

(16) *Launaea mucronata*

Launaea mucronata (Forssk.) Muschl., Man. Fl. Egypt: 1057. 1912 ≡ *Leontodon mucronatum* Forssk., Fl. Aegypt.-Arab.: 144. 1775 ≡ *Zollikoferia mucronata* (Forssk.) Boiss., Diagn. Pl. Orient., ser. 1, 7: 12. 1846 ≡ *Launaea resedifolia* subsp. *mucronata* (Forssk.) Maire in Bull. Soc. Hist. Nat. Afrique N. 28: 366. 1937. – Type: Egypt, in desertis Kahirinis, *Forsskål* (C [nos. 1401, 1402 (fide Hepper & Friis 1993: 125)], isotype S!).

Note: A specimen in S ex herb. L. J. Montin (1723-1785), which Montin acquired from M. Vahl in 1780 (see note on the verso of the sheet) is annotated “*Scorzonera ciliata* seq. M. Vahl” in Montin’s hand. This identification by Vahl is erroneous (and is not Vahl’s only error concerning Forsskål’s material distributed by him, see also the note sub *Launaea spinosa*). The specimen instead represents *Launaea mucronata* ≡ *Leontodon mucronatum* Forssk., and the basionym is accompanied by a description precise enough for unambiguous reference to the corresponding Forsskål collection. *Scorzonera ciliata* Forssk. on the other hand, is conspecific with *L. nudicaulis*, a species that can hardly be confused with *L. mucronata*. The specimen in S thus should be regarded as an isotype of *Leontodon mucronatum* Forssk.

Description (v.v.)

Annual (to occasionally paucennial) herb, with a taproot, flowering (5)25-50(80) cm high, fairly polymorphic, whole plant conspicuously greyish-glaucous, usually with a single, erect, leafy flowering stem corymbosely branched in upper part; otherwise plants branched ± from base on, ± without a dominant main stem and leaves basally rosulate. *Lower cauline leaves* (narrowly) spatulate in outline, 2-23 × 0.5-9 cm, rather variable but in general irregularly, deeply pinnatifid with

narrow, acute segments, with acute apex, and deeply, white-cartilagineously sinuate-dentate and \pm undulate margin; except for the very basal leaves, all regularly with large, cochleate and pinnatifid auricles; *upper cauline leaves* lanceolate in outline, smaller, otherwise pinnatifid and auriculate as the lower leaves, in synflorescence region gradually reduced to shortly lanceolate or ovate-acute bracts with (semi)amplexicaule base. *Synflorescence* of a flowering stem \pm divaricately branched, number of capitula considerably varying; main axis ending in a capitulum and overtopped by their branches; lower order branches usually monopodial, higher order branches monochasial; branching from accessory buds rather common in the later fruiting time. *Peduncles* as the terminal segment of the synflorescence axes (1.5)3-6(10) cm long, usually many-bracteate, spreading-erect. *Capitula* with c. 29-80 flowers. *Receptacle* at fruiting time (2.5)4-5(7) mm in diameter. *Involucre* at anthesis 8-12(14) mm long, at fruiting time up to 12-16(18) mm long; involucre bracts with \pm (in)distinct or almost without scarious margin, at time of fruit dispersal spreading and their midrib in lower part swollen and hardened; outer involucre bracts 7-12, apically contracted into a white prickle and often bent back already in bud, the outermost \pm ovate-acute 2-4.5 mm long, the following bracts longer and more lanceolate, the innermost lanceolate to linear-lanceolate, reaching $\frac{3}{4}$ and more of the length of the inner involucre bracts; inner involucre bracts with \pm obtuse white-scarious tip, 8-12, linear-lanceolate, subequal at anthesis, 8-14 \times 2-3.5 mm, with the postfloral prolongation of the involucre becoming different in length. *Flowers* with a ligule of 7-10 \times 1.8-3.2 mm, bright yellow (in particular the outer ligules dorsally greyish with blackish veins), and a tube 4.5-6 mm long; anther tube without appendages (2.2)2.4-2.8(3.0) mm long, somewhat longer in the inner than in the marginal flowers, apical appendages 0.2-0.3 mm and basal appendages 0.4-0.6 mm long; style branches 1.4-2.3 mm long, sweeping hairs usually yellow, in easternmost part of the distribution area (SE Arabian Peninsula, SE Iran, SE Pakistan), however, predominantly black. *Achenes* 2.9-7.0 \times 0.3-0.8 mm, heteromorphic, the inner \pm columnar, with 4 main ribs, secondary ribs not differentiated, transversally finely \pm papillose wrinkled, pale brown or greyish to darker brown, ribs exceeding base of achene corpus forming a connate and often slightly ventricose tubular base with a \pm even basal edge; the following papillose-pubescent achenes with the papillae arranged in dense wrinkled lines; achenes towards the margin of the receptacle denser papillose, somewhat curved, compressed and somewhat shorter, ribs at base less connate, more spreading, otherwise similar; the very marginal 5-ribbed, somewhat curved and compressed, otherwise like the former. *Pappus* homomorphic of setaceous rays only and deciduous, or dimorphic, of downy and setaceous rays, and persistent.

Recognition of subspecies

The taxon first described by Cassini as *Rhabdotheca sonchoides*, but usually referred to as *Launaea cassiana*, is, in contrast to the traditional view, not recognized here as a separate species but as a subspecies of *Launaea mucronata*. Decisive for this is a different taxonomic evaluation of the deciduous, homomorphic pappus of Cassini's taxon, which is the only reliable distinguishing feature between *L. mucronata* and *Rhabdotheca sonchoides*.

At first, it must be considered that in at least two other species of this section, i.e. *L. rhynchocarpa* and *L. crassifolia*, gradually also in *L. amal-aminae*, besides plants with a dimorphic persistent pappus also such with a homomorphic, deciduous pappus occur. Since both forms can be found even in the same collection and mounted on the same sheet, they apparently seem to grow among each other. The pappus of these species is homomorphic presumably due to a mutational loss of the outer downy rays (including a reduction of the pappus disk). Although further details are not known at present, the plants with deciduous pappus taxonomically may at most deserve the status of a variety.

Considering *Rh. sonchoides* and *L. mucronata*, the homomorphic pappus of the first, apparently is also the result of a loss of the outer downy rays, and plants of both taxa cannot habitually be distinguished and frequently occur within the same population. Moreover, equally in both taxa we face the rather surprising phenomenon that the populations in the easternmost part of the distribution area (i.e. the ± southern Gulf coast region) have black but yellow sweeping hairs in the other parts of their distribution area, and that both in general show similar variability, e.g. in achene colour. While these facts might support a hypothesis that the form with a deciduous pappus may independently evolve in principally every population as the result of a simple mutation, there are contradicting facts. (1) The distribution area of *R. sonchoides* is smaller than that of *L. mucronata*, as the former is absent from Pakistan, Kuwait, Iraq, Syria, Jordan, Palestine/Israel and Lebanon; (2) both taxa also show minor differences in achene features: (a) the achenes of *R. sonchoides* are somewhat shorter and stouter than in the majority of *L. mucronata* plants; (b) a larger number of inner achenes are (sub)glabrous, and the others are often less densely papillose; (c) the pappus of *Rh. sonchoides* is somewhat shorter than in the majority of *L. mucronata* plants.

These differences rather support the view that *R. sonchoides* has evolved from *L. mucronata* once and has since spread independently, though hybridization between both may, of course, occur. At present, the treatment of *R. sonchoides* as a subspecies of *L. mucronata* is therefore found the most appropriate solution.

