ultimate segments narrow, cuneate. Peduncles short, distinctly thickened upwards in fruit. Capitula radiate, 2–3 cm across. Involucre 1–1.5 cm wide. Phyllaries ciliate, pale green, all with white membranous apices, outer linear-lanceolate, inner oblong, c. 8–10 mm long. Receptacle conical, chaffy all over. Paleae oblong-lanceolate, 3–4 mm long, keeled, acuminate, persistent. Ray florets fertile, tubes compressed, glabrous; limbs oblong-elliptic, 1.2–1.4 × 4–6 mm, white. Disc florets yellow, c. 3–4 mm long, corollas glabrous. Cypselas obpyramidal, 1.5–2 mm long, neither tuberculate nor compressed, almost ribless, outer acutely triangular, inner ± terete, beset with 3–4-lobed unilateral auricle.

Flowering period: March–April.

Distribution: Egypt (ssp. *rafaensis* EIG), Iraq, Jordan, Lebanon, Palestine, Syria.

a) ssp. *leucanthemifolia*

The type subspecies has somewhat fleshy, obtuse, entire or apically crenate-dentate to incised leaves. It does not occur in Iraq, where *A. leucanthemifolia* is represented by the next subspecies.

b) ssp. *philistea* (BOISS.) EIG, Palest. J. Bot. Jer. ser. 1: 164 (1938).

Syn.: *A. philistea* BOISS., Fl. Or. 3: 302 (1875). Type: Hab. in arenosis Palestinae prope Gaza, BOISSIER s.n. (G-BOISS holo.).

Differs from the type subspecies in its deeply 1–2-pinnatisect leaves with narrow, linear, mucronate lobules which are less than 2–3 mm wide.

Specimens Examined:

DSD: c. 15 km SE of Ashuriya (c. 50 km WNW of Shabicha), c. 360 m, 1957, GUEST, AL-RAWI & RECHINGER 19370 (K!); **DLJ:** Near Tikrit, 1969, S. A. OMAR & HAMID 36296 (K!); **DWD:** Hazimae (c. 40 km SE of Rutba), c. 550 m, 1966, S. OMAR 34215 (K!); **FKI:** In Dibs, Beiji, 200 m, 1947, AL-RAWI & GILLET 7173 (K!); **DSD:** Near wadi Al-Tib Police Post nr. Kuwait (c. 70 km N of Amara), 1957, GUEST, AL-RAWI & RECHINGER 17477 (K!); Faggarat al-Shadaf, 1961, AL-RAWI 31151 (K!).

Distribution: Iraq, Israel, Palestine.

Habitat: Sandy or sandy-clay flood plains; wheat fields; dry steppe; stony ground near foothills; 200–550 m.

A new record for Iraq.

2. *Anthemis scariosa* BANKS & SOL. in RUSS., Nat. Hist. Aleppo ed. 2. 2: 263 (1794); DC., Prodr. 6: 4 (1838); BOISS., op. cit. 311; EIG, op. cit. 187; GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 208. Fig. 10.19 (1975); FEINBRUN-DOTHAN, op. cit. 329. Pl. 550. Type: Syria, near Aleppo, RUSSEL (BM! holo.).

Annual, erect or ascending, up to 50 cm tall, glabrous to sparsely hairy, showy herb. Leaves sessile, elliptic-oblong, 3–5 cm long, 1.5–2.5 cm wide, bipinnatisect into linear-lanceolate, 4–6 mm long, acute-mucronate ultimate segments. Peduncles slender, up to 20 cm long, unthickened in fruit. Capitula radiate, 2.5–4.5 (–5) cm across. Involucre 10–20 mm wide. Phyllaries glossy, glabrous, pale brown, scarious, outer ovate, inner obovate, basal part membranous margined, c. 3–4 × 2–3 mm, bearing apically a large, ± orbicular, c. 5 mm long and broad, translucent appendage mostly longer than the basal part. Receptacle hemispherical, 4–5 × 4–5 mm, chaffy all over. Paleae linear-lanceolate to oblanceolate, somewhat keeled, c. 3–4 mm long, with

narrow, pellucid margins, acuminate, caducous. Ray florets female, fertile, tubes pilose, swollen; limbs oblong, $8-20 \times 4-8$ mm, persistent, yellow. Disc corolla yellow, c. 3.5 mm long, pilose, inflated below in fruit, deciduous. Cypselas subcylindrical, $\pm$ angular, distinctly tuberculate, inner ones somewhat oblique, bald, outermost tipped with persistent ray corollas.

Flowering period: March–May.

Specimens Examined:

Mesopotamia, Biredjik, in campis ad kefre, 1888, SINTENIS 347 (F!, G!, K!); **FKI**: Kirkuk, c. 350 m, 1929, F. A. ROGERS 203 (K!, G!), s. n. (K!); Col. CHESNEY's Expedition to Euphrates, 140 (K!); **MAM**: In deserte Chabur (Khabur), 1867, C. HAUSSKNECHT 529 (JE!); **FUJ**: Albaiyder, 78 km S of Sinjar, 260 m, 1962, CHAKRAVARTY, AL-RAWI & ALIZZI 32079 (K!).

Distribution: Iran, Iraq, Lebanon, Syria, Turkey.

Habitat: Silty depressions in steppes and fields in upper plains and foothills; 250–350 m.

This species can be introduced as a garden ornamental for its medium to large showy yellow heads.

3. *A. hyalina* DC., Prodr. 6: 4 (1838); BOISS., Fl. Or. 3: 307 (1875); EIG, op. cit. 161; GRIERSON & YAVIN, op. cit. 199; FEINBRUN-DOTHAN, op. cit. 329. Pl. 549; MOUTERDE, Nouv. Fl. Lib. Syr. 3: 410. Pl. CCXXV, n. 4 (1983); GHAFOR & AL-TURKI in Candollea 52: 467. Fig. 4, L-O (1997). Type: Iraq, near Baghdad, ROUSSEAU s.n. (G-DC holo.).

Annual, up to 35 cm tall, densely to sparsely greyish hairy herb with suberect, divaricate branches from near the base. Leaves short-petioled, ovate, 2–3 cm long, 2–3-pinnatisect into ovate-oblong or oblanceolate, acute lobules. Capitula 2.5–3.5 cm across, on thickened, arcuate fruiting peduncles. Phyllaries 5–7 mm long, all obtuse, inner with broad, hyaline margins and brown, shiny obtuse appendage, nearly as long as or longer than the lower hairy part. Receptacle broadly conical, 5–7 mm long. Paleae lanceolate to oblanceolate, 3–3.5 mm long, $\pm$ keeled, abruptly and short acuminate, persistent. Ray florets female, 14–16, fertile, tube glabrous; limbs $7-12 \times 3-5$ mm, white. Disc corollas terete in fruit. Cypselas obpyramidate, 2–2.5 mm long, smooth, obscurely ribbed to ribless, auricle unilateral, short, opaque.

Flowering period: March–April.

Specimens Examined:

FUJ: Jazireh Derek, 1933, C. EDMONDS Rustam No. 2800 (K!); Balad Singar-Tal Afor, c. 350 m, 1933, EVAN GUEST Rustam No. 4139A (K!); Midway between Tal Afor

& Sinjar, 1969, S. OMAR & H. HAMID 36465 (K!); Ain Ghazal (Mosul province), 400 m, 1933, E. GUEST Rustam No. 4096 (K!); 5 km S of Mosul, Mosul Liwa, 1963, FRED A. BARKLEY 331 (K!); **DWD**: Wadi Massad Al-Rutba, 22 km SE of Rutba, Ramadi Liwa, 1962, FRED A. BARKLEY & HIKMAT ABBAS 991 (K!); Between Baghdad & Syrian desert, 1930, F. R. JACKSON A-240/1930 (K!); Mesopotamia, 1888, P. SENTENIS 577 (G-BOISS); Mesopotamia, 60 miles W of Euphrates, 1955, H. HELBAEK 290 (K!).

Distribution: Turkey, Lebanon, Palestine, Syria, Saudi Arabia, Iraq, Iran.

It can be easily recognised by appendage of the inner phyllaries which is as long as or longer than the lower hairy part.

4. *A. haussknechtii* BOISS. & REUT. in BOISS., Fl. Or. 3: 310 (1875); EIG in Palest. J. Bot. Jer. ser. 1: 170 (1938); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 204 (1975); FEINBRUN-DOTHAN, Fl. Pal. 3: 330. Pl. 551 (1978); MOUTERDE, op. cit. 410. Pl. CCXXV, n. 1 & 2 (1983); GHAFOR & AL-TURKI in Candollea 52: 461. Fig. 1, E-L (1997). Type: Syria, ad Aleppo, HAUSSKNECHT s. n. (syntype, n.v.); Iraq ad Tscharmelik (Cermelik) atque in deserto inter fl. Chabur et Montem Sindjar, HAUSSKNECHT s. n. (K! syn.; W iso.).

Annual, silvery to greyish, up to 25 cm tall herb with divaricate, erect or ascending branches from near the base. Leaves short-petioled, ovate, $1.5-4.5 \times 1-2.5$ cm, 2-3-pinnatisect into linear-oblongate, $1.5-3 \times c. 0.5$ mm, acute lobules. Capitula $1.5-2.5$ cm across, on 4-5 cm long, slightly thickened fruiting peduncles. Phyllaries with pale-brown scarious margins, hairy, outer triangular-lanceolate, c. 4-5 mm, acute, inner oblong-oblongate, $6-7 \times 1.5-2$ mm, obtuse. Receptacle conical, 6-8 mm long. Paleae oblongate, c. 4 mm long, $\pm$ keeled, eroded-fimbriate to sometimes lacerate, abruptly mucronate. Ray florets female, fertile, 15-20, with indurated, glabrous, persistent corolla tube; limbs elliptic-oblong, $5-8 \times 3.5-5$ mm, deciduous. Disc corollas glabrous, globose inflated in its lower part. Cypselas cylindrical, 1.75-2 mm, white, finely striate, tuberculate, straight or outer ones curved and bald, inner cypselas crowned by a unilateral, erose-dentate auricle as long as or nearly half the size of cypselas.

Flowering period: March-April.

Specimens Examined:

FUJ: In deserto inter Chabur (Khabur) & Sindshar (Sinjar), 1867, C. HAUSSKNECHT 528 (G!; JE!); **DWD**: 20 km WNW of Rutba, c. 600 m, 1957, AL-RAWI 21131 (K!); **MRO**: Gali Ali Beg, 1973, F. KARIM, H. HAMID & M. JASMIN 40892 (K!); **FPF**: Kani Kirmaj, c. 460 m, 1958, M. E. D. MOORE 317 (K!); **FUJ**: NW Iraq, 2 km N of Abu Wajnam, $34^{\circ} 52'N$ $45^{\circ} 40'E$, c. 400 m, 1933, EIG & ZOHARY s. n. (HUJ!); **FNI**: N Iraq, 35 km S of Khanaq (N of Mosul), ca. 450 m, 1933, EIG & ZOHARY s. n. (HUJ!); **MJS**: Jebel Sindjar, 600 m, 1933, EIG & ZOHARY s. n. (HUJ!); **MRO**: Sultan Dag (moun-

tain), N of Koi Sanjaq, 850 m, 7.5.1959, AL-RAWI & NURI 28200 (K!); **MSU**: 1 km S of Durbandikan, Sulaimaniya Liwa, 1964, FRED A. BARKLEY & IHSAN ALI SHEHBAZ 7717 (K!); **FKI**: 31 km N of Kirkuk to Kori Sanjaq, near Schwan village, 740 m, AL-RAWI, NURI & AL KASS 27962 (K!); Acra, c. 500–1000 m, Qaimqam of Acra, 1932, Rustam No. 3093A (K!); **FUJ**: Ain Al Hassan (near Sinjar), 330 m, 1933, EVAN GUEST Rustam No. 4237 (K!); **FUJ**: Tel Kotchek, 400 m, steppe, frequent, 1948, GILLET 10836 (K!).

Distribution: Turkey, Lebanon, Palestine, Syria, Saudi Arabia, Iraq, Iran.

Habitat: Gravel soil; mountainside steppe on conglomerate hill; fallow fields; fine gravelly hills with grey soil; decomposed limestone hills; red-clay or stony-clay hill-sides; red-clay hillside; open steppe; 400–1000 m.

EIG (1938) has recognized several infraspecific taxa in this species which can be easily distinguished from all the others in Iraq by its 6–7 mm long inner phyllaries and $\pm$ indurated ray floret tubes.

5. *A. marismartui* EIG, Palest. J. Bot. Jer. ser. 1: 181 (1938); FEINBRUN-DOTHAN, Fl. Pal. 3: 331. Pl. 554 (1978). Type: "ca. Hebron", KOTSCHY s.n. (G-BOISS holo.).

Syn.: *A. kurdica* IRANSHAHR in Pl. Syst. Evol. 139: 160 (1981) – **synon. nov.** Type: **FUJ**: Kurd.: Jabal Khantur, in saxosis calc. N Zakho prope Sharanish, 1200 m, RECHINGER 12096 (W! holo.).

A glabrescent, branched annual herb, up to 25 cm tall, branches ascending from near the base. Leaves ovate-oblong, bipinnatisect or nearly so into remote, linear, acute-mucronate ultimate segments. Peduncles slender, 4–10 cm long, unthickened in fruit. Capitula radiate or discoid, 1–2.5 cm across. Involucre 6–8 mm wide. Phyllaries lanceolate, outer 3–4 mm long, membranous margined, inner ones c. 5 mm long, broadly hyaline at the apices, nearly glabrous. Receptacle conical, c. 4–6 mm long, chaffy all over. Paleae narrowly oblong-spathulate, c. 3–3.5 mm long, membranous, $\pm$ keeled, acuminate-mucronate, deciduous. Ray florets fertile, tubes compressed, pilose; limbs oblong, 7–8 $\times$ 4–5 mm, white. Disc florets yellow, c. 3 mm long, tube pilose, inflated below and subcompressed above, lobes somewhat patent, terminated by a mucro half to twice the size of lobes. Cypselas $\pm$ obconical, 1.75–2.25 mm long, outer somewhat curved, indistinctly striate, shortly auriculate or with an inconspicuous unilateral rim at the apices.

