

## Review

# Synopsis of the Family Asteraceae in Egypt

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## ABSTRACT

A total of 97 genera comprising 230 species are reported. *Achillea biebersteinii* Afan., *Carduus acanthoides* L., *Atractylis humilis* L., *Atractylis serrata* Pomel and *Atractylis phaeolepis* Pomel are new records to the flora of Egypt. An original Key to the genera, species and infraspecific taxa, synonymy are also provided and 3 species are believed to be endemic.

**Key Words:** Plant systematic; Flora; Compositae; Egypt

## INTRODUCTION

The family Asteraceae (Compositae) is one of the largest families of flowering plants with about 1100 currently accepted genera and 25000 species (Heywood, 1977). It is of worldwide distribution particularly in semiarid region of the tropics and subtropics. The most members are evergreen shrubs or subshrubs or perennial rhizomatous herbs; biennial and annual herbs are also frequent. It is generally accepted that Compositae are a "natural" family with well established limits and a basic uniformity of floral structure imposed on all members by the common possession of characters such as the aggregation of the flowers into capitula and the special features of the stamens and corolla.

Compositae have long been known for their taxonomic complexity, an evaluation is presented of the exceptionally large number of name changes, particularly of generic attribution principally in the past decade. The transfer of certain Egyptian species is supported and some other changes. Among the notable contributions dealing with the critical revision of Compositae in Egypt are Chrtek (1969), Amin (1978), Zareh (1987, 1992 & 2005), Fayed (1987 & 1991), Fayed and Zareh (1987, 1988 & 1989), Fayed and Mohamed (1991a & b), El-Karemy and Zareh (1991) and Zareh and Osman (2004). Other works dealt partially with Egyptian taxa among which to be mentioned: Kazmi (1963), Wagenitz (1969), Boulos (1973), Fayed (1979) and Gamal El-Din (1980).

The present study reveals that the Compositae is represented in Egypt by 97 genera including 230 species of which *Carduus acanthoides* L., *Achillea biebersteinii* Afan., *Atractylis humilis* L., *Atractylis serrata* Pomel and *Atractylis phaeolepis* Pomel are new records to the flora of Egypt. *Centaurea pullata* L., *Atractylis boulosii* Täckh., *Filago pyramidata* L., *Gnaphalium uliginosum* L., *Helichrysum orientale* (L.) Gaertn., *Lasiospermum brachyglossum* DC., *Anthemis hebronica* Boiss. and Kotschy, *Anthemis bornmulleri* Stoj. and Acht., *Anthemis scrobicularis* Yavin and *Reichardia picroides* (L.) Roth reported by Täckholm,

(1974) and Boulos (1995 & 2002) are known to the author no specimens have been seen by the author and the occurrence of these taxa in Egypt is therefore doubtful.

The study is based on collections kept in CAI; CAIM; CAIRC, E and ASTUH (Assiut University herbarium, proposed acronym), in addition to intensive field observations. This study aims to provide a revised list as well as an original identification key to distinguish between the different taxa of the Compositae of Egypt. The accepted taxa are arranged more or less as same as Täckholm, (1974).

## CHECKLIST

1. *Gundelia* L.
  - 1.1. *G. tournefortii* L., Sp. Pl. 814 (1753).
2. *Echinops* L.
  - 2.2. *E. glaberrimus* DC. in Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 260 (1834).
  - 2.3. *E. hussonii* Boiss., Diagn. Pl. Orient., ser. 1, 10: 86 (1849).
  - 2.4. *E. macrochaetus* Fresen., Mus. Senckenb. 3: 69 (1845).
  - 2.5. *E. spinosus* L., Mant. 119 (1767). Syn.: *Echinops spinosissimus* Turra sensu Täckholm (1974).
  - 2.6. *E. galalensis* Schweinf. in Asch. & Schweinf., Mém. Inst. Egypt. 2, Suppl. 763 (1889).
  - 2.7. *E. taekholmiana* Amin, Candollea 42: 411 (1987).
3. *Carlina* L.
- 3.8. *C. involucreta* Poir., Voy. Barbarie 2: 234 (1789).
4. *Carduus* L. [Add. refs.: Kazmi (1964); El-Karemy & Zareh, (1991)]
- 4.9.\* *C. acanthoides* L., Sp. Pl. 821 (1753). Selected specimen: El-Hammam, 27.2.1929, Shabetai z1202 (CAIM).
- 4.10. *C. argentatus* L., Mant. Alt. 280 (1771).
- 4.11. *C. pycnocephalus* L., Sp. Pl. 1151 (1753).
  - a. var. *pycnocephalus*
  - b. var. *albidus* (M. Beib.) Boiss., Fl. Orient. 3: 321 (1875). Syn.: *Carduus albidus* M. Bieb., Fl. Taur.-Cauc. 2: 269 (1801).
- 4.12. *C. australis* L. fil., Suppl.: 348 (1781).

- 4.13. *C. tenuiflorus* Curt., Fl. Lond.: 6, t. 55 (1777). Syn.: *Carduus pycnocephalus* L. subsp. *tenuiflorus* (Curt.) Arènes, Notes Syst. (Paris) 15: 397 (1959).
- 4.14. *C. getulus* Pomel, Nouv. Mat. Fl. Atlant. 2: 275 (1875).
5. *Notobasis* (Cass.) Cass.
- 5.15. *N. syriaca* (L.) Cass. in Dict. Sci. Nat., 35: 171 (1825).
6. *Atractylis* L. [Add. ref.: (Zareh, 1992)]
- 6.16. *A. carduus* (Forssk.) C. Chr., Dansk. Bot. Ark. 4, 3: 27 (1922).
- a. var. *carduus* Syn.: *Atractylis carduus* (Forssk.) C. Chr.
- var. *latifolia* Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24 (1974).
- b. var. *angustifolia* Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24 (1974).
- c. var. *glabrescens* (Boiss.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24 (1974).
- 6.17. *A. humilis* L., Sp. Pl. 829 (1753). Syn.: *Atractylis carduus* (Forssk.) C. Chr. var. *marmarica* Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24 (1974). Selected specimens:: Burg el Arab, 28.4.1925, Simpson 3239 (CAIM); Cairo-Alexandria desert road, 23.7.1970, El-Sayed & El Mahdi s.n. (CAI).
- 6.18. *A. prolifera* Boiss., Diagn. Pl. Orient. Ser. 1, 10: 96 (1849).
- 6.19. *A. cancellata* L., Sp. Pl. 830 (1753).
- 6.20. *A. aristata* Batt., Bull. Soc. Bot. France 49: 291 (1902).
- 6.21. *A. mernephtae* Asch., Letourn. & Schweinf. in Asch. & Schweinf., Mém. Inst. Egypt. 2: 94 (1887).
- 6.22. *A. serrata* Pomel, Nouv. Mat. Fl. Atl.: 20 (1874). Selected specimens: Mersa Matruh, June 1973, Amin s.n. (CAI); Wadi Habs, 23.3.1974, Täckholm et al. s.n. (CAI).
- 6.23. *A. serratuloides* Sieber ex Cass., Dict. Sci. Nat. 50: 58 (1827).
- 6.24. *A. phaeolepis* Pomel, Nouv. Mat. Fl. Atl. 2: 273 (1875). Selected specimens: Cairo-Ismailia desert road, 18.4.1980, El-Bakry 42 (CAI); Wadi Digla, 19.2.1960, Täckholm et al. s.n. (CAI).
- Note: *Atractylis boulosii* Täckh. was described from Khan Younis (Palestine) by Täckholm (1974); no specimens are seen by the author from Egypt and its presence is doubtful.
7. *Cynara* L.
- 7.25. *C. cornigera* Lindl. in Sibth. & Sm., Fl. Graec. 9: 25 (1837).
8. *Silybum* Adans.
- 8.26. *S. marianum* (L.) Gaertn., Fruct. Pl. 2: 378 (1791).
9. *Onopordum* L. [Add. refs.: El-Karemy & Zareh, (1991)]
- 9.27. *O. ambiguum* Fresen., Mus. Senckenb. 1: 85 (1834).
- 9.28. *O. alexandrinum* Boiss., Diagn. Pl. Orient., ser. 1, 10: 93 (1849).
10. *Zoegea* L.
- 10.29. *Z. purpurea* Fresen., Mus. Senckenb. 1: 86, t. 5 (1834).
11. *Crupina* (Pers.) DC.
- 11.30. *C. crupinastrum* (Moris) Vis., Fl. Dalm. 2: 42, t. 51, f. 3 (1847).
12. *Centaurea* L. [Add. ref.: Wagenitz, G. & Hellwig, F.H. (1996)]
- 12.31. *C. eryngioides* Lam., Encycl. 1: 675 (1785).
- 12.32. *C. ammocyanus* Boiss., Diagn. Pl. Orient., ser. 1, 10: 109 (1849).
- 12.33. *C. glomerata* Vahl, Symb. Bot. 2: 94 (1791).
- 12.34. *C. dimorpha* Viv., Fl. Libyc. Spec. 58, t. 24 (1824).
- 12.35. *C. furfuracea* Coss. & Durieu, Bull. Soc. Bot. France 4: 363 (1857).
- 12.36. *C. postii* Boiss., Fl. Orient. 3: 688 (1875).
- 12.37. *C. solstitialis* L., Sp. Pl. 917 (1753).
- 12.38. *C. melitensis* L., Sp. Pl. 917 (1753).
- 12.39. *C. sinaica* DC., Prodr. 6: 592 (1838).
- 12.40. *C. aegyptiaca* L., Mant. 118 (1767).
- 12.41. *C. pallescens* Delile, Descr. Egypte, Hist. Nat. 278, t. 49 (1814).
- 12.42. *C. procurrens* Sieber ex Spreng., Syst. Veg. 3: 407 (1826).
- 12.43. *C. calcitrapa* L., Sp. Pl. 917 (1753).
- 12.44. *C. alexandrina* Delile, Descr. Egypte, Hist. Nat. 280, t. 49 (1814).
- 12.45. *C. pumilio* L., Cent. Pl. 1: 30 (1755).
- 12.46. *C. aegialophila* Wagenitz, Notes Roy. Bot. Gard. Edinb. 33: 230 (1974).
- 12.47. *C. scoparia* Sieber ex Spreng., Syst. Veg. 3: 402 (1826).
- Note: Täckholm (1974) & Boulos (1995) sited *Centaurea pullata* L. to occur in Egypt; no specimens have been seen by the author and its presence in Egypt is doubtful.
13. *Amberboa* (Pers) Less.
- 13.48. *A. sinaica* DC., Prodr. 6: 559 (1838). Syn.: *Amberboa leucantha* Coss. ex Batt. in A. Chev., Bull. Herbs. Boiss. sér. 2, 3: 774 (1903); *Volutaria leucantha* (Coss. ex Batt.) Maire in Jahand. & Maire, Cat. Pl. Maroc. 3: 818 (1934); *Volutaria sinaica* (DC.) Wagenitz, Candollea 46: 409 (1991).
- 13.49. *A. tubuliflora* Murb., Act. Univ. Lund. 33 (12): 105 (1897). Syn.: *Volutaria tubuliflora* (Murb.) Sennen., Campagn. Bot. Maroc Orient. 1930-1935, in observ. (1936).
- 13.50. *A. lippii* (L.) DC., Prodr. 6: 559 (1838). Syn.: *Centaurea lippii* L., Sp. Pl. 910 (1753); *Volutaria lippii* (L.) Cass. ex Maire in Jahand. & Maire, Cat. Pl. Maroc 3: 817 (1934).
- 13.51. *A. crupinoides* (Desf.) DC., Prodr. 6: 559 (1838).
14. *Mantisalca* Cass.
- 14.52. *M. salmantica* (L.) Briq. & Cavill., Arch. Sci. Phys. Nat. Genève, sér. 5, 12: 11 (1930).
15. *Carthamus* L.
- 15.53. *C. lanatus* L., Sp. Pl. 830 (1753).
- 15.54. *C. nitidus* Boiss., Fl. Orient. 3: 708 (1875).
- 15.55. *C. tenuis* (Boiss. & Blanche) Bornm., Verh. Zool.-Bot. Ges. Wien 48: 605 (1898) subsp. *foliosus* Hanelt, Feddes Repert. 67: 122 (1963).
- 15.56. *C. glaucus* M. Bieb., Tabl. Prov. Casp. 118 (1798) subsp. *alexandrinus* (Boiss. & Heldr.) Hanelt, Feddes