Key to the subspecies of *Launaea mucronata*

- 1 Pappus persistent, dimorphic, consisting of numerous downy rays and a smaller number of setaceous and distinctly longer, inner rays . . . subsp. ***mucronata***
- Pappus deciduous, homomorphic, consisting of c. 20-30 setaceous rays, ± equal in length and diameter subsp. ***cassiana***

(a) *Launaea mucronata* subsp. ***mucronata***

Launaea mucronata subsp. *mucronata*

= *Rhabdotheca tenuiloba* Pomel in Bull. Soc. Climatol. Alger 13 [Nouv. Mat. Fl. Atl. 2]: 263. 1875 ≡ *Zollikoferia tenuiloba* (Pomel) Batt., Fl. Algérie 1: 557. 1889, [non Boiss. 1849]. – Holotype: Algeria, Metlili, 31.3./1.4.1862, *Pomel* (MPU!; isotype: LD! [p.p. subsp. *cassiana*]).

= *Launaea resedifolia* var. *pulchella* Pamp. in Agric. Colon. 22: 366, fig. 2. 1928. – Holotype: Libya, fra l'Uadi Faregh e Maatan Risam, 18.4.1928, *G. Krüger* (FI!).

Ic.: Figs 4i, 14a-e, 20d, 21a. – Bouloumoy 1930: fig. 252(2) sub *Z. mucronata* ([est?] specimen); Rechinger 1977: fig. 116 (specimen); *ibid.*, fig. 115 sub *L. cassiana* (specimens); Feinbrun-Dothan 1977: fig. 728 \equiv Al-Rawi 1987: p. 267, fig. 5 (habit); Chaudhary & Zuwawi 1983: fig. 30A(1), 30B(b) (synflorescence, achenes); Léonard 1984: p. 43, fig. 5(G-H) (habit, achene); Collenette 1985: p. 161 sub *L. cassiana* (habit; = *Collenette 2559!*; the photo of “*L. mucronata*” on the same pages does not represent this species but possibly *L. amal-aminae*); Chaudhary & Akram 1987: p. 64, fig. 2 (habit); Phillips 1988: p. 73 (habit); Mandaville 1990: fig. 232 (habit); Ghareman 1994: fig. 1569 (habit, details) sub *L. cassiana*.

Description (v.v.)

Achenes (2.9)3.5-5.5(7.0) \times 0.3-0.8 mm. *Pappus* 6-9 mm long, persistent, white, dimorphic, of numerous downy and a smaller number of setaceous and longer rays. Otherwise plants as described above.

Chromosome number: Four reports published on plants from Morocco, Algeria, Egypt and Iran (see Kilian & al. 1995: 276) give $2n = 16$ and $n = 8$, respectively, for the typical subspecies.

Distribution and ecology

Both subspecies of *Launaea mucronata* are largely confined to the N African and Arabian desert region (Figs 106-107) with a winter rain season, and both are thus typical Saharo-Arabian elements (see also Feinbrun-Dothan 1977: 431). *L. mucronata* hence is, apart from a few overlappings at the edges of its area, also ecogeographically delimited from related species of *L. sect. Zollikoferia*.

The report of *L. mucronata* from Greece, Makedhonia (Turrill 1920: 189; see also Boulos 1966: 326), based on *Turner 176a* from the Mt Chortiatis area near Thessaloniki (“Lembet”, 6.1917), is, no doubt, erroneous as evident by the distribution and ecology of this species; the corresponding specimen, which should be at K, however, was not found (see Eleftheriadou & Raus 1996: 508).

Based on two gatherings from Fuerteventura, *L. mucronata* subsp. *mucronata* is reported here for the first time for the Canary Islands (compare Hansen & Sunding 1993). The typical subspecies is reported here the first time also for Syria (compare Mouterde 1983: 535), based on a single collection from the Euphrat at Qal’at as Salihyah near the border to Iraq.

L. mucronata grows mainly on sandy or silty substrates in desert or semidesert areas, and often in wadi beds; both subspecies are found also as ruderals and (harmless) weeds (collectors in sched.; Chaudhary & Akram 1987: 63; Mandaville 1990: 322).

L. mucronata subsp. *mucronata* usually has an annual lifespan. It germinates after the winter rains with narrowly lanceolate cotyledons and larger, sinuate-dentate primary leaves of similar shape, followed by more and more incised and undulate leaves, arranged in a small spreading-erect leaf rosette. A flowering stem is produced soon, and in natural environments the plants flower between February and May, and perish after the fruiting. However, there are several specimens indicating that under favourable conditions the species is able to persist at least

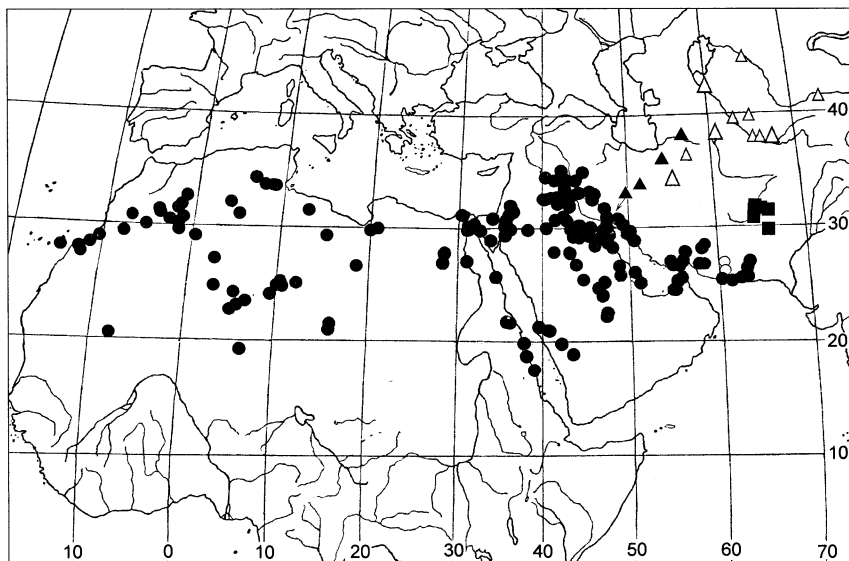


Fig. 106. Distribution of *Launaea mucronata* subsp. *mucronata* (circles), *L. platyphylla* (squares), and *L. korovinii* (triangles); open symbols: literature records, larger open triangles: records without precise locality, see text.

for a second year through the development of innovations from axillary buds at the base of the stem. As in many herbaceous plants, these innovations already and rather regularly are developed at fruiting time after the growth of the main stem is concluded, and for the same reason in case of the loss of the main stem due to browsing animals. In the Botanic Garden Berlin-Dahlem, two out of a total of c. 15 cultivated plants reached the second year, and one was a second time flowering, fruiting and developing basal innovations, but perished then. In contrast to the true perennials, *L. mucronata* does neither, however, develop a perennial caudex enabling the plant to long-term innovation growth, nor a root system capable for giving rise to rootborn shoots. Thus *L. mucronata* seems likely to represent a life form that might be named a 'facultative pauciennial therophyte', having the plasticity for annual or pauciennial growth depending on the available water capacity. Such a behavior was observed by, e.g., Danin (1983: 109, 116) also in *Pulicaria desertorum* DC. and *Blepharis ciliaris* (L.) Burt from Palestine/Israel, and by Holzäpfel (1994: 196) in certain *Picris* species from Australia, and it likely is much more common than presently known.