Flowering period: April–May.

Specimens Examined:

FPF: Bus Kaya (Bagsaya), 150–190 m, 1958, AL-RAWI & SH. HADDAD 25591 (K!); **LCA**: Near Baghdad, 1933, YUSUF LAZAR 239 (F!); **MAM**: Zawita mountain, between Ramia & Shaglaura, 1973, F. KARIM, H. HAMID & M. JASMIN 40853 (K!).

Distribution: Iraq, Jordan, Palestine, (Syria ?).

Habitat: Gravelly hillside, calcareous rocks; 150–1200 m.

Although considered an east Saharo-Arabian species by FEINBRUN-DOTHAN (1978), the authors regard it as a biregional element due to its extension into Irano-Turanian territory. This is a new record from Iraq and may also be found in Syria.

It is distinguished from all the other species by its long apiculate corolla lobes of disc florets.

6. *A. melanacme* BOISS. & HAUSSKN. in BOISS., Fl. Or. 3: 315 (1875); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 207 (1975). Type: Turkey, Mardin, Supra Terek (Derik), HAUSSKNECHT 524 (G holo.).

A low growing, 10–15 cm tall, greyish-pubescent, annual herb with decumbent branches from near the base. Leaves narrowly oblanceolate, c. 2 cm long, bipinnatisect into oblong-oblanceolate, c. 2 mm long, acute ultimate segments. Peduncles small, apparently remaining unthickened in fruit. Capitula radiate, c. 2 cm across. Involucre c. 10 mm wide. Phyllaries all $\pm$ triangular-lanceolate, densely hirsute outside, acute with dark brown narrow margins. Receptacle convex, chaffy all over. Paleae lanceolate, keeled, with broad, dark brown margins, acuminate at the apices. Ray florets fertile, with basally pilose corolla tube; limbs oblong-spathulate, 7.5–10 mm long, white. Disc florets yellow, c. 3 mm long, corolla tube pilose, seemingly not inflated below. Cypselas immature, c. 1 mm long, apparently shortly auriculate.

Flowering period: May–June.

Specimen Examined:

Mesopotamia, 1920, R. J. D. GRAHAM s. n. (K!).

Distribution: Iraq, Syria (?), Turkey.

Habitat: Fallow fields and limestone hillsides.

The only specimen seen, although young, definitely belongs here. This Irano-Turanian species is probably undercollected or rare in Iraq.

7. *A. microlepis* EIG, Palest. J. Bot. Jer. ser. 1: 185 (1938); RECH. f., Fl. Lowland Iraq 620 (1964). Type: Northern Iraq, 7 km W of Tel-Afar, 1933, EIG & ZOHARY s.n. (HUJ! holo.).

Syn.: *A. singarensis* EIG, op. cit. 186 (1938). Type: NW Iraq, 30 km W of Balad Sindjar, 465 m, 28.4.1933, EIG & ZOHARY Relev 3 (HUJ! holo.).

Annual, 7–20 cm tall, appressed hairy herb with ascending or erect branches. Leaves petiolate, $\pm$ patulous hairy to glabrous, ovate to oblong-ovate, (1–) 1.5–2 cm long, 8–10 mm wide, bipinnatisect into narrowly linear, $\pm$ remote, mucronulate segments. Peduncles 3–5 cm long, $\pm$ thickened in fruit. Capitula radiate, (1.5–) 2.5–3 cm across. Involucre 6–9 mm wide. Phyllaries linear-lanceolate, $3.5\text{--}4 \times c. 1$ mm, greenish, hairy outside, narrowly scarious margined. Receptacle conical, $5\text{--}6 \times c. 2.5$ mm, chaffy all over. Paleae narrowly oblong-spathulate, c. 2.5 mm long, slightly keeled, 3-dentate and mucronate at the apices, not persistent. Ray florets female, fertile, 8–10, tubes glabrous; limbs obovate-oblong, $12\text{--}15\text{--}(20) \times 4\text{--}5$ mm, white. Disc florets c. 3 mm long, corolla tubes basally pilose and $\pm$ inflated in fruit. Cypselas obconical, somewhat curved, nearly as long as paleae, whitish, striate, obscurely tuberculate, auricles unilateral, short, denticulate.

Flowering period: April–May.

Specimens Examined:

FUJ: 7 km W of Tel-Afar, c. 400 m, 1933, EIG & ZOHARY s.n. (HUJ, isotype of *A. microlepis*); **FKI**: 9 km N of Taug (between Bakuba & Kirkuk), 1933, EIG & ZOHARY s. n. (HUJ, syntype of *A. microlepis* var. *leiantha* EIG); **FUJ**: 53 km W of Balad Sindjar, 460 m, 1933, EIG & ZOHARY s. n. (HUJ); **FKI**: 14 km NW of Kirkuk, 1933, EIG & ZOHARY s. n. (HUJ); **FUJ**: Jazira, N of Sinjar, field, c. 400 m, 1954, EVAN GUEST 13344 (K!); Jazira (Nr. Tslafuq), c. 350 m, 1954, E. GUEST 13414 (K!).

Distribution: Endemic to Iraq.

Habitat: Fallow fields, grey stoneless soil; hill with projecting rocks; sandy soil in low bushy steppe; 400–500 m.

8. *Anthemis micrantha* BOISS. & HAUSSKN. in BOISS., Fl. Or. 3: 300 (1875); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 31, tab. 224, fig. 2 (1986). Type: Iraq, Pir Omar Gudrum, June 1867, C. HAUSKNECHT 532 (G ! holo.).

Appressedly greyish hairy, low growing, basally branched annual herb with erect, filiform stems. Leaves sessile, oblong to lanceolate, 10–15 mm long, 5–10 mm broad; lower pinnatipartite into short, linear-lanceolate, acute, remote ultimate segments, uppermost simple. Peduncles filiform, 1.5–2 cm long, thickened in fruit. Capitula radiate, c. 6–8 mm across, few-flowered. Involucre c. 5 mm wide. Phyllaries acute, outer triangular-ovate, $2.5\text{--}3.5 \times 1.5\text{--}2$ mm, inner lanceolate, whitish scarious margined. Receptacle convex, 3–4 mm long, chaffy all over. Paleae lanceolate, 2.5–3 mm long, acuminate. Ray florets female, fertile, c. 6, tubes compressed, glabrous; limbs ovate, c. 3×2 mm, white. Disc florets yellow, c. 2.5 mm long, glabrous. Cypselas (juvenile) smooth, unilaterally narrowly marginate.

Flowering period: May–June.

Specimen Examined:

MSU: Pir Omar Gudrum, 35° 46'N, 45° 14'E, 1867, HAUSSKNECHT 531 (G!).

Distribution: Endemic to Iraq.

Habitat: High mountain peaks; above 2500 m.

Known only from type locality and might have become extinct.

9. *Anthemis leptophylla* EIG, Palest. J. Bot. Jer. ser. 1: 162 (1938); RECH. f., Fl. Lowland Iraq 616 (1964); IRANSHAHR in RECH. f., op. cit. 29. tab. 21 (1986); GHAFOR & AL-TURKI in CHAUDHARY, Fl. Kingd. Saudi Arabia 2 (3): 174 (2000). Type: Iraq, N. W. Qalat Shergat (ad Tigridem infra urbem a Mosul quatuor horas in circuitu, substrata calcareo, c. 170–300 m), 1912, P. MARESH (sub *A. hyalina* DC. det. HAND.-MAZZETTI in Herb. Vindobon.).

Annual, erect, up to 40 cm tall, appressed hairy, unbranched or basally few-branched herb. Lower leaves with pectinate-dentate short petiole, median and upper ones sessile, broadly lanceolate-oblong to oblong-ovate, 1–4 cm long, 0.8–1.8 (–2) cm wide, finely bi- or ± tripinnatisect, lobes remote, ultimate segments linear, shortly acuminate. Peduncles 5–8 cm long, gradually thickened upwards in fruit. Capitula radiate, 2.5–4.5 cm across. Involucre 10–12 mm wide. Phyllaries smooth or nearly so, outermost narrowly triangular, c. 3 × 2 mm, hyaline margined, inner oblong-spathulate, c. 5–6 × 3–4 mm, obtuse, broadly hyaline and ± lacerate margined. Receptacle hemispherical, c. 3–4 × 4–5 mm, chaffy all over. Paleae oblong-spathulate, 3–3.5 × 1.5–2 mm, almost flat, membranous with a whitish nerve running through and forming a short mucro at the ± erose obtuse-truncate apices. Ray florets female, 15–20, tubes glabrous, ± winged at the base; limbs oblong-obovate to oblanceolate, 10–16 × 5–8 mm, white. Disc corollas glabrous, basally not swollen in fruit. Cypselas oblong-cylindrical, 1.5–2 mm long, 10-ribbed, smooth, straw coloured, shortly unilaterally marginate at the apices.

Flowering period: April–May.

Specimens Examined:

DWD/DLJ: Nr. Haditha, 1972, H. HAMID 39149 (K!); **DLJ:** 20 km E of Ana to Al Qaim, 1976, S. OMAR, AL KAISI, K. & H. HAMID 44422 (K!); **DLJ:** Between Ana & Al Qaim, 1972, H. HAMID 39178 (K!); **DLJ:** Rawa, 34°28'N, 41°51'E, 1972, H. HAMID 39120 (K!); **DLJ:** 50 km from Haditha to Boji, 1974, S. OMAR, M. NOORI, H. HAMID, KH. MUHAMMAD & M. JASIM 41478 (K!); **FUJ:** Qaiyarah, Mosul, 215 m, BAYLIN 93a (K!); **DSD:** 50 km N by W of Aidaha (Al-Aida: c. 80 km SSW of Salman, c. 370 m, 1957, GUEST, AL-RAWI & RECHINGER 19192 (K!)).

Distribution: Iran, Iraq, Saudi Arabia.

Habitat: Sandy clay soil; gravelly silty plain; disturbed ground, sandy washes on stony plain; 200–370 m.

10. *Anthemis deserti* BOISS., Fl. Or. 3: 305 (1875); RECH. f., Fl. Lowland Iraq 618 (1964); AL-RAWI, Fl. Kuwait 2: 240 (1987); GHAFOR & AL-TURKI in Candollea 52: 467. Fig. 4, I–K (1997); in CHAUDHARY, op. cit. 172, Pl. Comp. 52, I–K. Type: Habitat in arenosis desertorum Arabiae Petreae, SCHIMPER 399 (sub *A. peregrina* BOISS.) (G-BOISS holo. photo !).

Syn.: *A. melampodina* DELILE ssp. *deserti* (BOISS.) EIG in Palest. J. Bot. Jer. ser. 1: 177 (1938); TÄCKHOLM, Stud. Fl. Egypt, ed. 2. 574 (1974); FEINBRUN-DOTHAN, Fl. Pal. 3: 332 (1978).

Annual, greyish-tomentose herb with ascending branches from near the base. Leaves with 3–6 (–8) mm long petiole, oblong or linear-oblong, 2–3 × 1–1.5 cm, pinnatipartite into linear or oblong, entire or 3-fid ultimate segments. Peduncles slender, unthickened in fruit. Capitula radiate, 2–2.5 (–3) cm across. Involucre 8–10 mm wide. Phyllaries lanceolate, narrowly scarious margined, acute. Receptacle hemispherical, 2.5–3 mm long, chaffy all over. Paleae oblong-lanceolate, c. 3 mm long, carinate, acute. Ray florets female, 10–15, fertile, tubes glabrous; limbs 4–6 (–7) × 2.5–3.5 mm, white. Disc corollas glabrous, c. 3 mm long and inflated at the base in fruit. Cypselas ± obpyramideate, slightly curved or not, 1.5–1.75 mm long, longitudinally tubercled on ridges, exauriculate.

Flowering period: March–May.

Vernacular: Qahwiyan, Rebyan.