- Repert. 67: 113 (1963).  
 16. *Carduncellus* Adans.  
 16.57. *C. eriocephalus* Boiss., *Diagn. Pl. Orient.*, ser. 1, 10: 100 (1849).  
 16.58. *C. mareoticus* (Delile) Hanelt, *Feddes Repert.* 67 : 170 (1963).  
 17. *Cnicus* L.  
 17.59. *C. benedictus* L., *Sp. Pl.* 826 (1753).  
 18. *Dicoma* Cass.  
 18.60. *D. tomentosa* Cass., *Bull. Soc. Philom. Paris* 1818: 47 (1818).  
 19. *Hochstetteria* DC.  
 19.61. *H. schimperii* DC., *Prodr.* 7: 287 (1838). *Syn.: Dicoma. schimperii* (DC.) Baill. ex Hoffm. in *Engl. & Prantl, Natürl. Pflanzenfam.* 4, 5: 339 (1893).  
 20. *Ethulia* L.  
 20.62. *E. conyzoides* L.f., *Decas Prima* 1, t. 1 (1762) subsp. *conyzoides*  
 21. *Ageratum* L. [Add. ref.: Johnson (1971)]  
 21.63. *A. conyzoides* L., *Sp. Pl.* 839 (1753).  
 21.64. *A. houstonianum* Mill., *Gard. Dict.*, ed. 8, no. 2 (1768). *Syns.: Ageratum mexicanum* Sims in *Curtis, Bot. Mag.: tab.* 2524 (1824); *Ageratum conyzoides* L. var. *mexicanum* sensu Täckh., *Stud. Fl. Egypt*, ed. 2: 547 (1974).  
 22. *Grangea* Adans. [Add. refs.: Fayed (1987)]  
 22.65. *G. maderaspatana* (L.) Poir. in *Lam., Encycl., Suppl.* 2: 825 (1812).  
 23. *Ceruana* Forssk. [Add. refs.: Fayed (1987)]  
 23.66. *C. pratensis* Forssk., *Fl. Aegypt.-Arab.* 74 (1775).  
 24. *Felicia* Cass.  
 24.67. *F. dentata* (A. Rich.) Dandy in *F. W. Andrews, Fl. Pl. Sudan* 3: 29 (1956).  
 25. *Pluchea* Cass. [Add. refs.: King-Jones S. (2001); Zareh (2005)]  
 25.68. *P. dioscorides* (L.) DC., *Prodr.* 5: 450 (1836).  
 26. *Laggera* Sch. Bip. [Add. refs.:Herman et al. (2000); Zareh (2005)]  
 26.69. *L. viscosa* (Mill.) Zareh, *Feddes Rep.* 116, 1-2: 43-53 (2005). *Syns.: Conyza viscosa* Mill., *Gard. Dict.*, ed. 8, no. 8 (1768); *Conyza aurita* L.f., *Suppl. Pl.* 367 (1781); *Laggera aurita* (L.f.) Sch. Bip. ex C. B. Clarke, *Compositae Ind.* 92 (1876); *Pseudoconyza viscosa* (Mill.) D' Arcy, *Phytologia* 25 (5): 281 (1973).  
 27. *Blumea* DC. [Add. refs.:Herman et al. (2000); Zareh (2005)].  
 27.70. *B. bovei* (DC.) Vatke in *Linnaea* 39: 485 (1875). *Syn.: Conyza bovei* DC. in *Decne., Ann. Sci. Nat. Bot., sér.* 2, 1: 261 (1834); *Doellia bovei* (DC.) Anderb., *Willdenowia* 25: 21 (1995).  
 28. *Conyza* Less. [Add. refs.: Fayed, (1987); Nesom (1990)]  
 28.71. *C. stricta* Willd., *Sp. Pl.* ed. 4,3: 1922 (1803) var. *pinnatifida* (D. Don) Kitamura, Hara, *Fl. E. Himal.* 337 (1966).  
 28.72. *C. bonariensis* (L.) Cronquist, *Bull. Torrey Bot. Club* 70: 632 (1943).  
 28.73. *C. canadensis* (L.) Cronquist, *Bull. Torrey Bot. Club* 70: 632 (1943).  
 28.74. *C. aegyptiaca* (L.) Dryand. in *Aiton, Hort. Kew.*, ed. 1, 3: 254 (1789).  
 28.75. *C. albida* Willd. ex Spreng., *Syst. Veg.* 3: 514 (1826).  
 29. *Aster* L. [Add. refs.: Fayed, (1987); Nesom (1994)]  
 29.76. *A. squamatus* (Spreng.) Hieron., *Engl. Bot. Jahrb.* 29: 19 (1900).  
 30. *Sphaeranthus* L. [Add. ref.:Zareh (2005)]  
 30.77. *S. suaveolens* (Forssk.) DC., *Prodr.* 5: 370 (1836).  
 31. *Ifloga* Cass. [Add. refs.: Chrtk (1969), Fayed & Zareh (1988)]  
 31.78. *I. spicata* (Forssk.) Sch.Bip. in *Webb & Berthel., Phyt. Canar.* 2: 310 (1845).  
     a. subsp. *spicata*  
     b. subsp. *albescens* Chrtk, *Preslia* 41: 243 (1969).  
     c. subsp. *elbaensis* Chrtk, *Preslia* 41: 243 (1969).  
 31.79. *I. labillardieri* (Pamp.) Fayed & Zareh, *Willdenowia* 17: 122 (1988).  
     a. subsp. *labillardieri*  
     b. subsp. *hadidii* Fayed & Zareh, *Willdenowia* 17: 122 (1988).  
 32. *Filago* L. [Add. refs.: Wagenitz (1969), Fayed & Zareh (1988)]  
 32.80. *F. desertorum* Pomel, *Nouv. Mat. Fl. Atlant.* 1: 46 (1874).  
 32.81. *F. prolifera* Pomel, *Nouv. Mat. Fl. Atlant.* 1: 47 (1874).  
 32.82. *F. mareotica* Delile, *Descr. Egypte, Hist. Nat.* 274, t. 47, f. 2 (1814).  
 32.83. *F. contracta* (Boiss.) Chrtk & Holub, *Preslia* 45: 3 (1963).  
 Note: Täckholm (1974) & Boulos (2002) sited *Filago pyramidata* L. from Egypt; no specimens are seen by the author and its presence in Egypt is doubtful.  
 33. *Gymnarrhena* Desf.  
 33.84. *G. micrantha* Desf., *Mém. Mus. Hist. Nat. (Paris)* 4: 1, t. 4 (1818).  
 34. *Lasiopogon* Cass. [Add. ref.: Fayed & Zareh (1989)]  
 34.85. *L. muscoides* (Desf.) DC., *Prodr.* 6: 264 (1838).  
 35. *Phagnalon* Cass. [Add. refs.: Qaiser & Lack (1985), Fayed (1991)]  
 35.86. *P. sinaicum* Bornm. & Kneuck., *Bot. Z. Syst.* 12: 69 (1906).  
 35.87. *P. nitidum* Fresen., *Mus. Senckenb.* 3: 81 (1839).  
 35.88. *P. barbeyanum* Asch. & Schweinf., *Mém. Inst. Egypt.* 2: 87 (1887).  
 35.89. *P. schweinfurthii* Sch. Bip. ex Schweinf., *Verh. K. K. Zool. Bot. Ges. Wien* 18: 685 (1868).  
     a. var. *schweinfurthii*  
     b. var. *androssovii* (B. Fedtsch.) Qaiser & Lack in *Willdenowia* 15: 13 (1985).  
 35.90. *P. rupestre* (L.) DC., *Prodr.* 5: 396 (1836).  
 36. *Homognaphalium* Kirp. [Add. refs.: Fayed & Zareh (1989)]  
 36.91. *H. pulvinatum* (Delile) Fayed & Zareh, *Willdenowia*