Specimens seen:

CANARY ISLANDS: FUERTEVENTURA: Jandia, El Sable ad Playa de Sotavento, 29.12.1970, E. & G. Wängsjö 3988 (LD); Costa Calma, 27.3.1986, O. Hansen 352 (C).

MOROCCO: 6 km SE Tah, 27°42'N, 12°57'W, 30 m, 28.3.1990, F. Schuwerk 90/352 (M); 40 km N of Tafaya, 7.5.1985, Parker & Burt 132 (LIV); 8 km SW Tan-Tan-Plage,

20 m, 28°26'N, 11°23'W, 27.3.1990, *F. Schuhwerk 90/277* (M); Oued Noun [=Assaka], 12.1936, *Ollivier 15* (MPU); 41 km SE of Goulimime, 300 m, 21.3.1969, *M.R.K. Lambert 211* (BM); 35 km W Akka, 29°30'N, 8°03'W, 14.4.1986, *Podlech 40763* (G); c. 3 km E von Icht an der Straße Bouizakarn - Tata, 30.4.1994, *Kilian 3483* (B, herb. Kilian); c. 10 km S von Akka, an der Straße Akka - Tata (7084), 30.4.1994, *Kilian 3498a* (B); c. 5 km W von Fom Zguid, 2.5.1994, *Kilian 3516* (B, herb. Kilian); 2 km N Tagonnite, 29°59'N, 5°35'W, 610 m, 11.4.1990, *F. Schuhwerk 90/961* (M); 31 km W Quarzazate, 30°58'N, 7°10'W, 17.4.1986, *Podlech 40984* (G); Quarzazart, 3900', 7.8.1936, *E.K. Balls 2673* (BM, E, S); 18 km E Quarzazate, 1120 m, 30°57'N, 6°46'W, 17.4.1987, *Lippert 22239* (M); Ksares-Souk to Erfoud, 900 m, 5.4.1969, *P. & J. Davis 49097[a]* (E); in lapidosis arenosis montis Gara Mdouar ad occ. oasium Tafilalet, 950 m, 13.4.1933, *Maire & Wilczek 263* (MPU, S); pentes du Gebel Grouz [N Figuig], 4.1913, *Pitard 3560* (P); Guiffe, 14.5.1884, *Letourneux* (P); Cirque de Djahifat, 4.1913, *Pitard 3559* (P); Aine Yalou, 4.1913, *Pitard 3561* (P).

WESTERN SAHARA: Touf, Taquerzimt, 10.8.1938, *Miss. Etud. Biol. Acridiens 2576* (MPU).

MAURITANIA: Atar, 700', common weed of cultivations, 16.4.1959, *Popov 34* (BM); *ibid.*, 1910, *Chudeau* (P); Aussent, 3.5.1911, *Chudeau* (P); Ile Kiji, 13.11.1937, *Miss. Etud. Biol. Acridiens 2295* (MPU); Oued Djonah, 3.11.1910, *Chudeau* (P); dunes dans le Guelb, 6.5.1911, *Chudeau* (P).

ALGERIA: S. loc., *Th. Stomps 971* (U); Djebel Bani, Mrimina [= Mrheimine], 13.2.1939, *Malençon* (MPU); Beni Abbes, 22.5.1952, *Guinet* (MPU); 28 km SW Zeramra, 580 m, 29°49'N, 2°41'W, 1.4.1980, *Podlech 33705* (M); 12 km N Abadla an der Straße nach Bechar, 620 m, 31°06'N, 2°38'W, 4.4.1980, *Podlech 33816* (M); Bou Ayech, 14.4.1906, *Romieux 850* (G); Duveyrier, 12.4.1938, *A. Bertram* (MPU); Ain Sefra, *Battandier* (MPU); Sebkhā N von Timimoun, 210 m, 29°17'N, 0°09'E, 25.3.1981, *Podlech 35179* (G,M); Tadmaït, 5.1940, *Volkousky* (MPU); El Golea, 11.5.1968, *Rodin & Miroshnitschenko 2051* (LE); Ghardaïa, 4.5.1971, *Schneller 92* (Z); Beni-Isghen prope Ghardaïa, 3./4.1902, *Chevallier 594* (JE, LD, MPU, WU); Monts du Mouydir, Eingang zur Arak-Schlucht bei Arak, 565 m, 25°18'N, 3°44'E, 21.3.1981, *Podlech 35113* (M); *ibid.*, in faucibus Arak, 650-700 m, 2.3.1928, *Maire 763* (G, MPU); Hoggar Mts., 24°04'N, 5°24'E, spring 1955, *Hunting Techn. Serv. Ltd. 59 DDI* (E); *ibid.*, Oued Taharanet, 4000', in dry wadi bed, 12.3.1931, *Meinertzhagen* (BM); *ibid.*, Tamanrasset, 11.1953, *Quézel* (MPU); *ibid.*, in montibus Tefedest, in alveo limoso amnis Gif Aman, 9.4.1938, *Maire 765* (MPU); *ibid.*, Tefedest, O. Adieladial, 3.1956, *Quézel* (MPU); *ibid.*, Tusalmin[?], 11.1953, *Quézel* (MPU); Biskra, *Battandier* (MPU); Oued Biskra, à Biskra, 20.4.1853, *Balansa 791* (G, W); Bordj de Chegga, 10.7.1875, *Duhamel* (G); Tassili N'Ajjer, Djanet, 1100 m, 24°33'N, 9°29'E, 18./19.3.1980, *Podlech 33141* (G, M).

NIGER: Air Mts, Tin Gâlene Wadi, 14.3.1970, *Bradley 56* (K); *ibid.*, Mts. Baghezans, Ameolit, 10.2.1932, *Chevalier 43376* (P).

TUNISIA: Metlaoui à Gafsa, 7.4.1912, *Humbert* (MPU); Kriz, 3.1909, *Pitard* (MA); El Oudiane, 3.1908, *Pitard 1276* (G); el Guettar, 20.5.1884, *Doumet-Adanson & Bonnet* (P).

LIBYA: TRIPOLITANIA: Uadi Nasic fra el-Gheriat e Mizda, 12.3.1932, *Bargagli-Petrucchi* (FI); Südwestrand des Hongrabens, c. 50-60 km NNW Hon, 28.1.1972, *Gabriel* (B). – FEZZAN: Elbarcat, 700 m [c. 10 km SE Gat], 2.3.1934, *Corti 505* (FI); sérir tra l'Uadi Issa e Brach, 14.2.1934, *Corti 502* (FI); presso la sorgente Aghiosciachh (Tin Geraben, Gat), 1.3.1934, *Corti 504* (FI); Tin Geraben (Gat), nell'oasi, 28.2.1934, *Corti 503* (FI); Uadi Tenezzuft, nel letto dell'Uadi, c. 675 m, 7.5.1933, *Corti 501* (FI); nell'oasi di Gat, 700 m, 6.5.1933, *Corti 501* (FI); Tunin (Gat), 5.3.1934, *Corti 506* (FI); Wadi Zigzag, 1982, *D.*

Turner DT23/82 (BM); Jebel Soda and Wadi Berging, 2.3.1952, Guichard KG/Lib/124 (BM). – S I R T E: Fra l'Uadi Faregh e Maatan Risam, 18.4.1928, Krüger (FI); Maaten Risam a Gasr es Sahabi, 18.4.1928, Krüger (FI). – C Y R E N A I C A: Östliches Vorland des Gebel Harudsch, im Wadi Bu Shubayrim, [c. 27°N, 19°E], 26.4.1970, Scholz 70136 (B).