Specimens Examined:

LEA: Rustam Farm, near Baghdad, 1933, YUSUF LAZAR 36 (F!, K!); **DSD:** Faihat Um al Minaikhar Nr. Salman, 1973, F. KARIM, M. NOORI, H. HAMID & H. KHADIM 40216 (K!); Al-Maaniya, c. 95 km W of Shabicha, 1961, KHATIB & HAZIM, 30561 (K!); Shabicha al-Salman, 1953, RAMI & A. AL-JAB 21430 (K!); Al-Samah, 29° 45' N, 45° 50' E, 1968, ALIZZI & S. OMER 35748 (K!); Khadar al-mai, 29° 45' N, 46° 50' E, c. 190 m, 1960, AL-RAWI, M. AL-KHATIB & H. TIKRITY 29109 (K!); 10 km SE of Jiraibiyat, c. 125 km S of Basra, c. 175 m, 1957, GUEST, AL-RAWI & RECHINGER 17155 (K!); **DSD:** Khadar Almai, c. 180 m, 1963, KHATIB & ALIZZII 32686 & 32728 (K!); **DSD:** c. 30 km S by E of Rumailla station (c. 55 km W by S of Basra), 1957, GUEST, AL-RAWI & RECHINGER 17332 (K!); **DSD:** 20 km NW of Salman, 1972, FAUZI, HAZIM & H. HAMID 38697 (K!); **DSD:** 23 km SE by S of Zubair, c. 10 m, 1957, E. GUEST, AL-RAWI & RECHINGER 16853 (K!); **LBA:** Al-Batin Nr. (WNW) Jarishan, c. 85 km SW of Basra, c. 80 m, GUEST, AL-RAWI & RECHINGER 17092 (K!); **DSD:** Near Al-Baniya, 30° 12' N, 47° 15' E, c. 65 km WSW of Basra, c. 70 m, GUEST, AL-RAWI & RECHINGER 17311 (K!); **LCA:** 16 km W of Falluja, 1961, CHAKRAVARTY & AL-RAWI 30282 (K!); **DSD:** Near

Safai al-Maghif (NE of Ghazlani), c. 100 km WSW of Basra, c. 130 m, GUEST, AL-RAWI & RECHINGER, 17259 (K!); **DSD**: Southern desert, Al-Ishrishi (c. 35 km E by N Bwaiya), c. 115 m, 1955, GUEST & AL-RAWI 14187 (K!); **DSD**: Southern Desert, 60 km SW by W of Zubair, c. 70 m, 1955, GUEST & AL-RAWI 14307 (K!); **DSD**: Nr. Al-Aidha (Al-Aida) (c. 110 km SW of Salman, c. 35 km NW of Jumaima), 1957, GUEST, AL-RAWI & RECHINGER 19130 (K!); **DSD**: Southern desert, c. 80 km ESE Buraiqa, c. 140 m, 1955, GUEST & AL-RAWI s. n. (K!).

Distribution: E Egypt (rare), Iraq, Jordan, Lebanon, Palestine, Saudi Arabia, Syria (?).

Habitat: Sandy gravelly soil, depauperate 'haswa' plains and subdesert, 'haswa' ridge with large pebbles, plains with low flat dunes and sand ridges, sandy open wadis; 10–410 m.

A. deserti has often been treated as a subspecies of *A. melampodina*. The authors have observed that the latter species is much more frequent in Palestine, Jordan, Saudi Arabia and Egypt, where the former is comparatively less frequent. These two species are probably sympatric in Palestine, Jordan and Egypt but *A. deserti* seems to exist in pure populations in the present study area.

Unthickened peduncles, acute outer phyllaries and exauriculate cypselas separate *A. deserti* from *A. melampodina* which is very rare in Iraq.

11. *Anthemis gillettii* IRANSHAHR in Pl. Syst. Evol. 139: 159 (1982); in RECH. f., Fl. Iran. 158 (4): 33. Tab. 32 (1986). Type: LEA: E. Badra in collibus ad confines Persiae, 200 m, J. B. GILLETT 6706 (K! holo.).

Annual, up to 10 cm tall, hairy, simple or branched herb. Leaves petiolate, ovate, 1.5–2.5 cm long, 5–10 mm broad, bipinnatisect into linear, acute segments. Peduncles short, 2–4 cm long, thickened upwards in fruit. Capitula radiate, 1.5–2 cm across. Involucre 8–10 mm wide. Phyllaries hairy outside, outer oblong, c. 3 mm long, acute, inner obovate, 5–5.5 × c. 3 mm, broadly hyaline margined, obtuse. Receptacle ovoid-hemispherical, c. 5 mm long, chaffy all over. Paleae oblong, 3–3.5 mm long, carinate, apically short mucronate. Ray florets female, fertile, 8–10, tubes glabrous; limbs oblong, white. Disc florets yellow, as long as paleae, not inflated in fruit. Cypselas cylindrical, 1.5–1.8 mm long, faintly striate, smooth, almost bald or inconspicuously denticulate at the apices.

Flowering period: March–May.

Specimens Examined:

LEA: Badra, 1947, GILLETT 6657 (K!); Mountains on Persian border, E of Badra, 1947, GILLETT 6706 (K! iso); **FPP**: W of Khanaqin, 1929, COWAN & DARLINGTON 164 (K!); **FKI**: 12 km E of Kirkuk, 1948, AL-RAWI & GILLETT 10579 (K!).

Distribution: Iraq, Iran.

Habitat: Dry to moist steppe on gypsaceous soils and eroded slopes; 200–400 m.

12. *Anthemis hamrinensis* IRANSHAHR in Pl. Syst. Evol. 139: 161 (1982); in RECH. f., op. cit. 43. Tab. 45 (1986). Type: Iraq, Baghdad, inter Tigris flumen et Monte Jabal Hamrin, 24 km ab oppido Samarra Orientem versus, ca. 34° 15'N, 44°E, 4.5.1957, RECHINGER 9580 (W! holo.).

Annual, 10–20 cm tall, whitish-tomentose, much branched herb with patent to suberect branches. Leaves sessile, ovate-oblong, 1–2 cm long, 5–10 mm wide, bipinnatisect into linear-oblong ultimate segments. Peduncles slender, 4–7 cm long, unthickened in fruit. Capitula radiate, 1.5–2 cm across. Involucre 7–10 mm wide. Phyllaries dimorphic, outer ovate-oblong, 1.5–2 mm long, ± obtuse, inner narrowly obovate, 3–4 × 1.5–2 mm, scarious margined, obtuse. Receptacle conical, chaffy all over. Paleae oblong, flat, c. 2.5 mm long, mucronate. Ray florets female, fertile, 12–15, tubes glabrous; limbs oblong, c. 6 mm long, white. Disc corollas yellow above, purplish below, c. 2–2.5 mm long, ± compressed. Cypselas cylindrical, c. 1.5 mm long, striate, smooth, very shortly auricled.

Flowering period: May–June.

Specimens Examined:

DGA: Baghdad, inter Tigris flumen et Monte Jabal Hamrin, 24 km ab oppido Samarra Orientem versus, ca. 34°15'N, 44°E, 1957, RECHINGER 9580 (W!); **DGA:** 26 km E Samarra, c. 60 m, gravel soil, 1957, AL-RAWI 20376 (K!).

Distribution: Endemic to Iraq.

Habitat: Gravel mixed sandy soil; 50–400 m.

13. *Anthemis wettsteiniana* HAND.-MAZZ. in Ann. Nat. Hofmus. Wien 27: 433. Tab. 16. Fig. 7 (1913); RECH. f., Fl. Lowland Iraq 617 (1964); MOUTERDE, Nouv. Fl. Lib. Syr. 3: 409. Pl. CCXXIV, n. 3 (1983); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 30. Tab. 27 (1986). Type: Ad ripam destram Tigridis ad septentriones oppidi Tekrit, HANDEL-MAZZETTI 1008 (W! holo.).

Syn.: *A. desertisyraci* EIG, Palest. J. Bot. Jer. ser. 1: 174. Pl. 10, fig. 19 & Pl. 11A, fig. 18 (1938). Type: Syrian desert, 560 km E of Damascus, 320 km W of Baghdad, 530 m, 1933, EIG & ZOHARY s. n. (HUJ para.) *A. deltawensis* EIG, op. cit. 172. Pl. VII, f. 12; Pl. XI A, f. 15; Pl. X, f. 16 (1938).

Annual, greyish-green, appressedly lanate, up to 25 cm tall herb with ascending branches from the base. Leaves petiolate, broadly ovate to ovate-oblong, 2.5–4.5 × 1.5–2.5 cm, bipinnatisect into linear-lanceolate, remote, obtuse, mucronate ultimate segments. Peduncles (3–) 4–6 cm long, gradually thickened upwards in fruit. Capitula

radiate, (1.5–) 2–2.5 (–3) cm across. Involucre 8–10 mm wide. Phyllaries densely hairy outside, dimorphic, white membranous on margins; outer narrowly triangular-lanceolate to lanceolate, $4-5 \times 1-1.5$ mm; inner oblong-lanceolate, $6-7 \times 1.5-2$ mm, white membranous at the apices. Receptacle $\pm$ convex-conical, chaffy all over. Paleae spathulate or oblong-spathulate, 2.5–3 mm long, slightly carinate, membranous, shortly mucronate, deciduous. Ray florets female, fertile, 12–15, tubes glabrous, unindurated; limbs oblong, $7-12 \times 4-5$ mm, white. Disc florets pale-yellow, as long as or shorter than the paleae, glabrous. Cypselas $\pm$ curved, obconical-turbinate, c. 2 mm long, tuberculate; inner with 0.5–1 mm long auricle; outer nearly smooth, exauriculate.

Flowering period: March–April.

Specimens Examined:

DGA: N Iraq, foothills of Jebel Hamrin, 1933, EIG & ZOHARY s. n. (HUJ!); **LCA:** N Iraq, 35 km NE of Deltawah (N of Baghdad), 1933, EIG & ZOHARY s. n. (HUJ!); **DWD:** 60 km from Qaim, 1974, Botany Staff 41713 (K!); **DWD:** Rutba, 1955, AL-RAWI 640 (K!); **DWD:** E of Shitatha, 200 m, 1947, AL-RAWI & GILLET 6432 (K!); **DWD:** 30 km S of Shanawa (probably Shanana), 200 m, 1955, AL-RAWI 15603 (K!); **DWD:** Nr. Rutba wells, 1933, H. R. P. DICKSON iv (K!); **LCA:** 3 km N of Garma, bridge on Falluja-Baghdad canal, 1960, AGNEW 278 (E!); **DGA:** Sammara, Baghdad Liwa, 1961, AGNEW 5240 (E!); **DLJ:** Falluja desert-by cement works, 1960, AGNEW 345 (E!); **DLJ:** Jezira, 20 km W of Sumaicha-Belad line, Baghdad Liwa, 1960, AGNEW 272 (E!).

Distribution: Iran, Iraq, Syria.

Habitat: Foothills plains, sandy or clay soil or stony desert, cultivated fields; 200–550 m.

14. *Anthemis susiana* NABELEK in Pub. Fac. Sci. Univ. Masaryk, Brn. 52: 161 (1925); IRANSHAHR, op. cit. 34. Tab. 31 (1986). Type: F. NABELEK 3622, 3623 and 3635 (SAV syn. photo.!).

Annual, 5–15 cm tall, appressed whitish-pubescent herb with ascending branches from near the base. Leaves petiolate, oblong-lanceolate, 1.5–2.5 cm long, 5–10 mm wide, bipinnatisect into remote, linear, callose mucronulate segments. Peduncles up to 5 cm long, upwardly thickened in fruit. Capitula radiate, 1.8–2 cm across. Involucre 6–9 mm wide. Phyllaries dimorphic, outer triangular-ovate, 2.5–3 mm long, inner oblong-spathulate, $4-5 \times c. 2$ mm, hyaline margined, obtuse. Receptacle conical, c. 5 mm long, chaffy all over. Paleae obovate-spathulate, c. 2.5 mm long, membranous, $\pm$ carinate, inconspicuously mucronate. Ray florets female, fertile, 8–10, tube compressed, glabrous; limbs ovate-oblong, 8–10 mm long, white. Disc florets yellow, slightly longer than paleae, terete in fruit. Cypselas cylindrical, oblong-turbinate, 1.5–

2 mm long, striate, smooth, unilaterally minutely auriculate.

Flowering period: April–May.

Distribution: Iran, Iraq.

Habitat: Alluvial plain; 10–20 m.

No specimens from Iraq have been seen by the authors and it is included here on the authority of IRANSHAHR (1986), who has cited a specimen (Shatt at-Tib, c. 60–70 km N of Amarah).

15. *Anthemis arvensis* L., Sp. Pl.: 894 (1753); DC., Prodr. 6: 10 (1838); BOISS., Fl. Or. 3: 301 (1875); FEDOROV in SCHISCHKIN & BOBROV, Fl. SSSR 26: 36 (1961); TÄCKHOLM, Stud. Fl. Egypt, ed. 2. 574 (1974); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 198. Fig. 9 (1975); FERNANDES in TUTIN et al., Fl. Europ. 4: 153 (1976); GHAFOOR & AL-TURKI in Candollea 52: 465. Fig. 2, G-K (1997). Type: “Habitat in Europae praesertim Sueciae agris”, Herb. Linn. 1016.15 (LINN !).

Annual or biennial, sometimes perennating, up to 50 cm tall, sparsely to densely hairy herb. Leaves obovate-oblong, 1–3-pinnatisect into linear-oblong or linear-lanceolate to elliptic, acute-mucronate ultimate lobules. Capitula 1–4 cm across, on slender, not or slightly to distinctly thickened fruiting peduncles. Involucre 5–10 mm wide. Phyllaries oblong or oblong-obovate; outer acute; inner subacute to subobtusely, hyaline to pale-brown scarious on margins and apex. Receptacle convex, becoming shortly to elongate conical in fruit, 2–10 mm long. Paleae lanceolate-oblong, broadening toward ± stiffly acuminate apex, sub-persistent. Ray florets fertile, with glabrous tube, deciduous; limbs elliptic-oblong, 4–8 × 3–4 mm, white. Disc corolla basally not or slightly inflated, glabrous. Cypsela obconical, 1.5–2.5 mm long, smooth, with an undulate rim or lacerate hyaline auricle.

Flowering period: March–April.

Specimens Examined:

FUJ: Disintegrating marble inside of inner wall of old Hatra, Al-Jezira desert, 23.3.1964, E. D. BARKLEY & F. A. BARKLEY 6574 (K!); **FPF**: 3 km N of Saadya, 1975, AL-KAISI 42544 (K!); **FUJ**: Midway between Tal-Afar & Sinjar, 1969, S. OMER & H. HAMID 36478 (K!); **FKI**: Tur Shermati dist. Kirkuk, 1910, NABELEK 3632 (SAV!); **LCA**: Babylon, 32° 33' N, 44° 25' E, REUTER 3631 (SAV!).