- 18: 451 (1989). Syn.: *Gnaphalium pulvinatum* Delile, Descr. Egypte, Hist. Nat. 266, t. 44 (1814).
37. *Pseudognaphalium* Kirp. [Add. refs.: Hilliard (1981); Fayed & Zareh (1989)]
- 37.92. *P. luteo-album* (L.) Hilliard & B. L. Burtt, Bot. J. Linn. Soc. 82: 206 (1981). Syn.: *Gnaphalium luteo-album* L., Sp. Pl. 851 (1753).
38. *Gnaphalium* L. [Add. ref.: Fayed & Zareh (1989)]
- 38.93. *G. crispatum* Delile, Descr. Egypte, Hist. Nat. 267, t. 44, f. 3 (1814). Syn.: *Homognaphalium crispatum* (Delile) Kirp., Trudy Bot. Inst. Akad. Nauk SSSR, ser. 1, Fl. Sist. Vyss. Rast. 9:32 (1950).
- 38.94. *G. polycaulon* Pers., Syn. Pl. 2: 421 (1807).  
Note: Täckholm (1974) & Boulos (2002) reported *G. uliginosum* L. from Egypt based on a single record of unknown locality (Herb. Schweinfurth); this taxon belongs to Euro-Siberian element and its occurrence in Egypt is therefore doubtful.
39. *Helichrysum* Mill. [Add. ref.: Fayed & Zareh (1989)]
- 39.95. *H. conglobatum* (Viv.) Steud., Nomencl. Bot., ed. 2, 1: 738 (1840).
- 39.96. *H. glumaceum* DC., Prodr. 6: 197 (1838).  
Note: Täckholm (1974) & Boulos (2002) reported *H. orientale* (L.) Gaertn. to occur in Egypt (Ras El-Hekma); no specimens are seen by the author and its presence in Egypt needs verification.
40. *Leysera* L. [Add. refs.: Bremer (1978), Fayed (1991)]
- 40.97. *L. leyseroides* (Desf.) Maire, Bull. Soc. Hist. Nat. Afr. Nord 20: 186 (1929).
41. *Inula* L. [Add. refs.: Meikle 1985; Zareh (2005)]
- 41.98. *I. crithmoides* L. Sp. Pl. 883 (1753).
42. *Dittrichia* Greuter [Add. refs.: Anderberg (1991); Boulos (2002); Zareh (2005)]
- 42.99. *D. viscosa* (L.) Greuter, Exsicc. Genav. 4: 71 (1973). Syn.: *Inula viscosa* (L.) Aiton, Hortus Kew. 3: 223 (1789).
- 42.100. *D. graveolens* (L.) Greuter, Exsicc. Genav. 4: 71 (1973). Syn.: *Inula graveolens* (L.) Desf., Fl. Atl. 2: 275 (1799).
43. *Pegolettia* Cass. [Add. refs.: Anderberg (1986); Fayed & Mohamed (1991b); Zareh (2005)]
- 43.101. *P. senegalensis* Cass., Dict. Sci. Nat. 38: 232 (1825).
44. *Iphiaea* Cass. [Add. ref.: Fayed & Mohamed (1991b); Zareh (2005)]
- 44.102. *I. mucronata* (Forssk.) Asch. & Schweinf. in Mém. Inst. Égypt. 2: 86 (1887).
- 44.103. *I. scabra* DC., in Decne. in Ann. Sci. Nat. Bot. Ser. 2(2): 263 (1834).
45. *Varthemia* DC. [Add. refs.: Merxmüller et al. (1977); Zareh (2005)]
- 45.104. *V. montana* (Vahl) Boiss., Fl. Orient. 3: 212 (1875).
- 45.105. *V. candicans* (Delile) Boiss., Fl. Orient. 3: 212 (1875).
- 45.106. *V. sericea* (Batt. & Trabut) Diels in Bot. Jahrb. Syst. Beibl. 120: 119 (1917).
46. *Pulicaria* Gaertn. [Add. refs.: Gamal-Eldin (1981); Zareh (2005)]
- 46.107. *P. petiolaris* Jaub. & Spach. III. Pl. Orient. 4: 69, t. 344 (1852).
- 46.108. *P. sicula* (L.) Moris, Fl. Sard. 2: 363 (1840-1843).
- 46.109. *P. odora* (L.) Reichb., Fl. Germ. Excurs. 239 (1831); Gamal-Eldin in Phanerog. Monogr. 14:126 (1981).
- 46.110. *P. incisa* (Lam.) DC., Prodr. 5: 479 (1836).  
a. subsp. *incisa*  
b. subsp. *candolleana* Gamal-Eldin in Phanerog. Monogr. 14: 166 (1981).
- 46.111. *P. vulgaris* Gaertner, Fruct. Sem. Pl. 2: 461 t.173 (1791).
- 46.112. *P. inuloides* (Poir.) DC., Prodr. 5: 480 (1836).
- 46.113. *P. arabica* (L.) Cass., Dict. Sci. Nat. 44: 94 (1826) subsp. *arabica*
47. *Francoeuria* Cass. [Add. refs.: Alavi (1983); Lack (1980); Zareh (2005)]
- 47.114. *F. undulata* (L.) Lack in Rech. F., Fl. Iranica 145: 120 (1980). Syn.: *Inula undulata* L., Mant. 115 (1767); *Aster crispus* Forssk., Fl. Aegypt.-Arab. 150 (1775); *Pulicaria undulata* (L.) C. A. Mey., Verz. Pfl. Casp. Meer. 79 (1831).
48. *Anvillea* DC. [Add. ref.: Zareh (2005)]
- 48.115. *A. garcinii* (Burm.f.) DC., Prodr. 5: 487 (1836).
49. *Geigeria* Griess. [Add. ref.: Merxmüller (1953); Zareh (2005)]
- 49.116. *G. alata* (DC.) Benth. & Hook. ex Oliv. & Hiern in Dyer, Fl. Trop. Afr. 3: 368 (1877).
50. *Pallenis* (Cass.) Cass. [Add. refs.: Alavi (1983); Zareh (2005)]
- 50.117. *P. spinosa* (L.) Cass., Dict. Sci. Nat. 37: 276 (1825). Syn.: *Bupthalmum spinosum* L., Sp. Pl. 903 (1753). *Asteriscus spinosa* (L.) Sch. Bip. in Webb & Berthel., Phyt. Canar. 3(2): 230 (1844).
51. *Asteriscus* Tourn. [Add. refs.: Wiklund (1985); Fayed & Mohamed (1991a); Zareh (2005)]
- 51.118. *A. hierochunticus* (Michon) Wiklund in Nord. J. Bot. 5: 307 (1985).
- 51.119. *A. graveolens* (Forssk.) Less., Syn. Gen. Compos. 210 (1832). Syn.: *Nauplius graveolens* (Forssk.) Wiklund in Nord. J. Bot. 7: 16 (1987).
- 51.120. *A. aquaticus* (L.) Less., Syn. Gen. Compos. 210 (1832). Syn.: *Bupthalmum aquaticum* L., Sp. Pl. 903 (1753); *Nauplius aquaticus* (L.) Cass., Dict. Sci. Nat. 37: 273 (1825).
52. *Xanthium* L. [Add. ref.: Zareh & Osman (2004)]
- 52.121. *X. spinosum* L., Sp. Pl. 987 (1753).
- 52.122. *X. strumarium* L., Sp. Pl. 987 (1753).  
a. subsp. *strumarium*  
b. subsp. *italicum* (Moretti) D. Löve, Bot. Jour. Linn. Soc. 71: 271 (1976)..
53. *Ambrosia* L. [Add. ref.: Boulos (2002), Zareh & Osman (2004)]
- 53.123. *A. maritima* L., Sp. Pl. 988 (1753).
- 53.124. *A. artemisiifolia* L., Sp. Pl. 988 (1753).
54. *Eclipta* L. [Add. refs.: Panero & Jansen 1999, Zareh &

Osman (2004)]

- 54.125. *E. alba* (L.) Hassk., Pl. Jav. Rar. 528 (1848).  
 55. *Blainvillea* Cass. [Add. ref.: Zareh & Osman (2004)]  
 55.126. *B. acmella* (L.) Philipson, Blumea 6: 350 (1950).  
 56. *Galinsoga* Ruiz & Pav. [Add. refs.: Canne-Hilliker (1992), Boulos (2002)]  
 56.127. *G. parviflora* Cav., Icon. Descr. 3: 41, t. 281 (1791).  
 57. *Bidens* L. [Add. refs.: Tadesse 1993, Zareh & Osman (2004)]  
 57.128. *B. pilosa* L., Sp. Pl. 832 (1753).  
 57.129. *B. schimperii* Sch. Bip. in Walp., Repert. Bot. Syst. 6: 168 (1849).  
 57.130. *B. bipinnata* L., Sp. Pl. 832 (1753).  
 58. *Verbesina* L. [Add. ref.: Zareh & Osman (2004)]  
 58.131. *V. encelioides* (Cav.) Benth. & Hook. Fil. ex A. Gray in Brewer, S. Waston & Gray, Bot. Calif. 1: 350 (1876).  
 a. subsp. *encelioides*  
 b. subsp. *exauriculata* (Robinson & Greenman) J. R. Coleman, Amer. Midl. Nat. 76: 478 (1966).  
 59. *Tagetes* L.  
 59.132. *T. minuta* L., Sp. Pl. 887 (1753).  
 60. *Flaveria* Juss.  
 60.133. *F. bidentis* (L.) Kuntze, Rev. Gen. 3: 148 (1898).  
 61. *Anthemis* L. [Add. refs.: Zareh (1987), Ghafoor & Ali (2002)]  
 61.134. *A. arvensis* L., Sp. Pl. 894 (1753).  
 61.135. *A. microsperma* Boiss. & Kotschy in Boiss., Diagn. Pl. Orient., ser. 2, 5: 108 (1856).  
 61.136. *A. indurata* Delile, Descr. Egypte, Hist. Nat. 363, t. 47, f. 3 (1814).  
 61.137. *A. chia* L., Sp. Pl. 894 (1753).  
 61.138. *A. melampodina* Delile, Descr. Egypte, Hist. Nat. 268, t. 45, f. 1 (1814).  
 a. subsp. *melampodina*  
 b. subsp. *deserti* (Boiss.) Eig., Pal. J. Bot. Jerusalem ser., 1: 177 (1938).  
 61.139. *A. zoharyana* Eig., Pal. J. Bot. Jerusalem ser., 1: 178 (1938).  
 61.140. *A. eliezrae* Eig., Pal. J. Bot. Jerusalem ser., 1: 179 (1938). Syn.: *Anthemis leucanthemifolia* Boiss. & Bl. subsp. *rafaensis* Eig., Pal. J. Bot. Jerusalem ser., 1: 164 (1938).  
 Note: Boulos 2002 regarded *A. eliezrae* Eig. & *A. leucanthemifolia* Boiss. & Bl. subsp. *rafaensis* Eig as synonyms to *A. indurata* Delile; *Anthemis eliezrae* is easily distinguished from *A. indurata* by its inflated disc flowers base and tuberculate achenes. Therefore *A. eliezrae* is treated here as a distinct species (see also Feinbrun 1978: 333).  
 61.141. *A. retusa* Delile, Descr. Egypte, Hist. Nat. 74 (1814). Syn.: *Anthemis cairica* Vis., Pl. Quaed. Aegypt. 36, t. 6 (1836).  
 61.142. *A. cotula* L., Sp. Pl. 894 (1753).  
 61.143. *A. pseudocotula* Boiss., Diagn. Pl. Orient., ser. 1, 6: 86 (1846).  
 a. subsp. *pseudocotula*