C H A D: Tibesti-Gebirge, Tarso Tousside, Trou au Natron, 1500 m, 19.10.1964, Scholz 481a (B); ibid., Wadi Arayeh (kms. 928-945), 20.3.1953, Guichard KG/Tib/63 (BM).

E G Y P T: Bahariya Oasis, 56 km from Giza, Giza-Bahariya desert road, 37.10.1979, Abd El Ghani 2175 (K); Farafrah, 28.2.1874, Ascherson 984 (P); El Agami, W of Alexandria, 2.4.1971, Ibrahim & Mahdi (LD, S, U); along Cairo-Faiyum desert road, Giza Prov., 35 km SW of Cairo, 1.3.1968, I. Hedberg (UPS); [Gizeh], Pyramides, Sieber (BM, E, KIEL); ibid., 24.4.1908, Bornmüller 10823a (B); ibid., 27.3.1889, Peyron (G); ibid., 14.4.1879, F.-E. Cramer (G, Z); env. de Caire, 7.4.1880, E. Burdet (G); ibid., 12.4.1904, A. Keller 5 (S, Z); ibid., Montagne Rouge, 26.4.1885, E. Burdet (G); ibid., in declivibus inter Dschebel Akmar et Dschebel Mokattam, 7.5.1908, Bornmüller 10824 (B); Caire, Bové 301 (GH); ibid., 2.1821, C.G. Ehrenberg (S); Polygone de Cairo, 10.3.1880, W. Barbey 567 (BR); E du Caire, 3.1881, A. Burdet 260 (G); Wadi Hof bei Cairo, 6.5.1903, A. Keller (Z); prope Abu Zabel [30°15'N, 31°20'E], Fischer (LE, M); Ma'addi bei Cairo, 22.3.1896, Schweinfurth (Z); zwischen Station Tourrah und Maadi zwischen Kairo und Helouan, 10.4.1904, Kneucker 64 (B); Wadi Digla, E of El Ma'adi, 14.7.1922, Simpson 1398 (K); près d'Heliopolis, 4.5.1908, E. Burdet 324 (G); östlich von Heluan, 1877, Schweinfurth (GZU); Cairo-Suez road, 29.4.1939, Drar & Täckholm (S); inter Cairo et Suez, 2.1846, Boissier (LE); Wadi-el-Furn, an der alten Poststraße von Cairo nach Suez, 30.4.1879, Schweinfurth 346 (W); km 24 Cairo - Suez road, 25.5.1945, P.H. Davis 8531 (E, K); ibid., 7.4.1945, Davis 10251 (E); Theb[aide] inf[er]ior, 3./4. 1846, Figari (FI); Assiut, 8.7.1892, Sickenberger (Z); prope Rhamses [W Ismailia], Mall 566 (K); Ismailia, im Norden des Wadi Tumilat, 5.1880, Schweinfurth 274 (W); Sinai, südlich von Ayn Musa, 18.4.1904, Kneucker 3 (B); ibid., Wadi Mokarreb, 25.3.1904, Kneucker 11 (B); ibid., env. du Convent du Sinai [= St. Catharine], 28-30.4.1891, F.-E. Cramer (G); El Gradi, [nr. El Arich], 11.5.1887, Ascherson 264a (B); mouth of Wadi Dubar, 109 km SSW Quseir, 22.1.1986, S. & B. Snogerup 4330 (LD); 7 km E von Abu Roasch, 10.5.1885, Volkens (C); près de Koubat, desert arabe, 24.4.1908, E. Burdet 323 (G); Habuah, 28.4./23.5.1887, Ascherson 253, 270 (B, W); Gebel Achucur, 27.4.1885, Volkens (B); Bir Odeit, 26.3.1944, P.H. Davis 6640B (E).

S U D A N: Edîd Ababde Beish Bishari, coastal plain near Elba, 1925-26, Murray 3800 (K); N of Gebal Elba, wadi Kansisrob, 21.3.1928, Simpson 6355 (K); Elba [Mt], 11./14. 1.1928, Newberry 139, 140 (BM); near Khor Ashat, Red Sea coast, 70 miles from Port Sudan, 1935, Maxwell Darling 141 (K); Tokar Delta, 8.4.1949, Bally 6990 (K).

E R I T R E A: N Wadi Assarai area, 200', coastal plain in sandy soil in cultivations, 27.3.1949, Bally 6872 (G, K), 6874 (K).

P A L E S T I N E / I S R A E L: N Negev, E part of Nahal Amatzia, 10.5.1981, Zohary (Z); Wadi Arava, Negev, 10.5.1975, Lyshede (C); N-Arava, E des Moshav Hazeva, -150 m, 16.4.1983, Bierkamp 1614 (BSB); ibid., -200 m, 7.4.1983, Bierkamp 1381 (BSB); N-Arava, Nahal Gidron E von Moshav En Hazeva, -150 m, 4.4.1984, Bierkamp 84-139 (BSB); Ghor-es-Safieh, Dead Sea, 11.1883-2.1884, Hart (K); Arava Valley, env. of Ein Hotzeif, 14.3.1972, Zohary (Z); Arava valley, about 4 km N of Yotveta, 4.3.1962, Zohary & Orshan (S); Arava valley, Ein Ghadjan, 27.5.1958, Zohary & Y. Waisel (herb. Greuter); Wadi Jiraf (Arava Valley), 20.3.1947, Feinbrun (G); Moav, Wadi Zarqa Ma'in, 8.4.1930, Eig (M); Ain el Beida, 22.5.1917, Dinsmore 5639 (BH, Z).

JORDAN: 6 km S Aqaba, 20.4.1976, *Hemsley* (K); 15 km S von Aqaba, 50 m, Wadi, 12.4.1980, *Frey & Kürschner 80-564* (BSB, E); Ghor es Safiyah, -380 m, 28.4.1939, *Dinsmore B1639* (G, K, S); *ibid.*, 7.4.1925, *Zohary* (U); 50 km S of Ghor Safi, 5-8 km E of the main road to Aqaba, 9.2.1978, *Al-Eisawi 2416* (BM, M); Wadi 'Arabah c. 5 km S des Toten Meeres, c. -200 m, 25.7.1980, *Baierle* (herb. Baierle); Wadi Araba NW Jebel Madsus ed Dahal, 3 km N Ain el Fidan, c. 25 m, 15.4.1986, *Baierle & Jagiella 86-1885* (herb. Baierle); Wadi Khalid 1.5 km N Feinan (ruins), c. 320 m, 9.4.1986, *Baierle 86-1581* (herb. Baierle); Hamam 'Afra, 15 km NNE Tafila, c. 250 m, 18.4.1987, *Baierle & Pimpl 87-420* (herb. Baierle); 7 km SW Ain el Fidan, c. 0 m, 11.3.1986, *Baierle & Kürschner 86-415b* (herb. Baierle); Wadi Araba, Wadi et-Taijbe SW des Jebel et-Taijbah, c. 200 m, 30.3.1986, *Baierle & al. 86-1280* (herb. Baierle); Wadi Hisban nahe der Mündung zum Toten Meer, ca -140 m, 21.7.1980, *Baierle* (herb. Baierle); between Kefrein and Ayoun Musa, -100 m, 22.4.1911, *Meyers & Dinsmore 1639* (B, E, G, JE, LD); Moab, 26.4.1945, *P.H. Davis 9424* (E, K); 15 km E Ma'an, along the road to El Jafr, 9.4.1975, *Boulos & Jallad 7891* (E, K, LD); Azraq Oasis, 25.4.1974, *Boulos & al. 7156* (G, LD, MA); Newbridge, 23.4.1886, *Post* (BM, G); near Tell Qorna, small tributary of Wadi Rajl, 26.4.1965, *Townsend 65/286* (LE); Wadi Ishin[?], 2000', 14.4.1945, *P.H. Davis 9299* (E, K).