Distribution: Egypt, Iran, Iraq, most of Europe, Saudi Arabia, Turkey; introduced into the New World, Australia, New Zealand.

Habitat: Clay soil, roadsides in upper plains and foothills; 200–300 m.

An excessively variable species in size of capitula, receptacle, limb size and cypsel

features. It is often confused with *A. cotula* from which it differs in its obtuse inner phyllaries with pale-brown or hyaline margins and lanceolate to oblanceolate, not bristle-like, paleae having $\pm$ abrupt acuminate apices.

16. *Anthemis plebeia* BOISS. & NOË in BOISS., Fl. Or. 3: 313 (1875); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 41. Tab. 42 (1986). Type: Iraq, Kurdistan, NOË 228 (G-BOISS holo.).

Annual, 5–10 (–15) cm tall, densely appressed greyish-hairy, unbranched herb. Leaves subsessile, narrowly oblong, 1–1.5 cm long, 5–10 mm wide, bipinnatisect into linear-oblong, c. 1.5×0.5 mm, acute ultimate segments. Peduncles 2.5–3 cm long, unthickened in fruit. Capitula radiate, 1.5–2 cm across. Involucre 8–10 mm wide. Phyllaries ovate-oblong, outer small, inner $3-4 \times 1-1.5$ mm, all membranous, fimbriate margined. Receptacle hemispherical, c. 3×2 mm, chaffy all over. Paleae oblong, $3-3.5 \times c. 1$ mm, transparent, slightly keeled, irregularly fimbriate, shortly mucronate. Ray florets female, fertile, 10–12, tubes compressed, pilose; limbs oblong-obovate, $6-8 \times 3-4$ mm, white. Disc corollas yellow, glabrous, inflated below in fruit. Cypselas obpyramidate, smooth, sulcate-striate, truncate or with a very short unilateral rim.

Flowering period: March–April.

Specimens Examined:

FPF: 18 km SE of Baksaya, 100 m, 1958, AL-RAWI & SH. HADDAD 25627 (K!); **DSD:** 20 km W of Subaicha, 1961, HAINES, E. HADAC, WALEED-EL-HASHMI & AGNEW 5549 (E!); **DWD:** North End of Habbaniya Lake, Ramadi Liwa, 1960, A. D. Q. & S. AGNEW 237 (E!).

Distribution: Endemic to Iraq.

Habitat: Foothills, gravel wadis, fine silt depressions and sandy desert; 100–150 m.

It is a close relative of *A. gayana* which it resembles in shape of paleae and short peduncles.

17. *Anthemis melampodina* DELILE, Descr. Egypte Hist. Nat.: 268, tab. 45, fig. 11 (1813-1814); EIG, Palest. J. Bot. Jer. ser. 1: 176 (1938), pro parte; RECH. f., Fl. Lowland Iraq 618 (1964); FEINBRUN-DOTHAN, Fl. Pal. 3: 332. Pl. 557 (1978), pro parte; GHAFOR & AL-TURKI in Candollea 52: 469. Fig. 4, A-D (1997). Type: Egypt, DELILE (MPU! holo.).

Annual, 15–25 cm tall, densely appressed canescent herb with ascending branches from near the base. Leaves shortly petiolate, oblong to ovate-oblong, 1.5–3 cm long, 1 (–2)-pinnatisect into linear-oblong, mucronate lobules. Capitula 2–3 cm across, on gradually slightly thickened fruiting peduncles. Involucre 5–8 mm wide. Phyllaries

lanceolate to ovate-oblong, hairy outside, scarious on margins and apex, subobtusate to obtuse. Receptacle ovate-conical. Paleae oblong-ob lanceolate, c. 3 mm long, $\pm$ keeled, usually mucronate. Ray florets female, 9–15, fertile; limbs elliptic, 8–12 $\times$ 4–6 mm, white, deciduous. Disc corollas inflated and dark brown in lower half. Cypselas obpyramidate, c. 1.5–1.75 mm long, auricle scarious, unilateral, 1/6 to as long or longer than the cypselas.

Specimen Examined:

DWD: Iraq, 15 km W of Ramadi, 100 m, AL-RAWI & GILLET 6783 (K!).

Distribution: Egypt, Israel, Jordan, Palestine, Saudi Arabia, Iraq.

Habitat: Sub-desert; 100 m.

An east Saharo-Arabian species; very rare in Iraq where it is replaced by its much more common ally, *A. deserti*, in which outer phyllaries are acute and cypselas are bald.

18. *Anthemis zoharyana* EIG, Palest. Journ. Bot., Jer. ser. 1: 178 (1938); TÄCKHOLM, Stud. Fl. Egypt, ed. 2. 575 (1974); FEINBRUN-DOTHAN, op. cit. 333. Pl. 558; GHAFOR & AL-TURKI, op. cit. 465. Fig. 2, L-P (1997). Type: Palestine, Negeb, 10 km S of Beersheba, 15.V. 1928, EIG, FEINBRUN & ZOHARY s. n. (HUJ holo.; S iso.).

A sparsely tomentose to almost glabrous, up to 20 cm tall, greyish-green annual herb with rigid, $\pm$ upright branches from near the base. Leaves shortly petioled, oblong, 3–5 $\times$ 1–2 cm, 1–2-pinnatisect into remote, linear, 3–8 $\times$ c. 1 mm, mucronulate ultimate segments. Peduncles slender, hardly thickened in fruit. Capitula radiate, 2–3 cm across. Involucre c. 1 cm wide. Phyllaries sparsely hairy, dimorphic, outer lanceolate-ob lanceolate, c. 3 $\times$ 1.5 mm, narrowly scarious margined, inner ones oblong-spathulate, almost twice as long as outer ones, broadly scarious margined towards obtuse apices. Receptacle conical, 4–5 mm long, chaffy all over. Paleae narrowly oblong-spathulate, 3–3.5 $\times$ 1–1.5 mm, $\pm$ carinate, membranous, nerve greenish, mucronate. Ray florets female, fertile, 10–15, tube glabrous, compressed; limbs elliptic-oblong, 8–12 $\times$ 3–5 mm, white. Disc florets yellow, as long as paleae, tubes glabrous, inflated below in fruit. Cypselas obpyramidate, 1.5–2 $\times$ c. 0.75 mm, slightly compressed and curved, conspicuously tuberculate on dorsal side, ventrally $\pm$ ribbed, unilateral auricle deeply lacerate into acute, triangular lobes, as long as to slightly longer or shorter than cypselas.

Flowering period: April–June.

Distribution: Iraq, Palestine, Saudi Arabia.

Specimens Examined:

LEA: Uod al-Sada (2 km SW of Hz.) 550 m, 1962, CHAKRAVARTY, AL-RAWI, ALIZZI &

KHATIB 31471 (K!); **FKI**: Injana 34° 29' N, 44° 38' E, (Jabal Hamrin), 1971, S. OMAR & F. KARIM 37835 (K!).

Habitat: Depressions with silty soil or near water; 100–550 m.

This species is similar to *A. melampodina* DELILE in general appearance and habit but can be easily distinguished by its rigid leaves with much narrower and longer acute, remote ultimate segments, by the broad and long scarious apices of the inner phyllaries, and the cypselas crowned by a unilateral auricle deeply lacerated into acute triangular lobes. The other nearest relative seems to be *A. eliezeri* EIG, cypselas of which are apically truncate, concave toothed-margined and smooth.

19. *Anthemis handel-mazzettii* EIG, Palest. J. Bot. Jer. ser. 1: 162 (1938); RECH. f., Fl. Lowland Iraq 616 (1964). Type: Iraq: Ad confines Mesopotamiae et Arabiae borealis ad Euphratem medium inter Abukemal, et Ramadi, in desertis glareosis prope Kaijim infra Abukemal, ca. 120–180 m, 4. iv. 1910, HANDEL-MAZZETTI 646 (W ! holo.).

Syn.: *A. melampodina* DELILE var. *truncata* EIG, Palest. J. Bot. Jer. ser. 1: 176 (1938).

Annual, appressed pubescent, erect, 10–15 cm tall herb with ascending branches. Leaves sessile, oblong, 2–3.5 cm long, 1.5–2 cm wide, unipinnatisect to ± bipinnatisect into linear-oblongate or ± spatulate, entire or shallowly dissected, up to 5 × 2 mm, obtuse, spinulose ultimate segments. Peduncles 5–6 cm long, unthickened in fruit. Capitula radiate, 2.5–3 cm across. Involucre 6–8 mm wide. Phyllaries appressed hairy, obtuse, outer oblong, c. 3 × 1.5 mm, scarious margined, inner ones oblong-spatulate, c. 5 × 2 mm, with margins and apices broadly membranous. Receptacle hemispherical, c. 4–5 mm across, chaffy all over. Paleae narrowly ovate, 2.5–3 × c. 1 mm, acute-acuminate at the apices, hyaline. Ray florets 8–12, female, fertile, tubes glabrous; limbs oblong, 8–10 × 4–5 mm, white. Disc florets yellow, c. 4 mm long, tube glabrous, basally uninflated in fruit. Cypselas obpyramidal, mostly curved, c. 1.25 mm long, tuberculate, truncate and exauriculate at the apices.

Flowering period: March–April.

Specimens Examined:

DSD: Between Aidaha and Ansab, 1968, ALIZZI & S. OMAR 35655 (K!); **DSD**: Al-Batin, c. 65 km SW of Basra, c. 70 m, GUEST, AL-RAWI & RECHINGER 17086 (K!); **DSD**: Between Kuwaibda and Ar Rumail (40 km SW of Basra), 1933, EIG & ZOHARY s. n. (HUJ!); **DSD**: c. 92 km W of Basra, 40 m, 1933, EIG & ZOHARY s.n. (HUJ!, syntype of *A. melampodina* var. *truncata* EIG); **DSD**: Nr. Jumaima (c. 140 km SW of Salman), c. 390 m, 1957, GUEST, AL-RAWI & RECHINGER 19122 (K!); **DSD**: 65 km W of Basra (Petrol Resource), 1975, Botany Staff 42403 (K!); **DSD**: Tumela, Toba Railway Station, 20 km W of Ghubaishiya Basra, Basra Liwa, 1965, SHARIFF Y

HADDAD 9537 (K!); **DSD**: Khaidar el Mai, Southern desert near Kuwait, 1960, AGNEW & HAINES 259 (E!); **DSD**: E of Ghazlani, c. 105 km SW of Basra, c. 120 m, 1957, GUEST, AL-RAWI & RECHINGER 17239 (K!); **DWD**: 5 km W of Ramadi, on road to Hit, 60 m, 1947, AL-RAWI & GILLET 6791 (K!); **DSD**: 65 km NW of Subaicha, HAINES, WALEED AL-HASHMI & AGNEW 5560 (E!).

Distribution: Endemic to Iraq.

Habitat: Sandy gravelly soil; stony desert with sand; hard sandy plain; 40–400 m.

This species bears much similarity to *A. melampodina* DELILE in general appearance but can be easily distinguished by its bald, truncate cypselas and narrowly ovate paleae.

Sect. *Rascheyana* YAVIN in Israel J. Bot. 21: 176 (1972).

Annual herbs. Paleae oblong to lanceolate, cuspidate or mucronate, persistent. Cypselas cylindrical, slightly compressed dorsiventrally, 4–5 times as long as broad.

Type: *A. rascheyana* BOISS.

In Iraq, this section is represented by three species.

20. *Anthemis schizostephana* BOISS. & HAUSK. in BOISS., Fl. Or. 3: 314 (1875); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 40. Tab. 39 (1986). Type: Hab. in graminosis montis Pir Omar Gudrum Kurdistaniae Persiae, 1300 m, C. HAUSKNECHT s.n. (W holo.; G! JE! iso.).

Annual, up to 10 cm tall, low growing, appressed hairy herb with spreading branches from the base. Leaves petiolate, oblong, 1.5–2.5 cm long, 8–15 mm wide, bipinnatisect into linear, 1–3 mm long, mucronulate ultimate segments. Peduncles 1.5–2.5 (–3.5) cm long, slightly thickened in fruit. Capitula radiate, mediocre, 1.5–2 cm across. Involucre 8–10 mm wide. Phyllaries hairy outside, oblong-ovate, 4–5 × 2–3 mm, green in middle, with scarious whitish margins and apices. Receptacle conical, 5–6 mm long, chaffy all over. Paleae oblong-lanceolate, c. 3.5 mm long, ± keeled, abruptly short mucronate, persistent. Ray florets fertile, 15–20; tubes hairy, inflated, purplish; limbs elliptic, 8–10 × 5–6 mm, white. Disc florets yellow, as long as to slightly longer than the paleae, corolla tubes pilose, inflated and purplish below in fruit. Cypselas finely cylindrical, 2–2.5 mm long, whitish, sulcate, smooth, with a unilateral, acutely fimbriate, c. 1 mm long auricle.

Specimens Examined:

DSD: Nageib, Northern desert province, 25 m, 1955, GUEST, AL-RAWI & LONG 14038 (K!); **DSD**: c. 95 km SSE of Salman (nr. Bakur well or Jalib Bakur), c. 310 m, GUEST, AL-RAWI & RECHINGER 18890 (K!); Galzarda mountain, 1973, F. KARIM, H. HAMID & M. JASMIN 40676 (K!); **DSD**: c. 40 km WNW of Shabicha, 1957, GUEST, AL-RAWI &

RECHINGER 19297 (K!); **DWD**: Lake Tharthar, Ramadi Liwa, 1964, HASHIM & MATTI 384 (K!); **DWD**: 55 km W of Ramadi (Ramadi-Rutba highway), 1957, AL-RAWI 20863 (K!).