- b. subsp. *rotata* (Boiss.) Eig in Pal. J. Bot. Jerusalem: ser., 1: 202 (1938).  
 Note: *A. bornmulleri* Stoj. & Acht., *A. hebronica* Boiss. & Kotschy and *A. scrobicularis* Yavin were reported by Täckholm (1974) and Boulos (2002) from Sinai. No collections were seen by the author from this area although of repeated field investigations; the occurrence of these taxa in Egypt is therefore doubtful.  
 62. *Chamaemelum* Mill. [Add. ref.: Zareh (1987)]  
 62.144. *C. mixtum* (L.) All., Fl. Pedem. 1: 185 (1785). Syn.: *Anthemis mixta* L., Sp. Pl. 894 (1753).  
 63. *Anacyclus* L. [Add. ref.: Zareh (1987)]  
 63.145. *A. monanthos* (L.) Thell., Mém. Soc. Nat. Sci. Cherbourg, sér. 4, 38: 518 (1912) subsp. *monanthos*  
 64. *Achillea* L. [Add. ref.: Zareh (1987)]  
 64.146. *A. biebersteinii* Afan. in Notul. Syst. 19: 361 (1959). Selected specimen: Rafah, 8.4.1956, Khattab 2 (CAIM).  
 64.147. *A. fragrantissima* (Forssk.) Sch. Bip., Flora (Regensburg) 38: 13 (1855).  
 64.148. *A. santolina* L., Sp. Pl. 896 (1753).  
 65. *Otanthus* Hoffmanns. & Link [Add. ref.: Zareh (1987)]  
 65.149. *O. maritimus* (L.) Hoffmanns. & Link, Fl. Port. 2: 365 (1834).  
 66. *Tripleurospermum* Sch. Bip. [Add. ref.: Zareh (1987)]  
 66.150. *T. auriculatum* (Boiss.) Rech. f., Fl. Lowland Iraq 629 (1964).  
 67. *Matricaria* L. [Add. ref.: Zareh (1987)]  
 67.151. *M. recutita* L., Sp. Pl. 1, 891 (1753).  
 a. var. *recutita*  
 b. var. *coronata* (Boiss.) Fertig in Feinbrun-Dothan, Fl. Palaest. 3: 344 (1978).  
 67.152. *M. aurea* (Loefl.) Sch. Bip, Bonplandia 8: 369 (1860).  
 68. *Clamydophora* Ehrenb. [Add. ref.: Zareh (1987)]  
 68.153. *C. tridentata* (Delile) Ehrenb. ex Less., Syn. 266 (1832).  
 69. *Pinardia* Cass. [Add. ref.: Zareh (1987)]  
 69.154. *P. coronaria* (L.) Lessing, Syn. Gen. Composit.: 255 (1832). Syn.: *Chrysanthemum coronarium* L., Sp. Pl. 890 (1753).  
 70. *Tanacetum* L. [Add. ref.: Zareh (1987)]  
 70.155. *T. sinaicum* (Fresen.) Delile ex Bremer & Humphries, Bull. Nat. Hist. Mus. Lond. (Bot.) 23 (2): 103 (1993).  
 71. *Cotula* L. [Add. ref.: Zareh (1987)]  
 71.156. *C. anthemoides* L., Sp. Pl. 891 (1753).  
 71.157. *C. cinerea* Delile, Descr. Egypte, Hist. Nat. 275, t. 47, f. 4 (1814).  
 72. *Artemisia* L.  
 72.158. *A. scoparia* Waldst. & Kit., Pl. Rac. Hung. 1: 66, t. 65 (1801).  
 72.159. *A. monosperma* Delile, Descr. Egypte, Hist. Nat. 263, t. 43, f. 1 (1814).  
 72.160. *A. judaica* L., Mant. Atl. 281 (1771).  
 72.161. *A. herba-alba* Asso, Syn. Arag. 117 (1779). Syn.:

- Artemisia inculta* Delile, Descr. Egypte, Hist. Nat. 264 (1814) nom. nud.; *Seriphidium herba-alba* (Asso) Soják, Cas. Nár. Muz. (Prague) 152 (1): 22 (1983).
- 72.162. *A. vulgaris* L., Sp. Pl. : 848 (1753).
73. *Senecio* L. [Add. refs.: Alexander (1979), Fayed & Zareh (1987)]
- 73.163. *S. falvus* (Decne.) Sch. Bip. in Webb & Berthel., Phyt. Canar. 3: 317 (1847).
- 73.164. *S. glaucus* L., Sp. Pl. 848 (1753).
- a. subsp. *glaucus*
- b. subsp. *coronopifolius* (Maire) C. Alexander, Notes Roy. Bot. Gard. Edinb. 37: 412 (1979).
- 73.165. *S. vulgaris* L., Sp. Pl. 867 (1753).
- 73.166. *S. belbeysius* Delile, Descr. Egypte, Hist. Nat. 126, t. 45, f. 3 (1814) – endemic.
- 73.167. *S. aegyptius* L., Sp. Pl. 867 (1753).
- a. var. *aegyptius*
- b. var. *discoideus* Boiss., Fl. Orient. 3 : 388 (1875).
- 73.168. *S. hoggariensis* Batt. & Trab., Soc. Bot. France 58: 671 (1911).
- Note: No collections of *S. belbeysius* are seen by the author.
74. *Calendula* L. [Add. refs.: Heyn et al. (1974); Boulos (2002)]
- 74.169. *C. arvensis* L., Sp. Pl., ed. 2, 1303 (1763) subsp. *arvensis*
- 74.170. *C. tripterocarpa* Rupr., Bull. Phys.-Math. Acad. Pétersb. 14: 231 (1856).
75. *Osteospermum* L.
- 75.171. *O. vaillantii* (Decne.) Norl., Stud. Calend. 1: 305 (1943).
76. *Scolymus* L.
- 76.172. *S. hispanicus* L., Sp. Pl. 813 (1753).
- 76.173. *S. maculatus* L., Sp. Pl. 813 (1753).
77. *Cichorium* L. [Add. ref.: Kiers (2000)]
- 77.174. *C. endivia* L., Sp. Pl. 813 (1753) subsp. *divaricatum* (Schousb.) P. D. Sell, Bot. J. Linn. Soc. 71: 240 (1976). Syns.: *Cichorium pumilum* Jacq., Obs. Bot. 4:3 (1771).
78. *Hyoseris* L.
- 78.175. *H. scabra* L., Sp. Pl. 809 (1753).
- 78.176. *H. lucida* L., Mant. 103 (1767).
- Note: Boulos (2002) sited *H. lucida* as a synonym to *H. radiata* L. subsp. *graeca* Halácsy. *Hyoseris lucida* can be distinguished from *H. radiata* by their outer achenes which have a crown of short setae, the inner ones with rigid scabrid hairs and linear scales. In *Hyoseris radiata* the outer and inner achenes have linear scales and rigid scabrid hairs, thus *H. lucida* is treated here as a conspecific.
79. *Hedypnois* Mill.
- 79.177. *H. rhagadioloides* (L.) F. W. Schmidt, Samml. Phys. Ökon. Aufs. 1: 279 (1795).
80. *Rhagadiolus* Jaub. & Spach
- 80.178. *G. angulosus* Jaub. & Spach, III. Pl. Orient. 3: 122, t. 285 (1850).
81. *Koelpinia* Pall.
- 81.179. *K. linearis* Pall., Reise 3: 755 (1776).
82. *Rhagadiolus* Juss.
- 82.180. *R. stellatus* (L.) Gaertn., Fruct. Sem. Pl. 2: 354, t. 157, f. 2 (1791).
83. *Urospermum* Scop.
- 83.181. *U. picroides* (L.) F. W. Schmidt, Samml. Phys.-Ökon. Aufs. 1: 275 (1795).
84. *Leontodon* L.
- 84.182. *L. simplex* (Viv.) Widder, Phyt. 12: 209 (1967).
- 84.183. *L. hispidulus* (Delile) Boiss., Fl. Orient. 3: 727 (1875).
- 84.184. *L. laciniatus* (Bertol.) Widder in Bornm., Iter Pers.-Turc., Beih. Bot. Cent. 60 Abt. II: 217 (1939).
85. *Thrinchia* Roth.
- 85.185. *T. tuberosa* (L.) DC. in Lam. & DC., Fl. Fr. ed.3, 4 : 52 (1805). Syns.: *Leontodon tuberosus* L., Sp. Pl. 799 (1753).
86. *Picris* L. [Add. refs.: Lack (1974); Abou El-Naga & El Hussein (1995)]
- 86.186. *P. asplenioides* L., Sp. Pl. 793 (1753).
- 86.187. *P. cyanocarpa* Boiss., Diagn. Pl. Orient., ser. 1, 11: 37 (1849).
- 86.188. *P. longirostris* Sch. Bip., Mus. Senkenb. 3: 60 (1839). Syn.: *Picris damascena* Boiss. Gaill. in Boiss., Fl. Orient. 3: 740 (1875).
- 86.189. *P. sulphurea* Delile, Descr. Egypte, Hist. Nat. 114, t. 40 (1814).
- 86.190. *P. altissima* Delile, Descr. Egypte, Hist. Nat. 260, t. 41 (1814).
- 86.191. *P. strigosa* M. Bieb., Fl. Taur.-Cauc. 2: 250 (1808).
87. *Tragopogon* L.
- 87.192. *T. collinus* DC., Prodr. 7(1): 115 (1838).
- 87.193. *T. porrifolius* L., Sp. Pl. 789 (1753) subsp. *australis* (Jord.) Nyman, Consp. Fl. Eur. 462 (1879). Syns.: *Tragopogon longirostris* Bischoff ex Sch.Bip. in Webb. & Berthel., Phyt. Canar. 2: 469 (1850).
88. *Geropogon* L.
- 88.194. *G. hybridus* (L.) Sch. Bip. in Webb & Berthel., Phyt. Canar. 2: 472 (1850).
89. *Scorzonera* L.
- 89.195. *S. judaica* Eig in Eig, Zohary & Feinbrun, Plants of Palestine, Analytical Key 399 (1931). Syn.: *Scorzonera pseudolanata* Grossh., Fl. Kavk. 4: 235 (1934).
- 89.196. *S. mollis* M. Bieb., Fl. Taur.-Cauc. 3: 522 (1819) var. *longifolia* Boiss., Fl. Orient. 3: 762 (1875).
- 89.197. *S. schweinfurthii* Boiss., Fl. Orient. Suppl. 320 (1888).
- 89.198. *S. drarii* Täckh., Svensk Bot. Tidskr. 26: 375 (1932) – endemic.
- 89.199. *S. undulata* Vahl, Symb. Bot. 2: 86 (1791). Syn.: *Scorzonera alexandrina* Boiss., Fl. Orient. 3: 760 (1875).
90. *Launaea* Cass. [Add. refs.: Amin (1978), Kilian (1997)]
- 90.200. *L. spinosa* (Forssk.) Sch. Bip. ex Kuntze, Revis. Gen. Pl. 1: 350 (1891).
- 90.201. *L. massauensis* (Fresen.) Sch. Bip. ex Kuntze, Revis. Gen. Pl. 1: 351 (1891).
- 90.202. *L. capitata* (Spreng.) Dandy in F. W. Andrews, Fl.