SYRIA: Doura Europos [= Qal'at as Salihyah], winter 1933, *Mouterde* (P).

SAUDI ARABIA: S. loc., 1849, *McDonald* (K); 80 km S Isawiyah, Wadi Sirhan, 30°N, 38°10'E, 15.5.1962, *W. Zeller 15401* (BM); Djeddah, *Kruijt* (L); Sakaka, 24.11.1980, *Chaudhary* (RIY); Taif, 90 miles E of Jedda, 7.5.1949, *Trott 1205* (K); immediate neighbourhood of Ar'ar, 4.-5.1969, *Morwood Leyland C1* (K); Al-Harra [= 'Ar'ar], 2/15.4.1987, *Chaudhary & El-Sheikh* (RIY); 80 km SE of Badanah pump station [nr. Ar'ar], 10.6.1968, *Mandaville 1855* (BM); nr. Qfeyah or Hafar, 27°30'N, 41°10'E, 20.3.1962, *W. Zeller 6808* (BM); Hail, 22.25.3.1981, *Chaudhary* (E); W of Hamdah camp, between Tatliih & Khamis Mushayt, in huge wadi, 4400', 26.3.1977, *Collenette 192* (K); Jedda - Yemen, 1838, *Paul, Prince of Württemberg* (M); prope Jumaima, 140 km SW As-Salman [Iraq], 390 m, 22/23.4. 1957, *Rechinger 13767* (W); Anaiza [= Unayza], 26°05'N, 44°05'E, 28.3.1946, *Vesey Fitzgerald 15666/2* (BM); *ibid.*, 5.3.1970, *C. Parker SA91, SA113* (BM); near Zabirah Camp, 200 km N of Buraydah, 1800', 26.4.1981, *Collenette 2559* (E, K); 36 miles up Buraidah from Jeddah-Riyadh road, 30.3.1966, *C.F. Hemming 2404* (BM); Dawadimi Camp II, 24°46'N, 44°38'E, 10.3.1983, *Collenette 4110* (E, K); 15 km SE Qaisumah, 25.3.1981, *Hillcoat 295* (BM); 3 km ESE 4 corner boundary pt., wadi trib. to Al-Batin, 21.3.1968, *Mandaville 1609* (BM); Thumama, c. 80 km N Riyadh, 590 m, Tonpfanne mit *Hammada salicornica*-Zwerggesträuch, 29.10.1984, *Baierle & Kürschner 84-602* (BSB); *ibid.*, 580 m, 18.3.1985, *Baierle & Kürschner 85-42* (BSB); Arama-Plateau, c. 25 km W Rumah (c. 100 km N Riyadh), 620 m, 25.3.1985, *Baierle & Kürschner 85-183* (BSB); Wadi Al' a'aqla, 30 km N of Riyadh, 14/16.3.1981, *Hillcoat 211, 227, 232, 233* (BM); nr. Riyadh, c. 24°39'N, 46°46'E, 17.5.1969, *Popov 69/248* (BM); near Riyadh, by dam, wadi Hanifah, 2000', 14.2.1987, *Collenette 6010* (K); Riyadh, Agric. and Water Research Center, 3.1970, *Chaudhary 25-SA* (K); Riyadh, 3.1973, *Chaudhary* (E); SW of Riyadh, nr the Dam, Hair, 2000', 17.3.1989, *Collenette 7009* (E); zwischen Al Kharj und Al Aflaj, bei Halil, 600 m, Wadi, 20.3.1984, *Frey, El-Sheikh & Kürschner 84-41* (BSB,E); Al-Kharj, 4.1979, *Chaudhary* (RIY); *ibid.*, 1.3.1970, *C. Parker SA32* (BM); 13 km W Qaryat al'Ulya, 13.3.1967, *Mandaville 822* (BM); 20 km SW Ras as-Saffaniyah, sand, 3.4.1967, *Mandaville 933* (BM); Urariyah, 45 km S of Nayriah, 18.3.1983, *Naylor 304* (E); Abu Hadriyah, 23.3.1968, *Mandaville 1755* (BM); Al Habi, 26°29'N, 49°16'E, 5.3.1970, *Mandaville 2723* (BM); 9 km S 'Ayn al-'Abd, 22.3.1967, *Mandaville 871* (BM); 5 km NE Khursaniyah, 23.3.1968, *Mandaville 1805* (BM); 2 km E J. Ghuraymil, 8.3.1968, *Mandaville 1445* (BM); N of the Jebal, 1965, *Carpenter 86* (K); 12 km N Jabal

al' Amudah, 6.4.1967, *Mandaville 990* (BM); Masliq, 2.5.19??, *Thesiger* (BM); Al Touf, 1700', 31.3.1971, *I. Wood 202* (BM); Arafjan[?], 3.1933, *Dickson 115* (K).