Distribution: Iran, Iraq.

Habitat: Hard sandy gravel desert and hard silty plains; 250–350 m.

This species is characterized by short, slightly thickened peduncles, pilose corolla tubes and smooth, cylindric, shortly coronate cypselas.

21. *Anthemis homalolepis* EIG, Palest. J. Bot. Jer. ser. 1: 175. pl. 10, fig. 20 & pl. 11, fig. 19 (1938); RECH. f., Fl. Lowland Iraq 619 (1964). Type: Iraq, Syrian desert, 20 km W of Ramadi on the way to Baghdad, soil intermixed with little stones, 170 m, plain, 2.iv.1933, EIG & ZOHARY s. n. (HUJ! iso.).

Erect, appressed tomentose, 6–25 cm tall annual herb with diffuse, divaricate, ascending branches. Leaves sessile, ovate-oblong, 1–2.5 cm long, (5–) 8–12 mm wide, finely and deeply bipinnatisect into linear-oblong, $1-1.5 \times \text{ca. } 0.5$ mm, apiculate ultimate segments. Peduncles 6–9 cm long, slender or filiform, remaining unthickened in fruit. Capitula radiate, 1–2.5 cm across. Involucre 8–10 mm wide. Phyllaries: outer oblong-lanceolate, $3.5-4.5 \times \text{c. } 2$ mm, with broad hyaline margins; inner oblong-spathulate, $4.5-5.5 \times \text{c. } 2.5$ mm, broadly scarious and erose lacerate on margins and apices, all hairy outside, obtuse. Receptacle convex-hemispherical, c. 5–6 mm across, chaffy all over. Paleae flat, oblong-lanceolate, $3-3.5 \times \text{c. } 1.5$ mm, abruptly shortly mucronate, persistent. Ray florets 10–12, female, fertile, tubes glabrous; limbs oblong, $6-10 \times \text{c. } 4.5$ mm, white. Disc florets yellow, tubes glabrous, slightly longer than the paleae. Cypselas thin, cylindrical, $\pm$ curved, c. 2 mm long, sulcate, smooth, unilateral auricle very small.

Flowering period: February–May.

Specimens Examined:

DWD: Syrian desert, 20 km W of Ramadi on the way to Baghdad, 170 m, 1933, EIG & ZOHARY s. n. (HUJ!); **DWD**: Syrian desert, wadi Muhammadi, $32^{\circ} 22' \text{N}$, $42^{\circ} 40' \text{E}$, 70 km W of Ramadi (190 km W of Baghdad), 220 m, 1933, EIG & M. ZOHARY s. n. (HUJ!); **DWD**: 180 km W of Ramadi to Rutba, c. 450 m, 1962, CHAKRAVARTY, AL-RAWI, KHATIB & ALIZZI 31416 (K!); **DLJ**: 40 km NW of Falluja, 75 m, 1961, AL-RAWI 30191 (K!); **DWD**: 140 km W of Karbala, 200 m, 18.4.61, CHAKRAVARTY & AL-RAWI 30973 (K!); **DWD**: 20 km W of Nukhaib, 1961, AL-RAWI 30999 (K!); **DWD**: Swab, N of Rutba, 1967, ALIZZI 35210 (K!); **DWD**: 70 km W of Nukhaib, 1961, AL-RAWI 31019 (K!); **DWD**: c. 160 km E of Rutba, 440 m, CHAKRAVARTY, AL-RAWI, KHATIB & ALIZZI 31591 (K!); **DWD**: Syrian desert (c. 15 km W of Ramadi), c. 40 m, 1955, GUEST & AL-RAWI 13917 (K!); **DWD**: 80 km NW of Nukhaib, 1954, AL-RAWI 23707 (K!);

DWD: 20 km S of Nukhaib, ALIZZI & S. OMAR 35522 (K!).

Distribution: Endemic to Iraq.

Habitat: Wadi banks, sandy gravelly or loamy clay soils; dry gypsum soil with small gravel; 75–440 m.

22. *Anthemis rascheyana* BOISS., Diagn. Pl. Or. Nov. Ser. 1, 11: 8 (1849); EIG in Palest. J. Bot. Jer. ser. 1: 166 (1938); FEINBRUN-DOTHAN, Fl. Pal. 3: 334. Pl. 562 (1978); MOUTERDE, Nouv. Fl. Lib. Syr. 3: 412. Pl. CCXXIV, n. 1 (1986); GHAFOR & AL-TURKI in Candollea 52: 469. Fig. 4, E-H (1997); in CHAUDHARY, Fl. Kingd. Saudi Arabia 2 (3): 173. Pl. Comp. 52, E-H (2000). Type: Syria, Inter Rascheya et Damascus, BOISSIER s. n. (G-BOISS holo.).

Annual, up to 15 cm tall, ash-grey, appressed hairy herb with upright or ascending branches from near the base. Leaves oblong with pectinate petiole, somewhat bipinnatisect into linear-oblong, acute ultimate segments. Peduncles slender, not or only slightly thickened in fruit. Capitula small, radiate, 10–15 mm across. Involucre c. 6–8 mm wide. Phyllaries ovate-oblong, almost glabrous, obtuse with broad, scarious, ± lacerate margins. Receptacle hemispherical, c. 3–4 mm in diam., chaffy all over. Paleae oblong-lanceolate, carinate, obtusely denticulate and mucronate-acuminate at the apex, persistent. Ray florets female, tube ± compressed, glabrous and basally inflated; limbs, ovate-oblong, white. Disc florets yellow, with glabrous, basally inflated, ± compressed corolla tube. Cypselas thin, cylindrical, 1.5–2 mm long, dorsiventrally slightly compressed, striate, smooth, truncate to minutely auricled at the apex.

Flowering period: April–May.

Specimens Examined:

DSD: 8 km N by W of Aidaha (Al-Aida) (c. 95 km W of Salman), c. 410 m, 1957, GUEST, AL-RAWI & RECHINGER 19153 (K!); **DWD:** 7 miles south of T-1 station, Iraq, 1935, R. I. ATTIYAH s. n. (F!); **DWD:** Iraq Petroleum Co., Station T-4, collector unknown (probably YOUSUF LAZAR) 33 (F!).

Distribution: Iraq, Palestine, Saudi Arabia, Syria.

Habitat: Slight depressions on open stony plain, compact silty soil; up to 450 m.

A west Irano-Turanian element, recorded for the first time from Iraq, extending its distribution to middle Saharo-Sindian phytogeographic subregion of Iraq.

The remark of EIG (1938) as to the hairy or glabrous nature of corolla tube of ray florets is quite justified. Our specimens also do not exhibit hairs and similarly we could not find hairs on the tube of co-type (K!) of this species.

Sect. *Cota* (J. GAY) RUPR., Fl. Ingr. 1: 586 (1860).

Syn.: *Cota* J. GAY in GUSS., Fl. Sic. Syn. 2: 866 (1849) pro gen.

Annual, biennial or perennial herbs. Paleae oblong to spatulate, acuminate, more or less rigid, persistent. Cypselas strongly compressed dorsiventrally, rhombic in cross-section, twice or two and a half times as long as broad.

Type: *A. tinctoria* L.

Represented in Iraq by five species.

23. *Anthemis tinctoria* L., Sp. Pl.: 896 (1753); BOISS., Fl. Or. 3: 280 (1875) - pro parte; FEDOROV in SCHISCHKIN & BOBROV, Fl. SSSR 26: 41 (1961); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 211. Fig. 10 (1975); FERNANDES in TUTIN et al., Fl. Europ. 4: 155 (1976); FEINBRUN-DOTHAN, op. cit. 335. Pl. 565; MOUTERDE, op. cit. 404. Pl. CCXX, n. 1 (1983); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 18. Tab. 9 (1986). Type: Europe, Herb. Cliff. 414.2 (BM-CLIFF).

Perennial, erect, 30–50 (–70) cm tall, stiff, sparsely to densely tomentose-canescens, rarely almost glabrous, greyish-green herb with branches from near the base. Leaves obovate-ob lanceolate, 1–5 cm long, 0.6–2.5 (–3) cm wide, 2 (–3) pinnatisect into triangular-lanceolate, 1.5–2.5 × c. 1 mm, cuspidate segments. Peduncles 2.5–5 cm long, unthickened in fruit. Capitula radiate or discoid, (2–) 2.5–4.5 cm across. Involucre 1–1.5 cm wide. Phyllaries: outer triangular-lanceolate, smaller than inner ones, acute; inner phyllaries oblong to oblong-lanceolate, 3–4 × 2–3 mm, obtuse to subacute at the ciliate, pale or dark brown to diffuse brown apex, all sparsely or densely whitish-lanate in lower part. Receptacle hemispherical, 4–5 mm long, 10–15 mm across, chaffy all over. Paleae oblong-lanceolate, 4–5 × c. 1–1.5 mm, ± keeled, sharply cuspidate or attenuate acuminate at the apices. Ray florets when present fertile, 18–20, tube compressed; limbs oblong, 4–8 (–10) × c. 2 mm, white or creamy to golden yellow. Disc florets yellow, 3–4 mm long, tube basally not inflated at maturity. Cypselas ± dorsally compressed, 4-angled, rhombic in cross section, 1.75–2.25 mm long, faintly ribbed on each side, smooth, auricle less than 0.5 mm long, membranous, entire.

Flowering period: April–July.

Specimens Examined:

MRO: Iraqi Kurdistan: Env. of Rayat, 1280 m, near the bridge, 1933, ZOHARY s.n. (HUJ); **MRO:** Hoz (Kurdistania) Turc., alt. ca. 1900 m, in graminosis, 1910, FR. NABELEK 3602 (SAV!); **MRO:** Al-Gird Dagh (nr. Nawauda) by a stream, 2000 m, 1932, EVAN GUEST Rustam No. 2868 (F!, K!); **FUJ:** Pl. Mesopotameae & Mosul, 1841, KOTSCHY 177 (K!); Kurdistan (herb. Hookerianum 1867), K-141 (K!); **MRO:** Kurdistan, J. BRANDT & W. H. F. STRANGEWAYS 1840 (herb. Benthamianum), K-140

(K!); **MAM**: Daimka village, 35 km NE of Zakho, 1976, S. OMAR & K. AL-DABBAGH 45373-A (K!); **MRO**: Hawara Blinder Mountain, NE of Haji Omran, 1700-1900 m, 1959, AL-RAWI, NURI & AL-KASS 27797 (K!); **MRO**: Haji Omran, 1650 m, 1959, NURI & AL-KASS 27779 (K!); **MRO**: Between Kujar & Kani Grawl region, E. Karoukh, 1959, 1500-1700 m, AL-KASS, NURI SARHANK 27649 (K!); **MRO**: Haji Omran, 1971, S. OMAR, SAHIRA, F. KARIM & H. HAMID 38459 (K!); **MSU**: Azmir, on mountain, 1972, F. KARIM 39342 (K!).

Distribution: Throughout Europe, Iran, Iraq, Lebanon, Palestine, Syria, Turkey and Central Asia.

Habitat: Stony or muddy soil, mountain slopes, stream banks; stony soil; 1250–2000 m.

An extremely variable species in which a number of infraspecific taxa have been recognised in Europe. All the material seen by the authors belongs to var. *tinctoria* which differs from other radiate varieties in its erect or ascending habit, oblong leaves, yellow rays and deeply divided leaf segments with flat teeth.

24. *Anthemis melanolepis* BOISS., Diagn. Pl. Or. Suppl.: 297 (1888); GRIERSON & YAVIN, op. cit. 219; MOUTERDE, op. cit. 405. Pl. CCXX, n. 3 (1983); IRANSHAHR, op. cit. 21 (1986). Type: Cyprus, Prope Larenaca, P. SENTENIS & G. RIGO 804 (G holo.).

Syn.: *Cota palestina* REUT. in UNGER & KOTSCHY, Ins. Cypren 240 (1865), pro parte; *Anthemis palestina* REUT. in BOISS., Fl. Or. 3: 283 (1875), pro parte; *A. syriaca* BORNHM. in Feddes Repert. 10: 470 (1912); *A. melanolepis* var. *macrocarpa* EIG in Palest. J. Bot. Jer. ser. 1: 207 (1838).

Annual, ± glabrous, up to 30 cm tall herb with procumbent, divaricate branches. Leaves subsessile, oblong-obovate, 2–3-pinnatisect into triangular, callose-spinulose ultimate segments. Peduncles thickened upwardly. Capitula radiate, 2–2.5 cm across. Involucre 10–15 mm wide, outer phyllaries ovate, ± scarious at the apices, inner ones oblong, acute. Receptacle convex, chaffy all over. Paleae thick, leathery, brownish purple, apically cuneate, mostly shorter than cypselas, outer long cuspidate, occasionally all cuspidate and shorter than disc florets. Ray florets female, c. 15, tube glabrous; limbs oblong, c. 7.5 mm long, white. Disc florets yellow, c. 4 mm long, hardly inflated at the base in fruit. Cypselas tetragonous, compressed, c. 2.5 mm long, 8–10-ribbed on each side, ± winged on margins, auricle undulate, minute.

Flowering period: March–April.

Distribution: Cyprus, Turkey, Palestine, Iraq.

Included here on a report from Iraq (Diyala: ad confines Persiae in collibus conglom., 10 km E Mandali, ad ripam dextram fluvi, RECHINGER 12789) by IRANSHAHR (1986). The authors have not seen any material from the flora of Iraq area.