- Pl. Sudan 3: 40 (1956).  
 90.203. *L. nudicaulis* (L.) Hook. f., Fl. Brit. Ind. 3: 416 (1881).  
 90.204. *L. procumbens* (Roxb.) Ramayya & Rajagopal, Kew Bull. 23: 465 (1969).  
 90.205. *L. amal-aminae* N. Kilian, Englera 17: 346 (1997).  
 90.206. *L. angustifolia* (Desf.) Kuntze, Revis. Gen. Pl. 1: 350 (1891) subsp. *arabica* (Boiss.) N. Kilian, Willdenowia 25: 274 (1995).  
 90.207. *L. fragilis* (Asso) Pau, Bol. Soc. Aragonesa Ci. Nat. 16: 68 (1917) subsp. *fragilis*. Syn.: *Launaea tenuiloba* (Boiss.) Kuntze, Revis. Gen. Pl. 1: 351 (1891).  
 90.208. *L. mucronata* (Forssk.) Muschl., Man. Fl. Egypt 2: 1057 (1912).  
 a. *subsp. mucronata*  
 b. *subsp. cassiniana* (Jaub. & Spach) N. Kilian, Willdenowia 25: 277 (1995).  
 91. *Reichardia* Roth  
 91.209. *R. tingitana* (L.) Roth, Bot. Abh. 35 (1787).  
 Note: The presence of *Reichardia picroides* (L.) Roth reported by Täckholm (1974) is doubtful (Boulos, 2002: 299).  
 92. *Crepis* L.  
 92.210. *C. micrantha* Czerep in Bobrov & Tzvelev, Fl. SSSR 29: 684 (1964).  
 92.211. *C. libyca* (Pamp.) Shab., Min. Agric. Egypt Tech. & Sci. Service Bull. 197 (1938).  
 92.212. *C. clausonis* (Pomel) Batt. & Trab., Fl. Algérie 564 (1888-1890).  
 92.213. *C. nigricans* Viv., Fl. Libyc. Spec. 51, t. 10, f. 3 (1824).  
 92.214. *C. aspera* L., Sp. Pl., ed. 2, 1132 (1763) var. *aspera*  
 92.215. *C. aculeata* (DC.) Boiss., Fl. Orient. 3: 856 (1875).  
 92.216. *C. sancta* (L.) Bornm., Mitt. Thür. Bot. Ver., nov. ser., 30: 79 (1913) *subsp. obovata* (Boiss. & Noë) Bab., Gen. *Crepis* 741 (1947).  
 92.217. *C. senecioides* Delile, Descr. Egypte, Hist. Nat. 118, t. 42 (1814).  
 93. *Aetheorhiza* Cass.  
 93.218. *A. bulbosa* (L.) Cass., Dict. Sci. Nat. 48: 425 (1827).  
 94. *Heteroderis* (Bunge) Boiss. [Add. ref.: Léonard (1983)]  
 94.219. *H. pusilla* (Boiss.) Boiss., Fl. Orient. 3: 794 (1875) var. *leucocephala* (Bunge) Rech. f., Fl. Iranica 122: 291 (1977).  
 95. *Sonchus* L. [Add. ref.: Boulos (1973)]  
 95.220. *S. maritimus* L., Syst. Nat., ed. 10, 2: 1192 (1759).  
 95.221. *S. oleraceus* L., Sp. Pl. 794 (1753).  
 95.222. *S. asper* (L.) Hill., Herb. Brit. 1: 47, t. 34, f. 2 (1769).  
 a. *subsp. asper*  
 b. *subsp. glaucescens* (Jord.) Ball, J. Linn. Soc. 16: 548 (1878).  
 95.223. *S. macrocarpus* Boulos & C. Jeffrey, Taxon 18: 349 (1969) - endemic.  
 95.224. *S. tenerrimus* L., Sp. Pl. 794 (1753).

96. *Lactuca* L.  
 96.225. *L. undulata* Ledeb., Icones Pl. Fl. Ross. 2: t. 129 (1830).  
 96.226. *L. saligna* L., Sp. Pl. 796 (1753).  
 96.227. *L. serriola* L., Cent. Pl. 2: 29, no. 189 (1756).  
 96.228. *L. orientalis* (Boiss.) Boiss., Fl. Orient. 3: 819 (1875).  
 97. *Taraxacum* F. H. Wigg.  
 97.229. *T. minimum* (Briganti ex Guss.) N. Terracc., Atti Real. Ist. Incorags Sci. Nat. Nap., ser. 2, 6: 359 (1869).  
 97.230. *T. turcicum* Soest, Acta Bot. Neerl. 17: 495, f. 8 (1968).

## KEY TO THE TAXA

1	Plant thistle-like (leaves spiny).....	2
-	Plant not thistle-like (leaves not spiny).....	39
2	All florets ligulate, ligules 5-dentate.....	3
-	Disc florets tubular, ligulate florets if present (2-)-3-dentate.....	4
3	Leaves hairy, pappus barbellate.....	<i>Scolymus hispanicus</i>
-	Leaves glabrescent, pappus absent.....	<i>Scolymus maculatus</i>
4	Capitula numerous, aggregate in compound heads, capitulum 1-7 florets.....	5
-	Capitula few, separated in a simple heads, capitulum with numerous florets.....	11
5	Plant with latex, heads subtended with involucre, capitulum with 2-7 yellow flowers.....	<i>Gundelia tournefortii</i>
-	Plant without latex, heads not subtended with involucre, capitulum with a single white, blue or pink flower.....	6
6	Flowering heads (excluding spines) less than 2.5 cm in diameter ...	<i>Echinops teackholmiana</i>
-	Flowering heads (excluding spines) more than 3.0 cm in diameter ....	7
7	Uppermost leaves glabrous on both surfaces ....	<i>Echinops glaberrimus</i>
-	All leaves white-wooly at least beneath.....	8
8	Stem whitish-yellow, glabrous, head spines horn-like ....	<i>Echinops hussonii</i>
-	Stem greyish or redish, glandular or lanate, head spines stright .....	9
9	Leaf lobes broad, flat-margined .....	<i>Echinops macrochaetus</i>
-	Leaf lobes narrow, revolute-margined.....	10
10	Stem greyish, at least outer involucre bracts cobwebby-lanate, setae as long as or shorter than the involucre .....	<i>Echinops glaberrimus</i>
-	Stem dark-red, all involucre bracts glabrous, setae ½ the involucre .....	<i>Echinops galensis</i>
11	Stem with spinose wings .....	12
-	Stem without spinose wings.....	19
12	Heads more than 25 mm broad; involucre bracts long spiny tipped; receptacle honey-combed, with deep denticulately fringed pits.....	13
-	Heads less than 12 mm broad; involucre bracts acute to shortly acuminate; receptacle not honey-combed, with long bristles.....	14
13	Leaves white-wooly, longest spines of the involucre 4-5 cm ....	<i>Onopordum alexandrinum</i>
-	Leaves green, longest spines of the involucre not exceeding 3 cm ...	<i>Onopordum ambiguum</i>
14	Capitula hemispherical to globose, more than 17 mm broad; corolla 2-lipped .....	15
-	Capitula cylindrical-oblong, less than 15 mm broad; corolla not lipped .....	16
15	Involucre bracts membranous-margined, outer bracts shorter than median ones .....	<i>Carduus getulus</i>
-	Involucre bracts not membranous-margined, outer bracts equaling median ones .....	<i>Carduus acanthoides</i>
16	Capitula solitary, peduncle more than 5 cm long, median involucre bracts contracted into a linear prolongation.....	<i>Carduus argenteus</i>
-	Capitula clustered, if solitary, peduncle more less than 2 cm long, median involucre bracts contracted into a lanceolate prolongation .....	17
17	Uppermost leaves with stout spines, longer than the capitula, basal involucre bracts ½ or less than the others.....	<i>Carduus australis</i>
-	Uppermost leaves not surpassing the capitula, basal involucre bracts not or only a somewhat shorter than the rest.....	18
18	Median involucre bracts with thin, scarious, glabrous margin .....	<i>Carduus tenuiflorus</i>
-	Median involucre bracts with thick, not scarious, minutely ciliate margin .....	<i>Carduus pycnocephalus</i>
19	Leaves and its segments needle-like, receptacle naked .....	20