I R A Q: 2 km a Rutba orientem versus, 28.5.1957, *Rechinger 12829* (W); Rutbah, Al masad depression, 23.9.1967, *Alizzi & Omar* (K); near Rutba, 7.5.1965, *Alizzi & Husain* (K); 210 km a Ramadi occid. versus, 6./7.6.1957, *Rechinger 12658* (W); inter Ramadi et Rutba, 180 km a Ramadi occid. versus, 6./7.6.1957, *Rechinger* (W); 160 km NW of Ramadi (Ramadi-Rutba-highway), 350 m, 6.6.1957, *Al-Rawi* (K); 140 km W of Ramadi, 360 m, 19.10.1958, *Al-Rawi* (K); *ibid.*, 22.4.1959, *Al-Rawi & Nuri* (K); 135 km NW of Ramadi, 310 m, 6.6.1957, *Al-Rawi* (K); inter Anah & Deir am Euphrat, 6.5.1894, *Strauss* (JE); inter Hith + Anah, 1.5.1894, *Strauss* (JE); 114 km W of Karbala, 75 m, 18.4.1961, *Al-Rawi* (K); Ramada - Hit, 80 m, 24.3.1947, *Al-Rawi & Gillett* (K); 15 km SE Ashuriya, 50 km WNW Shabicha, c. 360 m, 26.4.1957, *Rechinger 13617* (W); 55 km a Ramadi occid. versus, 6./7.4.1957, *Rechinger 9771* (E, G, M, W); 31 km W of Ramadi, 6.6.1957, *Al-Rawi* (K); *ibid.*, 8./9.6.1957, *Rechinger 9761* (B, LD, S, W); 22 km W of Ramadi, 19.4.1963, *F.A. & E.D. Barkley & Safwad 5023* (K); 17 km W Ramadi, 110 m, 18.-20.11.1956, *Rechinger 8365* (W); *ibid.*, 21.11.1956, *Guest, Al-Rawi & Rechinger* (K); about 15 km W Ramadi, c. 40 m, 9.3.1955, *Guest & Al-Rawi* (K); 13 km NW Shabicha [= Ash Ahabakah, 30°48'N, 43°42'E], 320 m, 25.4.1957, *Guest, Al-Rawi & Rechinger* (K); *ibid.*, 26.4.1957, *Rechinger 9440* (G,W); Wadi Al-Khirr (c. 90 km NNW Shabicha, 330 m, 26.4.1957, *Rechinger 13581* (W), *Guest, Al Rawi, Rechinger* (K); 15 km NW of Aidaha (Al-Aida), c. 90 km SW of Salman, c. 400 m, 25.4.1957, *Guest, Al-Rawi & Rechinger* (K); 8-15 km NW Aidaha (Al-Aida), 410 m, 25.4.1957, *Rechinger 9415* (M, W), *13725* (E, W); near Al-Aidaha (Al-Aida), 24.4.1957, *Guest, Al-Rawi & Rechinger* (K); *ibid.*, 24.4.1957, *Rechinger 13736* (W); 32 km W of Karbala, 40 m, 4.5.1964, *Grant 280ci* (W); telegraph pole M 90 between Baiji and Mosul, 25.5.1934, *Field & Lazar 391* (K,S); W of Baiji, 11.6.1968, *Anders 2213* (W); Habbaniya Lake, 16.4.1976, *Al-Kaisi* (K); 50 km NE of Samara, 65 m, 25.5.1959, *Al-Rawi & Shanwani* (K); 13 km E of Falluja, 50 m, 3.5.1964, *Grant 280* (W); 10 km SW of Baghdad to Falluja, 35 m, 18.3.1981, *Omar & al.* (K); Al-Jazira inter Falluja et Wadi Tharthar (Thirthar), 50 km a Samarra meridiem versus, 3.5.1957, *Rechinger 9527* (W); Garma junction Falluja - Baghdad, 40 m, 27.11.1977, *coll. ignotus* (K); W of Baghdad, Faluja desert, 16.4.1955, *Wheeler Haines 159* (E, K), 20.4.1955, *Wheeler Haines 708* (E); prope urbem Baghdad, versus Felludscha, c. 100 m, 12.4.1910, *Handel-Mazzetti 850* (W, WU); Jebel Hamrin, NE of Baghdad, 15.12.1918, *W.E. Evans M/294* (E); *ibid.*, 4.1919, *Sutherland 44* (BM); 7 km NE of Kirkuk, 390 m, 6.5.1959, *Al-Rawi, Al-Kass & Nury* (K); As-Salman, c. 30°30'N, 44°30'E, 240 m, 22./23.4.1957, *Rechinger 9303* (M, W); *ibid.*, 22.4.1957, *Rechinger 13869* (W); 12 km ESE of Salman, 240 m, 23.4.1957, *Guest, Al-Rawi & Rechinger* (K); 35 km SE of Salman, 210 m, 23.4.1957, *Guest, Al-Rawi & Rechinger* (K), *Rechinger 9325* (W); near Samah [= 29°N, 45°33'E], 24.3.1966, *Alizzi* (K); 27-46 km WNW Ansab, 137 km S As-Salman, 340 m, 22./23.4.1957, *Rechinger 9372* (W); 30 km W of Mandali, 9.6.1965, *Haddad 10013* (K); ab oppido Mandali c. 10 km orientem versus, c. 33°40'N, 45°40'E, 2.6.1957, *Rechinger 12771* (W); *ibid.*, 25 km E Badra, 3.6.1957, *Al-Rawi* (K); ad confines Persiae, 16 km SE Badra, c. 33°N, 46° E, 12./13.4.1957, *Rechinger 13953* (W); c. 20 km a Badra septentri. versus, inter oppida Mandali et Badra, 2.6.1957, *Rechinger 12727* (E, W); Busaiya, 27.4.1973, *Fawzi, Hazim & Hamid* (K); Shaib al-Batin, c. 30°N, 47°E, 120 m, 25.3.1957, *Rechinger 14371* (W); prope Chilawa, 110 km SSW Basra, 170 m, 25.3.1957, *Rechinger 14400* (W); ad stationem munitam Shatt at-Tib, 50-200 m, 32°30'N, 47°10'E, 27./28.3.1957, *Rechinger 8885, 14201* (W), *Guest, Al-Rawi & Rechinger* (K); 8 km E of Qurna, 5 m, 18.5.1977, *Thamer, Waded & Hona* (K); Zubair, c. 30°20'N, 47°40'E, 18.3.1957, *Rechinger 8524* (E, W); NE of Jabal Sanam, 17.4.1974, *Weinert & al.* (GH); Amara Liwa, Msaieda, 20 m, 21.4.1955, *Al-Rawi* (K); near Sharqat (Jabut Makhat[?]), c. 250 m, 11.5.1954, *Guest* (K);

Khadar-al-mai, 21.3.1960, *Al-Rawi & al.* (K); Abu Sharam, ante 1918, *R.C. Thompson* (BM); Iskarderiya, 2.5.1956, *Wheeler Haines 708* (K); 12 km NW of Haditha, 170 m, rocky land, 1.4.1962, *Chakravarty & al.* (K); Haivaijah, 12.1917, *Sutherland 66* (BM); Chilat police station, near Persian border, 150 m, 5.4.1958, *Al-Rawi & Haddad* (K).

KUWAIT: S. loc., 10.3.1946, *Vesey-Fitzgerald 15539/7* (BM, FR); s.loc., *Halwagy 479* (W); on Al Salmy road, 94 km towards Salmy, 123 m, 13.4.1981, *Armer 156* (E); 94 km along the Salmi highway from Rikka, 123 m, 13.4.1981, *Al-Rawi, Jalili & Armer* (M); Runoff nr. highway nr. Ahmadi, 24.4.1987, *Nilson & al.* (S); Al-Wafra, 120 m, 28°35'N, 48°E, 28.3.1985, *Boulos & Al-Hasan 15560* (BM); Kuwait City, KISR experimental side, 29.2.1988, *Boulos & Armer 17143* (BM); *ibid.*, secondary school, 28.4.1962, *Mulesm 125* (GH); Khaldi-ah, 17.3.1982, *Armer* (E); Sheik Abdullah Taber's farm nr. turn-off to Sabiyah highway, 12.3.1981, *Armer 102* (E); Faylaka Island, nr. E tip of isl. on S side, 4.4.1967, *Mandaville 968* (BM).

BAHRAIN: Sandy ground nr. sea, 25.3.1986, *Alder 36* (E); 200', 28.4.1986, *Phillips 110* (K); Wadi 0.5 miles E of Ali, 4.3.1950, *Good 172* (BM, K); Al Hamla, 20 km S of Manama, 18.4.1985, *Boulos & Al-Hasan* (E); S Hamala - Budeya road, 80', 7.2.1970, *Stobbs 142* (K); near Buri, 13.3.1950, *Good 170* (BM, K).

QATAR: Al Karrarah and area 5 km away towards NE, 2.4.1977, *Boulos 11096* (G); Duhlan camp, 12 m, 29.12.1970, *Wilcox 39* (K); Jabal al Wakrah, 12 km S of Doha, 31.3.1977, *Boulos 10988* (G,K); Wadi Al Galaiel, towards the S end of Qatar Peninsula, 2.4.1977, *Boulos 11114* (K).

UNITED ARAB EMIRATES: Abu Dhabi and env., 17.12.1982, *R.A. Western 423* (E); Abu Dhabi, Bou Tarbouch, 11.4.1969, *Gaston 2639* (BM); nr. Zibara on the Abu Dhabi to Dubai road, 24°34'N, 54°42'E, 25.6.1982, *R.A. Western 256* (E); Abu Dhabi - Al Ain road, 16.3.1984, *R.A. Western 630* (E); *ibid.*, 16.4.1983, *R.A. Western 556* (E); Dubai, Jebel Ali, 20 m, 28.2.1984, *R.A. Western 625* (BM); Nachali oasis, 20 km from Dubai, 12./20.3.1979, *Hardwick 17* (E); Falaj al Mualla, turning off Ajman, 3.3.1980, *Lumley 73* (K); Ras El Khaima, 9.11.1950, *Guichard KG/88/Oman* (BM); *ibid.*, 1.2.1950, *Popov 543* (BM); Al Ain Hilton Hotel, weed, 26.2.1986, *Boulos & Al Hasan* (E); experimental farm 22 km N of Al-Ain, 28.2.1986, *Boulos & Al-Hasan* (BM); 3 km N of Shwayb, c. 45 km N of Al Ain, 24°35'N, 55°47'E, 20.5.1982, *R.A. Western 167, 168* (E); Dünen bei Al Awir, 24.3.1986, *Müller-Hohenstein 86299* (E).