25. *Anthemis coelopoda* BOISS., Diagn. Pl. Or. Nov. Ser. 1, 11: 12 (1849); Fl. Or. 3: 283 (1875); FEDOROV in SCHISCHKIN & BOBROV, Fl. SSSR 26: 64 (1961); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 217. Fig. 10 (1975); FERNANDES in TUTIN et al., Fl. Europ. 4: 157 (1976); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 25 (1986). Type: Turkey, Anatolia, E. BOISSIER s. n. (G-BOISS holo.).

Syn.: *A. rigida* NABELEK in Publ. Fac. Sci. Univ. Masaryk 52: 14. t. 2. fig. 2 (1925) (non BOISS. ex HELDR. 1857); *A. coelopoda* var. (β) *bourgaei* BOISS., Fl. Or. 3: 284 (1875), non *A. bourgaei* BOISS. & REUT. (1852).

Erect, 20–60 cm tall, sparsely pubescent to glabrescent, annual herb with divaricate suberect branches. Leaves elliptic-oblong, 2.5–7 cm long, 1.5–3 cm broad, bi- or tripinnatisect into oblong or oblanceolate, 2–8 mm long, 0.5–1.5 mm wide, acute-mucronulate ultimate segments. Peduncles 5–8 cm long, hollow and upwardly thickened in fruit. Capitula radiate, 2–3 cm across. Involucre 1–2 cm wide. Phyllaries: outer ovate to oblong-linear, $\pm$ acute; inner oblong, $4-6 \times 2-2.5$ mm, $\pm$ obtuse, scarious at the apices. Receptacle hemispherical, c. 5–6 mm across, chaffy all over. Paleae $\pm$ oblong-spathulate, $3.5-4.5 \times c. 2$ mm, gradually narrowed above, persistent, somewhat truncate and abruptly acuminate, acumen nearly as long as basal part or slightly shorter. Ray florets female, c. 20, fertile, tube glabrous; limb $10-15 \times 3-4$ mm, white. Disc florets yellow, c. 4 mm long, tube glabrous, basally not inflated in fruit. Cypselas oblong, c. 2 mm long, compressed, faintly (2–) 3-ribbed on each side, with minute, entire or crenulate auricle.

Flowering period.: March–May.

Specimens Examined:

MAM: Sakho (Zakho) to Sharanish, 1973, F. KARIM, H. HAMID & M. JASIM 41135 (K!); **MSU:** Sulaimania, 1930, D. W. PETERSON 820 (K!); **MAM:** Sarsang to Hillside, 1973, F. KARIM, H. HAMID & M. JASIM 41012 (K!); **MAM:** Surdor, nr. Dohuk, 1960, coll. ignot., W-187 (K!); **MSU:** Bakraja, 1971, S. OMAR & F. KARIM 37994 (K!); **MRO:** Kurdistan Turcicae districtu Serijur, Hondran Dar supra pagum Rewanduj dit Erbil (Arbela), in graminosis alt. ca. 900 m, 23.5.1910, NABELEK 3625 (SAV! Type of *A. rigida* NABELEK).

Distribution: Bulgaria, Yugoslavia, Greece, Turkey, Iraq, Iran, Afghanistan.

Habitat: Mountainside; bank of irrigation ditch ; clay soil in field; 800–1000 m.

26. *Anthemis altissima* L., Sp. Pl.: 893 (1753), emend. SPRENG., Syst. Veg. 3: 594 (1826); BOISS., Fl. Or. 3: 282 (1875); FEDOROV, op. cit. 64; GRIERSON & YAVIN, op. cit. 216. Fig. 10; FERNANDES, op. cit. 157; MOUTERDE, Fl. Lib. Syr. 3: 405. Pl. CCXX, n. 2 (1983); IRANSHAHR, op. cit. 23. Tab. 14 (1986). Type: Italy, Herb. Linn. 1016.3 (LINN!).

Syn.: *Cota altissima* (L.) J. GAY in GUSS., Fl. Sic. Syn. 2: 867 (1844); *A. cota* L., Sp. Pl. 893 (1753) emen. VIS., Fl. Salm. 2: 78 (1847); POST, Fl. Syr. Palest. & Sinai ed. 2, 2: 50 (1933); *A. cota* L. var. *brevicuspida* EIG in Palest. J. Bot. Jer. ser. 1: 204 (1938); *A. cota* var. *longicuspida* EIG, op. cit.

Annual, erect, up to 120 cm tall, hairy to nearly glabrous robust herb with branches from above the base. Leaves ovate-oblong, 2–3-pinnatisect into linear-lanceolate, 3–6 mm long, less than 1 mm wide, spinulose-mucronate ultimate segments. Peduncles upwardly thickened in fruit, up to 7.5 cm long. Capitula radiate, (2–) 2.5–4 (–5) cm across. Involucre 1–2 cm wide. Phyllaries: outer ovate, acute, not scarious margined; inner oblong-lanceolate, to $\pm$ elliptic-oblong, obtuse, with hyaline or scarious margins and tips. Receptacle hemispherical, becoming umbonate, c. 10–15 mm in diam., chaffy all over. Paleae oblong-spathulate, $\pm$ keeled, c. 3.5–4 $\times$ 1.5 mm, straw coloured, abruptly contracted at the apices with c. 3.5–4 mm long, slender acumen. Ray florets female, 18–20, mostly fertile, tube glabrous; limbs elliptic-linear, 7.5–12.5 $\times$ c. 3 mm, white. Disc florets yellow, as long as the paleae, tube glabrous, not inflated in fruits. Cypselas $\pm$ compressed, obpyramidate, 2–2.5 mm long, 4-angled and rhombic in cross section, usually 10-ribbed on each face, smooth, with a very short, entire auricle at the apices.

Flowering period: May–July.

Specimens Examined:

MSU: Sulaimaniya, 1934, Field Museum Near East Expedition, HENRY FIELD & YOUSUF LAZAR 952 (F!); **MJS:** Jebel Sinjar, above Kursi, 1100 m, 1948, GILLET 11055 (K!); **MRO:** Kurdistan, Herb. Hookerianum, Kew No. 204 (K!); **MAM:** Ain Nume, 37° 13' N, 43° 21' E, inter Aradan et Hasitha, 1910, NABELEK 3621 (SAV!); **DLJ:** Jazira (south of Sinjar near Baiji), c. 300 m, 1954, EVAN GUEST 13390 (K!).

Distribution: Spain, Italy, Germany, Yugoslavia, Albania, Bulgaria, Greece, Turkey, Palestine, Syria, Iraq, Iran, Turkmenistan, Afghanistan, Pakistan.

Habitat: Limestone soil, cultivated fields; 300–1100 m.

27. *Anthemis brevicuspis* BORNH. in Beih. Bot. Centralbl. 32 (2): 397 (1914); IRANSHAHR, op. cit. 22. Tab. 13 (1986). Type: Nahavand “Koh-i-Garru”, TH. STRAUSS s. n. (JE).

Syn.: *A. feinbruniae* EIG, Palest. J. Bot. Jer. ser. 1: 204 (1938); *A. rayatensis* EIG, op. cit. 205.

Erect, up to 35 cm tall, sparsely patulous hairy herb with divaricate, ascending branches. Lower leaves with dentate petiole, upper sessile, oblong to ovate-oblong, bipinnatisect to $\pm$ tripinnatisect into remote, linear-oblong to narrowly lanceolate, acute, mucronate ultimate segments. Peduncles up to 10 (–12) cm long, remaining

unthickened in fruit. Capitula radiate, c. 2.5 cm across. Involucre 8–10 mm wide. Phyllaries ovate to oblong-lanceolate, hairy, brown membranous margined, lacerate-fimbriate in upper half and at the acute apex. Receptacle hemispherical, 5–6 mm long, chaffy all over. Paleae oblong-spathulate, 3–3.5 mm long, c. 1.5 mm wide, slightly carinate, truncate to subcordate-emarginate, with 1–1.5 mm long mucro. Ray florets female, fertile, tube glabrous; limbs oblong, 9–12 mm long, 4–5 mm broad, white. Disc florets slightly longer than paleae, yellow, tube glabrous. Cypselas tetragonal, compressed, c. 3×1.25 mm, smooth, inconspicuously 10-striate, with 0.25–0.5 mm long, denticulate auricle at the apex.

Flowering period: April–October.

Specimens Examined:

MJS: Northern Iraq, Jebel Sindjar, 800 m, 1933, EIG & ZOHARY s. n. (type of *A. feinbruniae* EIG; HUJ! holo.; S iso.); **MRO:** Iraqi Kurdistan, Env. of Rayat, 1280 m, 1933, EIG & ZOHARY s. n. (HUJ!, isotype of *A. rayatensis* EIG).

Distribution: Iran, Iraq.

Habitat: Near cultivated moist lands in the mountainous region.

Sect. *Maruta* (CASS.) REICHENB., Deutsch. Botaniker ed. 2, 2: 139 (1844);
BOISS., Fl. Or. 3: 280 (1875).

Syn.: *Maruta* CASS., Dict. Sci. Nat. 29: 174 (1823) pro gen.

Annual herbs. Paleae subulate to bristle-like, more or less persistent. Cypselas obconical or turbinate, round or somewhat quadrangular in cross-section, not compressed, 2–3 times as long as broad.

Type: *A. cotula* L.

In Iraq, this section is represented by three species.

28. *Anthemis pseudocotula* BOISS., Diagn. Pl. Or. Nov. Ser. 1, 6: 86 (1846), emend. EIG, Palest. J. Bot. Jer. ser. 1: 196 (1938); RECH. f., Fl. Lowland Iraq 621 (1964); TÄCKHOLM, Stud. Fl. Egypt 2nd ed. 574 (1974); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 209. Figs. 8 & 10 (1975); FEINBRUN-DOTHAN, Fl. Pal. 3: 338. Pl. 570 (1978); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 16. Tab. 8 (1986); AL-RAWI, Fl. Kuwait 2: 240 (1987); GHAFOR & AL-TURKI in Candollea 52: 472. Fig. 6, A-G (1997); in CHAUDHARY, Fl. Kingd. Saudi Arabia 2 (3): 174. Pl. Comp. 53, A-G. (2000).

Annual, (10–)15–50 cm tall, appressed hairy or glabrescent herb with erect or ascending branches from near the base. Leaves shortly petiolate, ovate-oblong, $1.5\text{--}3 \times 1\text{--}1.5$ cm, 2 (–3)-pinnatisect into linear-oblongate, $1\text{--}3 \times \text{ca. } 0.5$ mm, acute ultimate segments. Peduncles 3–6 cm long, gradually thickened upwards and strongly

arcuate in fruit. Capitula radiate, 1.5–2.5 cm across. Involucre 5–8 mm wide. Phyllaries ovate-oblong, $3-4 \times 1-2$ mm, pubescent, scarious margined, subacute. Receptacle elongate-conical, $6-8 \times 3-4$ mm, chaffy in the upper half only. Paleae linear-subulate, 2.5–3 mm long, cuspidate, persistent. Ray florets female, 10–12, fertile, tube glabrous, compressed; limbs oblong, $3-7 \times 2.5-3.5$ mm, white. Disc florets yellow, as long as paleae, tube glabrous, somewhat swollen at the base in fruit. Cypselas turbinate-obpyramidate, $\pm$ tetragonous, 1–1.5 mm long, distinctly 10-ribbed, occasionally $\pm$ tuberculate, oblique, truncate or rounded at the apices, auricle absent or nearly up to half as long as cypselas.

Flowering period: March–July.

Mature fruits are essentially needed to confirm as to the infra-specific taxa and the following specimens lacking mature fruits could not be assigned to their respective subspecies or varieties.

Specimens Examined:

MAM?: Dhruk, 1932, MIEKE BEE 3281 (K!); Dhruk, 500 m, 1951, E. GUEST Rustam No. 1309 (K!); **FPF**: Qizil Robot, 1932, E. GUEST Rustam No. 1768 (K!); **DWD**: Al-Masad, 15 km S of Rutba, 650 m, CHAKRAVARTY & AL-RAWI et al. 32839 & 32875 (K!); **FUJ**: 40 km E of Sinjar, CHAKRAVARTY, AL-RAWI, KHATIB & ALIZZI 33137 (K!); **FUJ**: Roadside weed near Hamman Al-Alil, c. 30 km S of Mosul, 1974, M. HUSSAIN 511 (K!); **MRO**: 2 km N of Darband, 650 m, 1975, Botany Staff 43207 (K!); **LSM**: Chalut Police Station, near Persian border, c. 150 km, 1958, AL-RAWI & SH. HADAD 25676 (K!); **DWD**: 45 km NW of Rutba, Nr. H3, c. 710 m, 1957, AL-RAWI 211611 (K!); **FAR**: Arbil Province, 1933, M. AL-RADHI Rustam No. 3865 (K!); **LEA**: Fakkia, 70 km E of Amara, c. 40 m, 1958, AL-RAWI 25790 (K!); **MSU**: Qaradagh Mountain, Timara village, 1973, F. KARIM, H. HAMID & M. JASIM 40590 (K!); **DWD**: Jadida, W. of Nukhaib, 350 m, 1961, AL-RAWI 31047 (K!); **DWD**: 15 km S of Rutba, 620 m, KHATIB & NAZIM 32453 (K!); **DSD**: Southern desert, 30 km W by N, Butiaya, 1955, 150 m, E. GUEST, AL-RAWI & G. LONG 14153 (K!); **DGA**: Khorqin, 1957, valleys of Jebel Hamrin, HAINES W93 (K!); **LEA**: Tarmiya, Baghdad, 1955, HAINES W113 (K!); **DWD**: 5 km S of H3 (Nr. Rutba), c. 710 m, 1957, AL-RAWI 21207 (K!); **LCA**: Sudur, 1976, S. OMAR, AL-KAISI & M. NOORI 44298 (K!); **MSU**: Between Sasar & Dokan, 510 m, 1975, Botany Staff 43059 (K!); **DLG**: Balad, AL-RAWI & GILLET 6508 (K!); **DLJ**: Telegraph pole M30, Between Baiji & Mosul, 1925, HENRY FIELD & YOUSUF LAZAR R 389 (K!); **MSU**: Just E of Durbendikan, Sulaimaniya Liwa, 1964, F. A. BARKELY & SHARIF Y. HADDAD 7750 (K!); **FPF**: E of Badra, 1949, 180 m, AL-RAWI & GILLET 7253 (K!); **DLJ**: Rawah-Sinjar, 115 km SW of Sinjar, 250 m, 1962, CHAKRAVARTY, AL-RAWI, KHATIB & ALIZZI 31989 (K!); **LEA**: Shimal (Sinjar), 1932, near Baghdad, YOUSUF LAZAR 129 (K!); **DWD**: 75 km W of Rutba (Wadi Al-Walaj), c. 710 m, 1957, AL-RAWI 21190 (K!); **DGA**: Baghdad, 12 km, inter Tigris flumen et