-	Leaves spiny-serrate or spiny-pinnatifid, receptacle densely bristly ... 21		
20	Plant glabrous or sparsely covered with short stalked glands; leaves spinescent along the lower half ..... <i>Iphiaea mucronata</i>	47	or a fringed appendage ..... 48
-	Plant densely covered with glandular hairs; leaves spinescent only at the base ..... <i>Iphiaea scabra</i>	-	Leaves ovate-lanceolate, white-woolly beneath, Heads in terminal raceme ..... <i>Dicoma tomentosa</i>
21	Heads involucre by the uppermost spiny leaves or the outer involucre bracts leaf-like ..... 22	-	Leaves linear-lanceolate, glabrous, Heads in terminal and axillary corymb ..... <i>Hochstetteria tomentosa</i>
-	Heads not involucre by spiny leaves and the outer involucre bracts not leaf-like ..... 24	48	Involucre bracts entire margined; achenes dimorphic, marginal achenes with a basal hilum, central ones with a lateral hilum ..... <i>Mantisalca salmantica</i>
22	Inner involucre bracts radiating, resembling ligules, longer than middle row and floret ..... <i>Carlina involucreata</i>	-	Involucre bracts indurate margined; achenes monomorphic, all with basal hilum ..... 49
-	Inner involucre bracts not radiating, not resembling ligules, shorter than middle row and florets ..... 23	49	Achenes epappose ..... 50
23	Leaves white-mottled, pappus setae barbellate ..... <i>Silybum marianum</i>	-	Achenes pappose ..... 51
-	Leaves green, pappus setae plumose ..... <i>Cynara cornigera</i>	50	Upper leaves undivided, not auriculate; involucre bracts spines yellow; florets white or purple ..... <i>Centaurea calcitrapa</i>
24	Achenes silky-hairy ..... 25	-	Upper leaves pinnatifid, auriculate; involucre bracts spines violaceous at base; florets yellow ..... <i>Centaurea alexandrina</i>
-	Achenes glabrous ..... 32	51	Shrubs; achenes 4-angled with uniform pappus ..... <i>Centaurea scoparia</i>
25	Annuals; outer involucre bracts pinnatifid, differ than cauline leaves. 26	-	Perennials or annuals; achenes slightly compressed with 2 or 3 kind of pappus ..... 52
-	Perennials; outer involucre bracts similar to cauline leaves ..... 28	52	Involucre bracts scarious-margined; achenes silky; outer pappus crown-like ..... 53
26	Heads discoid ..... <i>Atractylis cancellata</i>	-	Involucre bracts not scarious-margined; achenes not silky; outer pappus not crown-like ..... 54
-	Heads radiate ..... 27	53	Scarious part of outer involucre bracts more than half the bract, spines more than 5 mm long; pappus whitish, all not plumose ..... <i>Centaurea pumilio</i>
27	Middle involucre bracts with violet spots near the apex. <i>Atractylis serrata</i>	-	Scarious part of outer involucre bracts less than fifth the bract, spines less than 3.5 mm long; pappus with reddish base, middle row plumose ..... <i>Centaurea aegialophila</i>
-	Middle involucre bracts without violet spots near the apex. <i>Atractylis prolifera</i>	54	Involucre bracts with fimbriated margins ..... 55
28	Heads discoid ..... 29	-	Involucre bracts with entire margins ..... 56
-	Heads radiate ..... 31	55	Heads more than 4 cm diameter; involucre bracts not indurated, terminal spine shorter than 1 cm ..... <i>Centaurea eryngioides</i>
29	Leaf margins glabrous; heads cylindrical, less than 8 mm in diameter ..... <i>Atractylis serratuloides</i>	-	Heads less than 1.5 cm diameter; involucre bracts indurated, terminal spine longer than 1.5 cm ..... <i>Centaurea ammocyanus</i>
-	Leaf margins white-tomentose; heads ovate to rounded, more than 8 mm in diameter ..... 30	56	Heads clustered in a rosette of leaves ..... <i>Centaurea glomerata</i>
30	Involucre bracts pilose-pubescent at the back, with membranous margins ..... <i>Atractylis merneptiae</i>	-	Heads solitary terminal or in the dichotomies ..... 57
-	Involucre bracts white-floccose to glabrescent at the back, margins hyaline ..... <i>Atractylis phaeolepis</i>	57	Involucre bracts apex with palmate spines ..... <i>Centaurea bimorpha</i>
31	Plant short-stemmed or stemless; involucre bracts truncate, ending with a subulate spine ..... <i>Atractylis humilis</i>	-	Involucre bracts apex with a single long median spine and short lateral spinules ..... 58
-	Plant long-stemmed; involucre bracts obtuse, abruptly mucronate ..... <i>Atractylis carduus</i>	58	Main stem reduced to subsessile head; median spine of median row of involucre bracts slightly longer than lateral spines ..... <i>Centaurea furfuracea</i>
32	Pappus setae scabrid or barbellate ..... 33	-	Main stem at least 10 cm long; median spine of median row of involucre bracts at least 3 times as long as lateral spines ..... 59
-	Pappus setae plumose (at least inner row) ..... 37	59	Stem winged; cauline leaves decurrent ..... 60
33	Achenes not ribbed, pappus in two rows, outer row longer than inner one. <i>Cnicus benedictus</i>	-	Stem not winged; cauline leaves not decurrent ..... 62
-	Achenes 10-ribbed, pappus setae if present in one row, squamiform ..... 34	60	Upper leaves oblong, pinnatifid; involucre bracts cobwebby ..... <i>Centaurea sinaica</i>
34	Flowers yellow, pappus chaff acute ..... <i>Carthamus lanatus</i>	-	Upper leaves linear, simple with entire margins; involucre bracts glabrous ..... 61
-	Flowers purple or white, pappus chaff obtuse or emarginate ..... 35	61	Heads subtended by a row of leaves; median involucre bracts with long median spine more than 7 mm long and 4-5 lateral spinules on each side ..... <i>Centaurea melitensis</i>
35	Stem white, glossy, leaves glabrous ..... <i>Carthamus nitidus</i>	-	Heads not subtended with a row of leaves; median involucre bracts with short median spine less than 4 mm long and 1-2 lateral spinules on each side ..... <i>Centaurea solstitialis</i>
-	Stem green, not glossy, leaves crisp-woolly to glabrescent ..... 36	62	Stem and leaves densely white-woolly; leaf lobes linear, ± opposite, mucronate ..... <i>Centaurea postii</i>
36	Pappus twice as long as achenes ..... <i>Carthamus tenuis</i> subsp. <i>foliosus</i>	-	Stem and leaves not white-woolly; leaf simple or with lobes not as above ..... 63
-	Pappus shorter than the achenes ..... <i>Carthamus glaucus</i> subsp. <i>Alexandrinus</i>	63	Cauline leaves simple with dentate margins; median involucre bract with 2 pairs of basal lateral spinules ..... <i>Centaurea procurrens</i>
37	Marginal florets sterile, outer pappus not plumose, hilum basal ..... <i>Notobasis syriaca</i>	-	Cauline leaves pinnatifid to pinnatisect; median involucre bracts with 3 pairs of scattered lateral spinules ..... 64
-	All florets fertile, all pappus plumose, hilum lateral ..... 38	64	Heads densely crisp-papillose, canescent; florets purplish ..... <i>Centaurea aegyptiaca</i>
38	Heads solitary, longer than 4 cm; pappus plumose ..... <i>Carduncellus eriocephalus</i>	-	Heads glabrous; florets pale yellow ..... <i>Centaurea pallescens</i>
-	Heads numerous, shorter than 2 cm; pappus scabrid ..... <i>Carduncellus mareoticus</i>	65	(44) Pappus of black bristles ..... <i>Crupina crupinastrum</i>
39	(1) All, or at least the central florets tubular, plant without latex... 40	-	Pappus of bright setae ..... 66
-	All florets ligulate, plant with latex ..... 171	66	Heads radiate with tubular margin florets; achenes attached to the receptacle obliquely by one side of the base; style with thickened hairy zone near the point of branching ..... 67
40	Capitula unisexual, female florets later transformed into a spinescent fruit ..... 41	-	Heads discoid or radiate with ligulate margin florets; achenes not attached to the receptacle obliquely; style branches not with thickened hairy zone... 71
-	Capitula bisexual, florets not transformed into spinescent fruit... 44		
41	Leaves finely dissected, male capitula arranged in spikes, fruiting involucre with 4-6 beaks at apex ..... 42		
-	Leaves undivided or 3-lobed, male capitula arranged in compound heads, fruiting involucre with straight or hooked prickles all over ..... 43		
42	Plant villose-canescens, aromatic; staminate capitula in ± dense spike; florets more than 8 per capitulum ..... <i>Ambrosia maritima</i>		
-	Plant hirsute, not aromatic; staminate capitula in ± lax raceme; florets less than 7 per capitulum ..... <i>Ambrosia artemisiifolia</i>		
43	Stem spiny, leaves shorter than 3 cm, entire, lower surface white-tomentose ..... <i>Xanthium spinosum</i>		
-	Stem spineless, leaves longer than 4 cm, dentate, both surfaces green. <i>Xanthium strumarium</i>		
44	Involucre bracts spiny tipped ..... 45		
-	Involucre bracts not spiny tipped ..... 65		
45	Outer involucre bracts green, leaf-like ..... <i>Pallenis spinosa</i>		
-	Outer involucre bracts yellowish-white, not leaf-like ..... 46		
46	Heads homogamous; involucre bracts woolly, acutely attenuate... 47		
-	Heads heterogamous; involucre bracts ± glabrous, ending with a prickle		