OMAN: Buraimi, 5.4.1948, *Thesiger* (BM); El Khorran, 2.1951, *Lee Oldfield FNLO 129* (BM); Jabal Samain, 4.5.1948, *Thesiger* (BM).

IRAN: Luristan, Pusht-i Kuh, Halat-e Mehran [Iraq. border opposite Badrah], 15.3.1948, *Behbusi 150* (W); Khuzistan, Ahwaz, 20.4.1940, *Koelz 14883* (W); Mohammera [= Chorramshah], 5.1850, *Noë 396* (LE); Dorahi-yeh Bibi-hakimeh to Muenaveh, 18.1.1977, *Termé & Moussavi* (W); Seytun [= Cham e Zeydun], 4.1868, *Hausknecht* (JE); 10 miles S Bandar-e-rig, 1.5.1961, *Stutz 943* (W); in Korgo [Kharq], insula Sinus Persici, 20.1.1842, *Kotschy 27. 530* (A, C, E, FI, GH, JE, KIEL, L, M, P, W); in aren. fl. Dalaki pr. Kol Malla [= Kotal-e Mallu], 4.1868, *Hausknecht* (JE); ad Bushire, 7.3.1893, *Bormmüller 433* (B); *ibid.*, 23.2.1937, *Koie 136* (B,C); *ibid.*, 0-100', 3.-4.19??, *Trott 747* (K); *ibid.*, 13.4.1940, *Koelz 14816* (W); *ibid.*, Cheghadak to Dehrsr, Jaynak, 28.2.1975, *Iranshar & Termé* (W); Kaki to Dayyer, 100 m, 27.3.1974, *Davis & Bokhari 55934* (E, K); N of Kaki, 100 m, 27.3.1974, *Davis & Bokhari 55986* (E); Tarq-i-Darlan, E of Lar, c. 550 m, 1.3.1959, *coll. illegible 3617* (K); 25 km E of Bandar Lengeh, 10 m, 30.3.1974, *Davis & Bokhari 56156* (E, K); Qeshm Island, central part, 3.4.1974, *Kunkel 16554* (C, G); *ibid.*, 17 km W of town, 3.4.1974, *Kunkel 16533* (G); *ibid.*, 3.4.1976, *Frey & al. 497/76* (BSB); *ibid.*,

7.4.1976, *Frey & al. 613/76* (BSB); *ibid.*, bei Loft, 6.4.1976, *Frey & al. 580/76* (BSB); *ibid.*, 20.2.1893, *Bornmüller 435* (B, G, JE); Hengam Island, NW side, 11.4.1974, *Kunkel 16874a* (G); Larak Island, 10.4.1974, *Kunkel 16806, 16773* (G); bei Khamir, 2.4.1976, *Frey & al. 379/76* (BSB); *ibid.*, 4.4.1976, *Frey & al. 513/76* (BSB); 14 km NE of Bandar Abbas, 5.5.1961, *Pabot 6610* (G); Bandar Abbas, 1.4.1976, *Frey & al. 319/76* (BSB); *ibid.*, 4.5.1961, *Pabot 6542, 6565* (G); *ibid.*, 10.2.1893, *Bornmüller 434* (B); *ibid.*, Dünen 17 km E, 2.4.1972, *Kasy 515* (W); *ibid.*, 6.4/8 km NE, 20 m, 5.5.1961, *Pabot 6588* (G); *ibid.*, 1.4.1976, *Frey & al. 319/76* (BSB); *ibid.*, between Qeshm and Dargahan, 6.4.1975, *Wendelbo & Foroughi* (W); entre Hadjiabad et Badar Abbas, 8 km S Hadjiabad, 3.6.1960, *Dadashzadeh DK 700* (G); inter Hadjiabad prope Tarum et Bander Abbas, inter Ginau et Sarzeh, c. 250 m, 29.4.1948, *K.H. & F. Rechinger, Aellen & Esfandiari 3408* (S, W); inter Hadjiabad prope Tarum et Parabidin[?], 900 m, 29.4.1948, *K.H. & F. Rechinger, Aellen & Esfandiari 3328* (G, W); W edge of Jaz Muriyan basin, 15 km NW of Shahabad, 430 m, 8.5.1975, *Parris 75443* (E); W du Jaz Murian, entre Kahn Mitza et Tumbgiran, 27°21'N, 58°16'E, 420 m, 20.4.1972, *Léonard 5708* (BR, G, K, LE, M); E du Murian, 27°08'N, 58°35'E, 370 m, 22.4.1972, *Léonard 5735* (BR, K, LE, M); S du Dasht-e-Lut, environ de Rigan, 28°34'N, 58°58'E, 570 m, 25.5.1972, *Léonard 6298* (BR, LE, M); Chahbahar - Pasabandam, 6.3.1974, *Shirdelpur* (W); 9 km E Barrage du Kharkheh, 12.4.1959, *Pabot 405* (G); 5 km E Barrage du Kharkeh, 15.3.1959, *Pabot 333* (G).

PAKISTAN: MAKRAAN: Jiwani, 30 m, 19.5.1963, *Popov 81* (BM); Gabd, Dasht valley, 50 m, 20.5.1963, *Popov 85* (BM); inter Gwadar et Suntsar, 17.4.1965, *Rechinger 27954* (G,W); Pasni to Kappar, road to Gwadar, 14.4.1965, *Lamond 451* (E); inter Pasni et Kappar, 14.4.1965, *Rechinger 27861* (B, G, M, W); Pasni, 15.5.1963, *Popov 6* (BM); Hoshab-Turbat road, 4 miles before Hoshab, 19.4.1965, *Kazmi* (M); W of Hoshab, 11.4.1965, *Lamond 356, 367* (E,G,M); Hoshab to Panjgur, 20-30 km from Hoshab, 20.4.1965, *Lamond 565* (E); 8-25 km W Awaran versus Turbat, 26°N, 63°06'E, 11.4.1965, *Rechinger 27749a* (B, G, M, W); 20-30 km S Panjgur, 20.4.1965, *Rechinger 30126* (W); Panjgur to Surab, 30-50 km from Panjgur, 21.4.1965, *Lamond 630* (E); 30-50 km NE Panjgur, 26°58'N, 64°06'E, versus Bag, 1100 m, 22.4.1965, *Rechinger 28212b* (M); 60 km S Panjgur, 26°58'N, 64°06'E, 800-850 m, 19.4.1965, *Rechinger 28075* (B, G, W); near Panjgur, 28.5.1963, *Popov 178* (BM); Coast of Beluchistan, Mesh Shiraq, 11.1880, *Pierce* (K).