Monte Jabal Hamrin, ad oppido Samara Orientem versus, ca. 34° 15' N, 44° E, 1957, RECHINGER 9558 (G!, K!); **DWD**: In arenosis 10 km N of Sheikh Mohammad, 1957, RECHINGER 9593 (G!); Western desert, c. 700 m, 1957, RECHINGER 9944 (G!, K!); **DWD**: 35 km W of Rutba, ca. 600 m, 1957, RECHINGER 9920 (G!, K!); **LGA**: Diwaniya, Southern desert, Wadi Al-Khirr, 15 km W of Lussuf (c. 100 km NNW of Shabicha), 32 m, 1957, RECHINGER 9489 (G!, K!); **DWD**: Western desert, Wadi Al-Walaj, 75 km SW of Rutba, ca. 700 m, 1957, RECHINGER 9931 (G!); **LEA**: Baghdad, 1920, R. J. D. GRAHAM s. n. (K!); **DSD**: Takhadid, 330 m, 1978, AL-KAISI, K. HAMID & H. HAMID 48084 (K!); **DLJ**: Tharthar Dam, 1965, HIKMAT ABBAS AL-ANI & Y. HADDAD 9659 (K!); **LCA/LEA**: Al-Sudor, Diyala Liwa, 1964, W. SULEIMAN 215 (K!); **DSD**: Southern desert, Shabicha, 1947, AL-RAWI & GILLET 6283 (K!); **FUJ**: Road to Sinjar, 1969, S. OMAR & H. HAMID 36421 (K!); Between Baghdad and Syrian desert, F. K. JACKSON H 240/1930 (K!); **LEA**: Near Baghdad, 1933, YOUSUF LAZAR 198 (F!); Mosul, R. G. BAYLISS 93 (K!); **DWD**: Shabicha, Southern desert, c. 300 m, 1955, GUEST, AL-RAWI & G. LONG 14060 (K!); **DSD**: Southern desert, 52 km E by Salman, 1955, GUEST, AL-RAWI & G. LONG 14126 (K!); **FPF**: 25 km SE of Buksaya, Khatima Police Station, AL-RAWI & SH. HADDAD 25639 (K!); **DWD**: Wadi Al-Khirr, 15 km N of Lussuf (c. 100 km NNW of Shabicha), 1957, GUEST, AL-RAWI & RECHINGER 19442 (K!); **FPF**: Pilkana, near Khaniqin Chehale, near Amara, 1928, H. FIELD & YOUSUF LAZAR H. 35 (F!, K!).

Distribution: Cyprus, Turkey, Palestine, Syria, Egypt, Saudi Arabia, Iraq, Iran.

Habitat (of sp.): Fine sandy-clay to light clay gravelly soils or silty soil or moist black loam in depressions; sometimes in heavy silt; 30–750 m.

The following infra-specific taxa have been recognized on the basis of availability of mature fruits.

ssp. *pseudocotula*

Cypselas auriculate.

(a) **ssp. *pseudocotula* var. *pseudocotula***. Type: Persia australi ad Shiraz et prope pagos Dalechi et Gere, TH. KOTSCHY 75 (G-BOISS holo.).

Auricle 1/3 to 1/2 as long as cypselas, triangular, entire or obscurely lobed.

Flowering period: April–June.

Specimens Examined:

MSU: Derbandi Khan, mountain, 1971, S. OMAR & F. KARIM 38138 (K!); **DSD**: Desert Province, c. 55 km NW of Shabicha, c. 210 m, 1955, GUEST, AL-RAWI & H. LONG 14050 (K!); **FUJ**: Tell Kotchek, c. 400 m, 1948, GILLET 10836 (K!); **LCA**:

Near Baghdad, 1933, Y. LAZAR 197 (F!); **LCA**: Baghdad, 1933, Y. LAZAR Rustam No. 3897 (K!).

Distribution: Egypt (Sinai), Turkey, Lebanon, Palestine, Syria, Iraq, Iran.

Habitat: Silty depressions; 150–400 m.

(b) *ssp. pseudocotula var. radiata* EIG, Palest. J. Bot., Jer. ser. 1: 197 (1938). Type: Palestine Coastal plain, Atlith, 1935, EIG, GRIZI & ZOHARY s. n. (HUJ holo.).

Auricle very short, divided into a few lobes.

Flowering period: April–June.

Specimens Examined:

DWD: 75 km W of Rutba (Wadi Al-Walaj), c. 710 m, 1957, AL-RAWI 21189 (K!); **MRO**: Gali Warta, c. 30 km NW by N of Rania, 950 m, 1959, AL-RAWI, NURI & AL-KASS 28861 (K!); **MRO**: Koi Sanjaq, 590 m, 1959, AL-RAWI, AL-KASS & NURI 28117 (K!); **MSU**: Qara Chulam, between Sula & Chuwarta, 1971, S. OMAR & F. KARIM 38094 (K!); **MRO**: Plingan village, c. 17 km NW of Rania, 900 m, 1959, AL-RAWI, NURI & AL-KASS 28663 (K!); **MRO**: Kalala Junction, 1958, AL-KASS 18584 (K!); **DWD**: 35 km NW of Rutba, c. 600 m, 1957, AL-RAWI 21145 (K!); **MRO**: Qara village, on road to Koi Sanjaq, c. 440 m, 1959, AL-RAWI, NURI & AL-KASS 28035 (K!); **MAM**: 8 km S of Dohuke, 590 m, 1975, Botany Staff 43370 (K!); **DLJ**: Telegraph pole M 90, between Baiji & Mosul, May 1925, H. FIELD & Y. LAZAR 389 (K!); **FKI**: 30 km from Kirkuk to Sulaimaniya, hillside, 1973, F. KARIM, H. HAMID & M. JASMIN 4514 (K!); **FAR**: Arbil Province, 1933, M. W. AL-RADHI Rustam No. 3865 (K!); **FPF**: 38 km SE of Mandali, c. 127 m, 1957, AL-RAWI 20698 (K!).

Distribution: Iraq, Jordan, Syria.

Habitat: Clayey sand or sandy silty soils in low depressions; 100–950 m.

(c) *ssp. pseudocotula var. massadensis* YAVIN, Israel Journ. Bot., 19: 146 (1970). Type: Judean Desert, Arad-Mezada road, gravelly ground, 6.4.1966, YAVIN s. n. (HUJ holo.).

Auricle 1/3 to 1/2 as long as cypselas, divided into a few triangular lobes.

Flowering period: March–April.

Specimens Examined:

Inside the castle of Hodos, 230 m, 1964, CHAKRAVARTY & AL-RAWI 33043 (K!); **DWD**: 70 km W of Nukheib, 300 m, 1961, AL-RAWI 31394 (K!); **FUJ**: Near Baaj, roadside, 1969, S. OMAR & H. HAMID 36529 (K!); **FUJ**: Balad Sinjar-Tal Afar, 1100 ft., 1933,

GUEST Rustam No. 4139 (K!); **DLJ**: Falluja-Ain-Ehwrait Etal, 1930, GUEST Rustam No. 1120 (K!); **DGA**: 13 km E of Samarra, c. 65 m, AL-RAWI 20359 (K!).

Distribution: Iraq, Palestine.

Habitat: loamy clay soils in depressions; 50–400 m.

ssp. *rotata* (BOISS.) EIG, l. c. 197, t. 8. figs. 44 & 46 (1938).

Syn.: *Anthemis rotata* BOISS., Fl. Or. 3: 318 (1875). Type: Arabia Petraea, March, 1846, BOISSIER s. n. (G-BOISS holo.).

Auricle absent.

(d) ssp. *rotata* var. *rotata*

Apex of cypselas oblique, slanting outwards.

Flowering period: March–July.

Specimens Examined:

MSU: Sulaimaniya Arbat, 1971, S. OMAR & F. KARIM 38115 (K!); **MSU**: 5 km from Ranjawin, 1160 m, 1973, M. NOORI & K. HAMID 41244 (K!); **DGA**: Between Samara & Tekrit, 1974, SAHIRA, RAJA & KHALIDA 41807 (K!); **FPF**: 10 km N of Khaniqin, hillside, 1977, H. HAMID 46605 (K!).

Distribution: Egypt (Sinai), Iraq, Israel, Jordan, Palestine.

Habitat: Gravelly soils by roadsides and hillside; 800–1160 m.

(e) ssp. *rotata* var. *rotundata* EIG, l. c. Pl. 8. f. 46 (1938). Type: Palestine, Judean desert, env. of Wadi Sikieh (Siqive) 29.3.1930, FEINBRUN & ZOHARY s. n. (HUJ holo.).

Cypselas rounded at the apex, not slanting outwards.

Flowering period: March–May.

Specimens Examined:

MSU: Tainal, 1971, S. OMAR & F. KARIM 37925 (K!); **LCA**: Work-ground, near irrigation ditch, Baghdad, 1955, HAINES 113 (K!); **DGA**: 50 km E of Samara, Asila village (10 km N Shaikh Mohammad), c. 50 m, 1957, AL-RAWI 20439 (K!); **LEA**: 13 km E of Baquba, 1929, COWAN & DARLINGTON 184 (K!).

Distribution: Iraq, Israel, Palestine.

Habitat: Sandy soil near irrigation ditches; 50–100 m.

29. *Anthemis cotula* L., Sp. Pl.: 894 (1753); BOISS., Fl. Or. 3: 315. (1875); FEDOROV in SCHISCHKIN & BOBROV, Fl. SSSR 26: 67. Pl. 4, fig. 1 (1961); RECH. f., Fl. Lowland Iraq

621 (1964); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 208. Fig. 10 (1975); FERNANDES in TUTIN et al., Fl. Europ. 4: 155 (1976); FEINBRUN-DOTHAN, Fl. Pal. 3: 337. Pl. 569 (1978); MOUTERDE, Nouv. Fl. Lib. Syr. 3: 413. Pl. CCXXX, n. 1 (1983); GHAFOR & AL-TURKI, loc. cit. 473. Fig. 6, P-S (1997). Type: 'Habitat in Europae ruderalis, praecipue in Ucraina' Herb. Linn. 1016.16 (LINN!).

Syn.: *Cotula foetida* S. G. GMEL., Reise Russl. 1: 137 (1774).

Annual, up to 60 (–70) cm tall, sparsely hairy to almost glabrous, foetid herb with erect or ascending basal branches and corymbosely branched above. Leaves shortly petioled or subsessile, sometimes fleshy, obovate-oblong or ovate-oblong, 1.5–6.5 cm long, 0.5–3 cm wide, finely 2–3-pinnatisect into narrowly linear, 1–3 × ca. 1 mm, entire or 2–3-dentate, acute-mucronate ultimate segments. Peduncles slender, up to 15 cm long, unthickened in fruit. Capitula radiate, occasionally discoid, 1.2–3 cm across. Involucre 6–10 mm wide. Phyllaries ovate-oblong, 3–4 mm long, whitish hairy, margins narrowly scarious, ± obtuse at the apices. Receptacle oblong-conical, 5–8 × 3–4 mm, chaffy in the upper half only. Paleae linear-subulate, c. 2.5–3 mm long, bristly, persistent. Ray florets female, 14–16, sterile, tube glabrous; limbs oblong-elliptic, 5–14 × 3–6 mm, white. Disc florets yellow, as long as to slightly longer than the paleae, tube terete, glabrous, ± inflated below in fruit. Cypselas subcylindrical-turbinate, 1–1.5 mm long, obscurely 8–10-ribbed, tuberculate, light brown, exauriculate to rarely crenulate-rimmed.

Flowering period: March–May.

Specimen Examined:

FUJ: Mosul, in silvulis salicum ad ripam Tigridis, 10.5.1910, FR. NABELEK 3639 (SAV!).

Distribution: SW Asia, common in almost all European countries and North Africa; introduced into N & S America, Australia and New Zealand.

Habitat: Rare in Iraq in clay and alluvial damp soil in upper plains and foothills region; 250–300 m.

An excessively variable species which can be easily confused with *A. pseudocotula* and *A. arvensis*. Differs from the former by its more stiffly erect stems, more or less glabrous, linear leaf lobules, reflexed limbs and exauriculate, tuberculate cypselas, and from the latter in its readily deciduous cypselas, neither thickened nor arcuate fruiting peduncles and sterile ray florets.

30. *Anthemis corymbulosa* BOISS. & HAUSSKN. in BOISS., Fl. Or. 3: 316 (1875); RECH. f., Fl. Lowland Iraq 621 (1964). Type: Hab. in deserto ad fluviam Chabur Mesopotamiae, HAUSSKNECHT s. n. (G-BOISS holo.).