67	Outer involucre bracts with a pectinate-fringed appendage, achenes with a free folded margins..... <i>Zoegea purpurea</i>		bristly on the upper part only..... 93
-	Outer involucre bracts with acute or mucronate appendages, achenes with simple entire margins..... 68	93	Peduncles thickened; ray flowers fertile; achenes persistent at maturity, distinctly and thickly 10-ribbed..... <i>Anthemis pseudocotula</i>
68	Pappus scales purple; florets whitish..... <i>Amberboa sinaica</i>	-	Peduncles not thickened; ray florets sterile; achenes deciduous at maturity, ribs not thick, less than seven..... <i>Anthemis cotula</i>
-	Pappus scales cream or whitish; florets blue to purple or yellow..... 69	94	Pappus absent..... 95
69	Cauline leaves not decurrent; apices of outer and middle involucre bracts black, marginal florets blue, inner ones yellow to golden yellow..... <i>Amberboa crupinoides</i>	-	Pappus in the form of crown or auricle..... 96
-	Cauline leaves decurrent; apices of involucre bracts not black; all florets purple or blue... 70	95	Ray florets sterile, achenes with 4 ribs, not tuberculate..... <i>Anthemis arvensis</i>
70	Involucre bracts with black margins; florets purple..... <i>Amberboa tubuliflora</i>	-	Ray florets fertile, achenes with 9 ribs, tuberculate..... <i>Anthemis microsperma</i>
-	Involucre bracts with hyaline or brownish margins; florets blue..... <i>Amberboa lippii</i>	96	Disc florets not inflated at base; achenes not tuberculate..... <i>Anthemis indurata</i>
71	Involucre bracts joined into a tube around the achene... <i>Tagetes minuta</i>	-	Disc florets inflated at base; achenes tuberculate..... 97
-	Involucre bracts free, not forming a tube around the achene..... 72	97	Peduncle thickened; achenes white, with a short dentate crown..... <i>Anthemis eliezrae</i>
72	Inner involucre bracts equal, 1-seriate; outer ones free, much shorter, forming a calyculus near base..... 73	-	Peduncles not thickened; achenes brown, auricle at least 1/3 as long as the achene..... 98
-	Involucre bracts imbricate, multiserial, outer ones not form calyculus 77	98	Receptacular paleae deciduous at maturity; corolla of ray florets 2-winged at each side; achenes $\pm$ obconical..... <i>Anthemis chia</i>
73	Cauline leaves often dark reddish or purple, cordate, undivided..... <i>Senecio falvus</i>	-	Receptacular paleae persistent at maturity; corolla of ray florets not winged; achenes quadrangular..... 99
-	Cauline leaves green, oblong-lanceolate, pinnatifid to pinnatipartite. 74	99	Plant densely gray-canescens; achenes quadrangular..... <i>Anthemis melampodina</i>
74	Ray florets longer than 4 mm, exceeding the involucre bracts..... 75	-	Plant sparingly pubescent to glabrous; achenes obconical..... <i>Anthemis zoharyana</i>
-	Ray florets absent, if present shorter less than 3 mm, not exceeding the involucre bracts .. 76	100	Pappus of crown or auricle..... 101
75	Ligules purple; calyculus bracts 0-4, involucre bracts brown-tipped... <i>Senecio hoggariensis</i>	-	Pappus absent..... 105
-	Ligules yellow; calyculus bracts over 8; involucre bracts black-tipped..... <i>Senecio glaucus</i>	101	Perennial herb or chamaephyte, achenes with very short denticulate crown..... <i>Tanacetum sinaicum</i>
76	Involucre bracts longer than 6 mm; calyculus bracts 8-20, black-tipped..... <i>Senecio vulgaris</i>	-	Annual plant, achenes with membranous auricle..... 102
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77	Stem winged..... 78	-	Stem leafy, achenes not furrowed..... 103
-	Stem not winged..... 79	103	Lower leaves opposite, often 3-dentate, upper ones alternate; heads homogamous; achenes 10-ribbed..... <i>Clamydophora tridentata</i>
78	Leaves opposite, serrate; heads globose; pappus absent..... <i>Sphaeranthus suaveolens</i>	-	Leaves alternate, pinnatisect; heads heterogamous; achenes 3-5 ribbed..... 104
-	Leaves alternate, entire; heads hemispherical; pappus biseriate..... <i>Geigeria alata</i>	104	Heads radiate; bisexual florets 5-dentate..... <i>Matricaria recutita</i>
79	Leaves pinnatifid or deeply dissected (pinnatisect) to lobed..... 80	-	Heads discoid; bisexual florets 4-dentate..... <i>Matricaria aurea</i>
-	Leaves simple..... 112	105	Heads less than 3 mm broad, involucre 2-seriate..... 106
80	Leaves opposite; pappus of 2-4 retrorsely barbed aristae..... 81	-	Heads more than 4 mm broad, involucre 3-4-seriate..... 110
-	Leaves alternate; pappus otherwise..... 83	106	Heads homogamous..... <i>Artemisia herba-alba</i>
81	Ray flowers white..... <i>Bidens pilosa</i>	-	Heads heterogamous..... 107
-	Ray flowers yellow..... 82	107	Plant densely tomentose, all florets fertile..... <i>Artemisia judaica</i>
82	Achenes $\pm$ oblong, compressed, tipped with 2 bristles..... <i>Bidens schimperii</i>	-	Plant glabrous or sparsely pilose, inner disc florets perfectly sterile 108
-	Achenes fusiform, slender, tipped with 4 bristles..... <i>Bidens bipinnate</i>	108	Lower leaves amplexicaul at base; involucre bracts obtuse..... <i>Artemisia vulgaris</i>
83	Leaves pinnatifid or coarsely crenate; style branches flattened; achenes pappose, pappus of bristle-like scales..... 84	-	All leaves slightly clasping at base; involucre bracts acute..... 109
-	Leaves deeply dissected to lobed; style branches truncate and penicillate; achenes epappose or with a crown or a posterior auricle..... 85	109	Heads globose, less than 1.5 mm broad..... <i>Artemisia scoparia</i>
84	Plant prostrate; leaves lyrate-pinnatifid; receptacle naked..... <i>Grangea maderaspatana</i>	-	Heads ovoid, more than 2.5 mm broad..... <i>Artemisia monosperma</i>
-	Plant erect; leaves coarsely crenate; receptacle paleaceous..... <i>Ceruana pratensis</i>	110	Heads ligulate, 20-30 mm broad..... <i>Pinardia coronaria</i>
85	Receptacle paleate..... 86	-	Heads discoid, 4-8 mm broad..... 111
-	Receptacle naked..... 100	111	Leaf-lobes serrate; heads heterogamous; involucre bracts glabrous, scarious-margined; achenes of female florets 2-winged..... <i>Cotula anthemoides</i>
86	Heads homogamous, all florets tubular..... <i>Anacyclus monanthos</i>	-	Leaf-lobes entire; heads homogamous; involucre bracts woolly, not scarious-margined; achenes not winged..... <i>Cotula cinerea</i>
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87	Shrubs, ray florets yellow..... 88	-	Leaves alternate..... 120
-	Herbs, ray florets white..... 90	113	Leaves capillary, less than 1 mm broad; corolla tube hairy in the lower half..... <i>Leysera leyseroides</i>
88	Leaves undivided; heads homogamous..... <i>Achillea fragrantissima</i>	-	Leaves more than 3 mm broad; corolla tube not hairy below..... 114
-	Leaves pinnatisect into minute segments; heads heterogamous..... 89	114	Ray florets absent; tubular florets blue..... 115
89	Leaves more than 1.5 mm broad, segments not transversely imbricate..... <i>Achillea biebersteinii</i>	-	Ray florets present, florets yellow or white..... 116
-	Leaves less than 1 mm broad, segments transversely imbricate..... <i>Achillea santolina</i>	115	Leaf base obtuse, involucre bracts oblong-lanceolate, glabrous..... <i>Ageratum conyzoides</i>
90	Corolla-base of bisexual florets obliquely saccate, forming a long spur covers the achenes on one side..... <i>Chamaemelum mixtum</i>	-	Leaves base subcordate, involucre bracts narrowly lanceolate, hairy..... <i>Ageratum houstonianum</i>
-	Corolla-base not as above..... 91	116	Phyllaris 3-4-seriate, longer than 6 mm, achenes with 2-5 awn aristae..... <i>Blainvillea acmella</i>
91	Scales between the florets bristle like..... 92	-	Phyllaris 1-3-seriate, less than 4 mm long, achenes epappose or with a few deciduous minute bristles..... 117
-	Scales between the florets lanceolate..... 94	117	Involucre bracts 1-seriate; style with an apical ring of hairs; achenes triquetrous with 3 broad membranous wings..... <i>Osteospermum vaillantii</i>
92	Ray florets twice as long as tubular ones; receptacle hemispherical or broadly conical, bristly all over..... <i>Anthemis retusa</i>	-	Involucre bracts 2-3-seriate; style without an apical ring of hairs; achenes not triquetrous or winged..... 118
-	Ray florets as long as tubular ones; receptacle ovate or oblong-conical,	118	Leaves with 3 parallel nerves; achenes epappose..... <i>Flaveria bidentis</i>
		-	Leaves 1-nerved; achenes with a few minute bristles..... 119
		119	Plant covered with appressed short rigid hairs, leaves lanceolate, sessile

..... <i>Eclipta alba</i>	
-	Plant glabrous or sparsely hairy, leaves ovate, upper sessile, at least lower ones petiolate..... <i>Galinsoga parviflora</i>
120	(112) Heads heterogamous with ligulate marginal florets..... 121
-	Heads homo- or heterogamous with tubular or filiform marginal flowers..... 144
121	Outer involucre bracts hairy; ray florets lilac..... <i>Felicia dentata</i>
-	Outer involucre bracts glabrous, ray florets blue, pink, white or yellow..... 122
122	Florets pink to violet-blue..... 123
-	Florets yellow..... 129
123	Annual or perennial plants, involucre more than 6 mm long; ligule longer than the pappus..... <i>Aster squamatus</i>
-	Shrubs or undershrubs; involucre shorter than 5 mm; ligules shorter than the pappus..... 124
124	Pistillate florets strap-shaped..... 125
-	Pistillate florets filiform..... 127
125	Leaves glabrous or sparsely hairy; involucre bracts oblong-lanceolate, outer ones glabrous; flowers all ligulate..... <i>Conyza canadensis</i>
-	Leaves appressed-hairy; involucre bracts linear-lanceolate, outer ones hairy; outer female florets ligulate, inner ones bisexual tubular. <i>Conyza albida</i>
126	At least upper leaves narrowly linear, heads arranged in small group almost throughout the stem..... <i>Conyza bonariensis</i>
-	All leaves regularly incised toothed, heads in lax terminal corymb..... 127
127	Corolla of female florets narrowly cylindric, obliquely truncate, apex fimbriate; pappus twice as long as corolla..... <i>Conyza aegyptiaca</i>
-	Corolla of female florets filiform-tubular, lobed, apex linear-triangular; pappus as long as or slightly shorter than corolla..... <i>Conyza stricta</i>
128	Ray florets orange; style undivided, tip surrounded by a ring of short hairs; inner achenes annular (larva-shaped)..... 129
-	Ray florets yellow; style divided, not surrounded by hairy ring; achenes not annular..... 130
129	Marginal achenes beakless; always 3-winged with dentate margin ... <i>Calendula tripterocarpa</i>
-	A least some of the marginal achenes beaked; 1-2-winged with lacinate margins..... <i>Calendula arvensis</i>
130	Achenes of disc florets winged, pappus of 2 aristae..... <i>Verbesina encelioides</i>
-	Achenes of disc florets not winged, pappus of numerous bristles or scales..... 131
131	Outer involucre bracts leaf-like, much exceeding the head, connate at base, pappus absent..... <i>Anvillea garcinii</i>
-	Outer involucre bracts not exceeding the head, free at base, pappus present..... 132
132	Pappus biseriate, outer ones of minute cup shape..... 133
-	Pappus uniseriate, cup shape series not present..... 138
133	Cauline leaves petiolate..... <i>Pulicaria petiolaris</i>
-	Cauline leaves sessile, semi-amplexicaule or auriculate at base..... 134
134	Aromatic plants, leaf margins undulate, ligulate flowers distinctly exceeding the involucre..... <i>Pulicaria incisa</i>
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135	Upper leaves strongly revolute, pappus of inner setae 18-25..... <i>Pulicaria sicula</i>
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136	Some leaves longer than 6 cm, hairs with tubercle base..... <i>Pulicaria inuloides</i>
-	All leaves less than 5 cm long, hairs without tuberculate base..... 137
137	Cauline leaves obtuse; pappus setae of inner row more than 10, outer pappus setae 1/10 as long as inner ones..... <i>Pulicaria arabica</i>
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-	Pappus setae scabrid throughout..... 139
139	Receptacles paleaceous, pappus of lanceolate irregularly dentate pales..... 140
-	Receptacles epaleaceous, Pappus of bristles more or less equal in length..... 142
140	Stemless (rarely substemless); leaves narrowed into a petiole; palae apex rounded and glandular..... <i>Asteriscus heirochunticus</i>
-	Stemmed; leaves sessile and semi-amplexicaule; palae apex acute and pubescent..... 141
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-	Viscid-glandular annuals; all leaves undivided, entire-margined; ligulate flowers pubescent..... <i>Asteriscus aquaticus</i>
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144	(120) Heads homogamous..... 145
-	Heads heterogamous..... 150
145	Pappus absent..... 146
-	Pappus present..... 147
146	Corolla not auriculated; achenes 4-5 costate, truncate above..... <i>Ethulia conyzoides</i>
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149	Leaves obtuse, inner involucre bracts recurved and smooth at tip..... <i>Varthemia montana</i>
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-	Plant with distinct stem, heads not as above..... 151
151	Heads more than 10 mm long, solitary or in loose corymbose panicles..... 152
-	Heads less than 5 mm long, aggregated into compound glomerules..... 159
152	Shrubs or undershrubs, 1-3 m high; basal leaves more than 25 mm broad..... <i>Pluchea dioscorides</i>
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153	Involucre bracts scarious-margined..... 155
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-	Leaves hairy, obovate-oblong, less than 6 mm wide..... <i>Laggera viscosa</i>
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-	Pappus barbellate or shortly plumose at the apex..... 160
160	Style lanceolate..... 161
-	Style truncate..... 162
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162	Female flowers epappose, each subtended with bract; bisexual florets 4-lobed; pappus-setae plumose above..... 163
-	Female flowers pappose, not subtended with bracts; bisexual florets 5-lobed; pappus-setae barbellate..... 166
163	Involucre bracts ±obovate, florets epappose..... <i>Filago contracta</i>
-	Involucre bracts ±lanceolate, florets pappose..... 164
164	Heads solitary, ovate, homogamous..... <i>Filago mareotica</i>
-	Heads aggregate in glomerules, subglobose or oblong-ovate, heterogamous..... 165
165	Outer rim of the inner involucre bracts ciliate... <i>Filago desertorum</i>
-	Outer rim of the inner involucre bracts glabrous. <i>Filago prolifera</i>

166	Leaves narrowly linear, bisexual flowers more than 3.5 mm long, exceeding in number the female florets, pappus monomorphic..... 167	<i>Urospermum picroides</i>	Heads campanulate, cylindrical to subglobose; involucre bracts more than 15, unequal, in 2-several rows, imbricate; achene beak not inflated at base ..... 186
-	Leaves ±spatulate, bisexual florets less than 2.5 mm long, less in number the female florets, pappus dimorphic..... 168		186 Pappus at least of inner achenes plumose..... 187
167	Heads obclavate; florets 7-9 per head ..... <i>Helichrysium glumaceum</i>		- pappus scabrous bristles or simple hairs..... 194
-	Heads hemispherical-campanulate; florets over 25 per head ..... <i>Helichrysium conglobatum</i>		187 Rootstock thick, fleshy or tuberous; florets violet-purple or at least marginal ones purplish beneath; achenes not beaked with a hollow stalk surrounding the hilum below; side-hairs of pappus-bristles interlaced..... 188
168	Head subtended by a row of involucre leaves; involucre bracts acute to acuminate; bisexual florets funnel-shaped; pappus-setae nude below ..... <i>Homognaphalium pulvinatum</i>		- Rootstock not thickened; florets yellow all over; achenes beaked without hollow stalk below; side-hairs of pappus-bristles not interlaced... 192
-	Head not subtended involucre leaves; involucre bracts obtuse to subacute; bisexual florets tubular; pappus-setae scabrous below..... 169		188 Ligules yellow inside, reddish or purple outside..... 189
169	Stereome strongly divided; pappus-setae cohering at base with long patent cilia ..... <i>Pseudognaphalium luteo-album</i>		- Ligules purple or violet..... 191
-	Stereome undivided; pappus-setae free at base, with short patent cilia ..... 170		189 Leaves lanate; achenes hairy ..... <i>Scorzonera judaica</i>
170	Heads surrounded by a whorl of uppermost leaves; stereome undivided; pappus-setae of bisexual florets with clavate apical cells ..... <i>Gnaphalium crispatum</i>		- Leaves stellate-hairy; achenes glabrous..... 190
-	Heads not surrounded by a whorl of uppermost leaves; stereome with thin streaks; pappus-setae of bisexual florets with linear apical cells ..... <i>Gnaphalium polycaulon</i>		190 Achenes longer than pappus; densely prickly <i>Scorzonera schweinfurthii</i>
171	Achenes strongly incurved (arcuate), dorsiventrally asymmetrical with hairs or projections on the dorsal side; pappus absent or of short crown ..... 172		- Achenes shorter than pappus; minutely rugose... <i>Scorzonera mollis</i>
-	Achenes ± cylindrical, dorsiventrally symmetrical; pappus of bristles or hairs ..... 174		191 Leaves linear with sheathing base ..... <i>Scorzonera undulata</i>
172	Leaves capillary, entire; involucre bracts after flowering not elongated and not indurated; achenes monomorphic, with hook-shaped prickles on dorsal side..... <i>Koelpinia linearis</i>		- Leaves lanceolate, crisp-margined, base not sheathing.. <i>Scorzonera drarii</i>
-	Leaves lyrate, toothed; involucre bracts after flowering elongated, indurated and partly enclose the marginal florets; achenes dimorphic, marginal achenes glabrous, inner ones hirtellous..... 173		192 Outer achenes epappose or with a short corona, inner ones pappose ..... <i>Leontodon simplex</i>
173	Fruiting heads with stellate spreading involucre; pappus absent ..... <i>Rhagadiolus stellatus</i>		- All achenes with plumose pappus..... 193
-	Fruiting heads with slightly divergent involucre; pappus of short fringed cup ..... <i>Garhadiolus angulosus</i>		193 Plant hispid; leaves with narrow acute lobes ..... <i>Leontodon hispidulus</i>
174	Lateral heads sessile, in clusters of 2-several; florets blue or white ..... <i>Cichorium endivia</i>		- Plant crisp-pubescent; leaves with capillary lobes ..... <i>Leontodon laciniatus</i>
-	Lateral heads pedunculate, solitary; florets ±yellow or purple..... 175		194 Plant stemless, leaves all basal in a rosette..... 195
175	Leaves parallel-veined, linear; cauline leaves sheathing grass-like and often subtending brownish lanate hairs; involucre bracts 1½ - 2 as long as florets ..... 176		- Plant with distinct stem, cauline leaves present..... 199
-	Leaves not parallel-veined; cauline leaves not sheathing and not subtending lanate hairs; involucre bracts shorter than the florets..... 178		195 Involucre bracts not elongated or indurated; pappus of soft simple hairs ..... 196
176	Achenes dimorphic, marginal achenes with 5 rigid scabrous bristles, 2 much shorter, inner with long plumose hairs .... <i>Geropogon hybridus</i>		- Involucre bracts after flowering elongated, indurated and partly enclosed outer achenes; pappus of bristles or scales (at least inner florets)..... 197
-	Achenes monomorphic, all with numerous feathery bristles..... 177		196 Scape less than 12 cm high; beak as long as its achene ..... <i>Taraxacum minimum</i>
177	Leaves entire, up to 20 cm; Involucre bracts twice as long as florets ..... <i>Tragopogon porrifolius</i>		- Scape more than 15 cm high; beak twice as long as achene ..... <i>Taraxacum turcicum</i>
-	Leaves undulate, shorter than 10 cm; Involucre bracts ± as long as florets ..... <i>Tragopogon collinus</i>		197 Hispid annual; leaves of basal and cauline, sinuate-dentate; florets yellow; achenes not winged ..... <i>Hedynopsis rhagadioloides</i>
178	Plant white hispid with forked bristles or anchor-shaped (2-3-hooked) rough glochidiate hairs..... 179		- Glabrous or sparsely perennial; leaves basal in a rosette, pinnatisect; florets yellow with purplish strips outside; middle and inner achenes winged..... 198
-	Plant glabrous or of simple hairs, forked or hooked glochidiate hairs absent ..... 185		198 Annual; scapes swollen above into a club-shape end; calyculer bracts in one row, fifth as long as the involucre..... <i>Hyoseris scabra</i>
179	Plant tuberous, stemless; florets golden-yellow; pappus of inner achenes plumose, those of outer achenes short scaly..... <i>Thrinia tuberosa</i>		- Perennial; scapes not swollen above; calyculer bracts in two rows, half as long as the involucre..... <i>Hyoseris lucida</i>
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181	Achenes homomorphic, fine-wrinkled, turned blue in fruiting ..... <i>Picris cyanocarpa</i>		- Lateral heads if present with long peduncle; achenes not squamose-muricate; beak deciduous ..... 201
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