Annual, erect or ascending, up to 45 cm tall, unbranched below, somewhat corymbosely branched above upper half, glabrous or glabrescent herb. Leaves shortly petioled or somewhat sessile, linear-oblong, 1.5–3 cm long, 1–1.5 cm wide, uni- or bipinnatisect into small, remote, finely filiform, $\pm$ obtuse ultimate segments. Peduncles slender, 2.5–4 cm long, unthickened in fruit. Capitula radiate, 1.2–1.6 cm across. Involucre 4–6 mm wide. Phyllaries ovate, c. $2\text{--}2.5 \times 1.5$ mm, glabrous, obtuse, broadly membranous at the apices and margins. Receptacle conical, 3–4 mm long, pitted in the lower and chaffy in the upper half. Paleae narrowly lanceolate, c. 2 mm long, keeled. Ray florets female, sterile; limbs narrowly oblong-ovate, $6\text{--}7 \times 2.5\text{--}3$ mm, white. Disc florets yellow, with glabrous, punctate-glandular, $\pm$ compressed corolla tube. Cypselas deciduous, turbinate, c. 1.5 mm long, somewhat tuberculate by sessile glands, with nearly half as long or shorter unilateral auricles.

Flowering period: May–September.

Specimens Examined:

FUJ: In deserte ad fluviam Chabur Mesopotamiae, HAUSSKNECHT 527 (G-BOISS; JE!); **LEA:** P.4. NE of Baquba, (Shatvaban road), 1957, Hunting Technical Services Limited 8 (K!); **LEA:** Iraq, lower Diyala, 1957, V. C. R. 161 (K!).

Distribution: Endemic to Iraq.

Habitat: In shallow depressions in the vicinity of irrigated lands; 100–200 m.

YAVIN (1970) reported this species as endemic to Turkey. This appears to be based on misidentification as it was not reported by GRIERSON & YAVIN (1975) from that country. IRANSHAHR (1986) did not include this species in Flora Iranica.

Sect. *Rumata* A. FEDOROV, Fl. SSSR 26: 865 (1961).

Perennial herbs with woody rhizomatous rootstock. Phyllaries usually black or pale margined. Paleae lanceolate, more or less carinate, often subulate. Cypselas obconical or obpyramidate, angular in cross section, not compressed.

Type: *A. saportana* ALB.

Two species of this section occur in Iraq.

31. *Anthemis pauciloba* BOISS., Diagn. Pl. Or. Nov. Ser. 1, 6: 83 (1845); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 195. Fig. 9 (1975); MOUTERDE, Fl. Nouv. Lib. Syr. 3: 408. Pl. CCXXII, n. 3 (1983); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 12. Tab. 3 (1986). Type: Anatolia, Diarbekir, TH. KOTSCHY 272 (K! holo.; W iso.).

Syn.: *A. argentea* EIG in Palest. J. Bot. Jer. ser. 1: 192 (1938); *A. pauciloba* var. *brachysperma* EIG, l. c. 190.

Perennial, upright, up to 45 cm tall, basally $\pm$ woody, appressedly greyish or pale pubescent herb with branches from near the base. Leaves long petioled, lower leaves ovate or oblong-spathulate, up to 10 cm long (incl. petiole), pinnatipartite or incompletely 2-pinnatisect into linear-oblongate or cuneate segments, upper leaves cuneate-spathulate, entire or shallowly 2–3-toothed. Peduncles up to 30 cm long, unthickened in fruit. Capitula radiate or discoid, 1.5–2.2 cm across. Involucre 10–15 mm wide. Phyllaries ovate-lanceolate, 3–4 mm long, sparsely to densely lanate-tomentose, acute. Receptacle depressed hemispherical, c. 5 mm long, chaffy all over. Paleae oblongate, c. 2.5 mm long, keeled, acuminate. Ray florets 10–30 when present, tube glabrous; limbs 2.5–7 mm long, yellow. Cypselas angular, 2–3 mm long, incurved, obscurely ribbed, whitish, with unilateral, 0.5–1 mm long, $\pm$ dentate auricle.

Flowering period: April–July.

Distribution: Lebanon, Syria, Turkey, Iraq.

Habitat: Limestone steppes; 1300–2000 m.

Included here on a report from Iraq by IRANSHAHR (1986) who has cited RECHINGER 10968 (W) and RECHINGER 10874 (W) from Sharanish area of Iraqi Kurdistan. The authors, however, have not examined any material.

32. *Anthemis kotschyana* BOISS., Diagn. Pl. Or. Nov. Ser. 2, 3: 23 (1856) **var. *discoidea*** (BORNM.) GRIERSON, Notes Roy. Bot. Gard. Edinb. 33: 428 (1975); GRIERSON & YAVIN, op. cit. 196. Fig. 9 (1975). Type: Anatolia, Egin, Salachlu, P. SENTENIS 2725 (W hol.).

Syn.: *A. kotschyana* f. *discoidea* BORNM. in Feddes Rep. Beih. 89: 331 (1944); *A. warburgii* EIG in Palest. J. Bot. Jer. ser. 1: 189 (1938); *A. bulgardaghica* EIG, op. cit. 192; *A. rotundifolia* EIG, op. cit.

Perennial, appressed greyish hairy herb with suberect, up to 25 (–40) cm tall, basally woody branches. Leaves long petiolate, lamina ovate or oblong, 0.8–2 cm long (excl. equally long petiole), bipinnatisect into linear-oblongate, 2–5 mm long ultimate segments; upper leaves becoming 1-pinnatisect. Peduncles up to 15 cm long, leafless. Capitula discoid, 1–1.5 cm across. Involucre 7–12 mm wide. Phyllaries oblong to ovate-lanceolate, 2–4 mm long, sparsely appressed pubescent, slightly scarious at the apices, pale or dark margined, acute or $\pm$ acute. Receptacle hemispherical. Paleae linear-oblong to $\pm$ spathulate, 3–4 mm long, membranous, mucronate. Disc florets yellow, 2.5–3.5 mm long, inflated basally in fruit. Cypselas obconical, 1.5–2.5 mm long, pale-whitish, obscurely striate, exauriculate or unilaterally shortly auricled.

Flowering period: May–August.

Distribution: Iran, Iraq, Turkey.

Habitat: *Quercus* woods, on steppe and cultivated slopes; 1800–2060 m.

Of this highly polymorphic species only var. *discoidea* (BORNH.) GRIERSON has been reported from Iraq by IRANSHAHR (1986) who cites AL-RAWI 23604 from Iraqi Kurdistan. It is very difficult to separate this variety from discoid forms of *A. cretica*.

Sect. *Odontostephana* EIG, Palest. J. Bot. Jer. ser. 1: 203 (1938).

Syn.: Sect. *Maruta* (CASS.) BOISS., Fl. Or. 3: 280 (1875) pro parte (excl. typo).

Annual herbs. Phyllaries deciduous. Paleae subulate, on upper part of receptacle, deciduous. Disc cypselas long cylindric, dilated to the base and apex; ray cypselas deciduous.

Type: *A. odontostephana* BOISS.

Two species are found in Iraq.

33. *Anthemis tubicina* BOISS. & HAUSSKN. in BOISS., Fl. Or. 3: 319 (1875); GRIERSON & YAVIN in DAVIS, Fl. Turk. 5: 211 (1975) Type: Iraq: In rupestribus calcareis montis Sindjar Mesopotamiae, 1867 HAUSSKNECHT 539, Montis Pir Omar Gudrum, 915–1220 m, HAUSSKNECHT 534 (G-BOISS syn; JE! syn).

Syn.: *A. odontostephana* BOISS. var. *tubicina* (BOISS. & HAUSSKN.) BORNH., Beih. Bot. Centrbl. 28 (2): 247 (1911); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 11. Tab. 2 (1986).

Annual, 10–25 cm tall, greyish hairy herb with decumbent branches from near the base. Leaves small, petiolate, ovate-oblong, 1.5–2.5 cm long, 1–1.5 cm wide, bipinnatisect into linear-oblong, 1–3 mm long, less than 1 mm wide, acute ultimate segments. Peduncles filiform, 2–4 cm long, becoming much (3–4 mm wide) thickened in fruit. Capitula small, radiate, 8–12 mm across. Involucre 4–5 mm wide. Phyllaries oblong-ovate or inner obovate, 3–4 mm long, broadly scarious margined, hairy in the midrib region, obtuse, deciduous. Receptacle convex, 3–4 mm in diam., chaffy in the upper part. Paleae narrowly linear-lanceolate, shorter than to equalling the cypselas, hyaline, deciduous. Ray florets 5–6, sterile; limbs $\pm$ obovate, 4–5 mm long, white. Disc florets yellow, tube glabrous, not inflated at the base in fruit. Cypselas cylindrical, 3–4 mm long, slightly dilated to the base, 10-ribbed, all prickly tuberculate, persistent and $\pm$ patent on receptacle at maturity, truncate with acutely 10-lobed or dentate radiating crown at the apex.

Flowering period: March–June.

Specimens Examined:

MJS: Sinjar, 650–700 m, 1948, GILLET 10883 (K!); **MJS:** Mesopotamia, 1867, calcareous rocks, Mt. Singare, HAUSSKNECHT 539 (G!, JE!); **MSU:** Pir Omar Gudrum, in rupestris calc., 3–4000 ft., June 1867, HAUSSKNECHT 534 (G-BOISS!, JE!).

Distribution: Turkey, Syria (?), Iraq, Iran.

Habitat: Calcareous rocks; 650–1300 m.

34. *Anthemis odontostephana* BOISS., Diagn. Pl. Or. Nov. Ser. 1, 6: 85 (1846); BOISS., Fl. Orient. 3: 319 (1875); HOOK. f., Fl. Brit. Ind. 3: 312 (1882); FEDOROV in SCHISCHKIN & BOBROV, Fl. SSSR 26: 70 (1961); STEWART, Ann. Cat. Vasc. Pl. W. Pak. & Kashm. 714 (1972); IRANSHAHR in RECH. f., Fl. Iran. 158 (4): 10. Tab. 1 (1986) excl. var. *tubicina* (BOISS. & HAUSSKN.) BORNH. Type: Persiae australis ca. Persepolin et prope Gere, Th. KOTSCHY 51 (G-BOISS holo.; LE iso.).

A dwarf annual, up to 15 cm tall, appressedly greyish hairy, simple or branched and leafy in lower half only, branches upright, leafy only up to middle. Leaves shortly petiolate, ovate, 1.5–2 cm long, 6–10 mm wide, uni- or bipinnatisect into $2-3 \times c. 1.5$, acute ultimate segments. Peduncles filiform, 8–10 cm long, gradually thickened in fruit. Capitula radiate, 1–1.2 cm across. Involucre 6–7 mm wide. Phyllaries oblong, 2–3 mm long, appressedly hairy, broadly membranous margined, obtuse, deciduous. Receptacle conical, 2 mm long, chaffy in the upper half. Paleae few, setaceous-subulate, 2.5–3 mm long, very narrow, deciduous. Ray florets few, female, sterile; limbs elliptic, $c. 5 \times 4$ mm, white. Disc florets yellow, with a glabrous, terete corolla tube. Cypselas cylindrical, $\pm$ curved, 2.5–3 mm long, dilated at the bases and apices, 10–15-ribbed, outer ones tuberculate-muricate, truncate, with a 10–15-dentate rim, the inner ones with a unilateral, oblique, $\pm$ lacerate auricle.

Flowering period: March–May.

Specimens Examined:

LBA: Basrah, 1957, HAINES s. n. (E!); **DGA:** Jabal Hamrin, 1917, SUTHERLAND 111 (BM!); **MRO:** Deibrun ad fontem naphtae in rad. mont. Siah Kuh (Suriana), 1909-10, NABELEK 3624 (SAV!); **FPF:** Kuh-Beijat inter Deibrun et Amara, 1909-10, NABELEK 3634 (SAV!).

Distribution: Afghanistan, Pakistan, Iran, Iraq, United Arab Emirates, Oman.

Habitat: Red soil; 50–1500 m.

The material from Iran is less robust, the peduncles are less thickened and number of cypselas are less in this species as compared with *A. tubicina* which is more robust in all aspects. *A. odontostephana* seems more common in Iran and other areas of its eastern range of distribution.

Discussion

From the Orient which included Cyprus, Egypt, Iraq, Jordan, Lebanon, Syria and Turkey, EIG (1938) had described 40 new species and 60 new varieties and subspecies of *Anthemis* L. He had recorded ca. 15 new species besides a number of new varieties and subspecies from Iraq alone. *A. deserti-syriaci*, described by EIG (1938) from Iraq, however, is not acceptable to us as a good species as the characters on which it is based are very much similar to those of *A. wettsteiniana*. This species subsequently was recognised by BREMER & HUMPHRIES (1993). RECHINGER (1964) gave an account of 12 species of *Anthemis* L. including a key to their identification from the Lowlands of Iraq. For Flora Iranica, IRANSHAHR (1982) described 12 new species, including two endemic species from Iraq (viz., *A. hamrinensis*, *A. kurdica*) and one occurring in both Iran and Iraq (viz., *A. gillettii*). We have reduced *A. kurdica* IRANSHAHR to the synonymy of *A. marismartui* EIG after scrutiny of the holotype.

Through our work on *Anthemis* of Iraq (recognizing 34 species), we have tried to document, as far possible, the true identity of species found in the area. Recent work by GHAFOR & AL-TURKI (1997) shows an extension in the range of distribution of some of the species from the Orient to SW and Central Saudi Arabia. Further work on *Anthemis* L. of the Orient and distribution patterns of its various taxa coupled with biosystematic studies (as done by YAVIN, 1970, 1972) is desirable.

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