(b) *Launaea mucronata* subsp. *cassiana*

Launaea mucronata subsp. *cassiana* (Jaub. & Spach) N. Kilian in Willdenowia 25: 277. 1995 ≡ *Sonchus cassianus* Jaub. & Spach, Ill. Pl. Orient. 3: 112, fig. 280. 1848 ≡ *Zollikoferia cassiana* (Jaub. & Spach) Boiss., Fl. Orient. 3: 822. 1875 ≡ *Launaea cassiana* (Jaub. & Spach) Kuntze, Revis. Gen. Pl. 1: 351. 1891. – Syn- types: Egypt, *Olivier & Bruguière* (P!); *ibid.*, in deserto, 1837, *Aucher-Éloy 3513* (P!); *ibid.*, ad margines deserti prope Manfalout, [27°33'N, 39°58'E], 7.3.1848, *Kralik* (LY [det. Spach]!, P [ex herb. E. Durand, det. Spach]!; isosyntypes FI-W!, G!, MPU [ex herb. P]!), S!; [Saudi Arabia], prope urbem Djedda, 28.1.1836, *Schimper 827* (P!; isosyntypes: E!, G!, KIEL!, L!, LE!, M!, W!); *ibid.*, in ditone Hedjaz, 1837, *Botta* (P!, MPU [ex herb. P]!). – Lectotype (designated here): *Kralik* (P!, flowering and fruiting specimen ex herb. E. Durand, formerly herb. Cosson, with Spach's handwritten determination label).

= *Rhabdotheca sonchoides* Cass. in Cuvier, Dict. Sci. Nat. 48: 425. 1827. – Holotype: Egypt, Pyramides, *Sieber* [label without collector's name and with the

determination: “*Sonchus divaricatus*. Del./ (Bocc. sic. tab. 7. fig. CA.)” (K [ex herb. J. Gay]; isotypes: FI-W!, FR!, JE!, L!, M!, W!; [NB: the duplicates in BM!, E! and KIEL!, in contrast, represent *L. mucronata* subsp. *mucronata*].

= *Launaea cassiana* var. *marginata* Maire in Bull. Soc. Hist. Nat. Afrique N. 24: 221. 1933. – Holotype: Algeria, (“in pascuis glareosis secus amnem Vesceram”) graviers de l’Oued Biskra, 30.4.1853, *Balansa* (MPU!; isotype P!).

Note: Though Cassini’s protologue of *Rhabdotheca sonchoides*, which is the type of his genus *Rhabdotheca*, is quite precise, and although isotypes exist in various herbaria, this name kept lacking recognition up to the present. Webb (1849: 145f) who investigated the holotype, erroneously regarded it as a synonym of *Sonchus chondrilloides* Desf. (= *Launaea fragilis*). Around the same time Jaubert & Spach described a new species, *Sonchus cassianus*, suspecting that it might, perhaps, be identical with Cassini’s *Rhabdotheca sonchoides*. However, the question of their possible identity remained without answer, and Boissier (1875: 822) even did not mention *Rhabdotheca sonchoides* anymore. From then on, *Zollikoferia cassiana*, or the corresponding binomial in *Launaea*, has become the common name for this taxon.

lc.: Jaubert & Spach 1847-50: fig. 280 sub *Sonchus cassianus* (habit and details); Batanouny 1981: fig. 101 sub *L. cassiana* (habit); Migahid 1989: fig. 201-202 sub *L. cassiana* (habit, specimens); Phillips 1988: p. 72 sub *L. cassiana* (habit); Cornes & Cornes 1989: fig. 118 sub *L. cassiana* (habit).

Description (v.v.)

Achenes 2.9-5.0(6.0) × 0.4-0.7 mm. *Pappus* 4-7(9) mm long, deciduous, homomorphic, of c. 20-30 setaceous rays, ± equal in length and diameter, or sometimes the outermost gradually shorter and thinner. Otherwise plants like the typical subspecies.

Chromosome number: Two reports, from Morocco and Egypt (see Kilian & al. 1995: 277) give $2n = 16$ and $n = 8$.

Distribution and ecology

The distribution area of subsp. *cassiana* compared with that of subsp. *mucronata* (Figs 106-107) is more restricted: subsp. *cassiana* is absent from the northern part of the Arabian Peninsula and the eastwards adjacent areas and it only reaches Iran opposite the Street of Hormoz, where it seems to be much rarer than subsp. *mucronata*. Most of the specimens cited by Rechinger (1977: 158f sub *L. cassiana*) belong to either *L. mucronata* subsp. *mucronata* or *L. stenocephala*.

In N Africa subsp. *cassiana* also appears less common than the typical subspecies. The available distribution data, however, at most allow the estimation that it is more strictly confined to the true desert zone and therefore, e.g., in the northwest of the Sahara only touching the southernmost part of Morocco.

The notes on habitats, lifespan and flowering time of subsp. *mucronata* made above are equally valid for subsp. *cassiana*, which often grows intermixed with the typical subspecies.

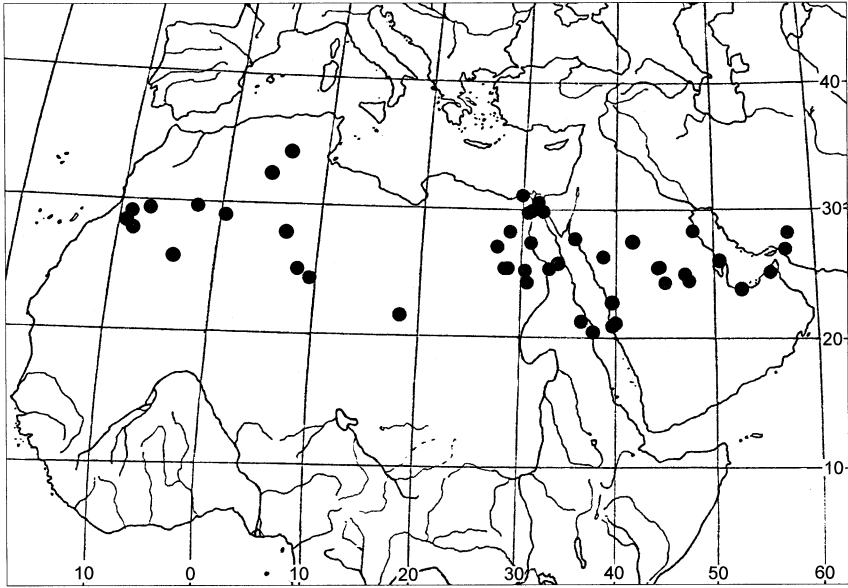


Fig. 107. Distribution of *Launaea mucronata* subsp. *cassiana*.

Specimens seen:

MOROCCO: 41 km SE of Goulimime, 300 m, 21.3.1969, *M.R.K. Lambert 211a* (BM); 6 km E Taghjit, 605 m, 29°03'N, 9°22'W, 27.4.1989, *Podlech 45228* (M); Dra, Assa, 12.3.1951, *Guinet & Sauvage 575* (MPU); c. 10 km S von Akka, an der Straße Akka - Tata (7084), 30.4.1994, *Kilian 3498* (B, herb. Kilian); Oase Kasba-ej-Joua c. 20 km W Tissint an der Straße nach Tata, 1.5.1994, *Kilian 3502* (B, herb. Kilian).

MAURITANIA: Aïn Chegga, *Rolland 59* (MPU).

ALGERIA: A Merkala au S de l'Oued Draa, rocailles grésences désertiques et sables au forrents, 18.4.1935, *Maire* (MPU); Kahal Morra, 24.2.1939, *Rolland 59bis* (MPU); 22 km SW von Zeramra, 520 m, 29°51'N, 2°38'W, 1.4.1980, *Podlech 33676, 33694* (M); Timimoun, c. 300 m, 29°15'N, 0°12'E, 29.3.1980, *Podlech 33519* (G,M); Daya de Fiila au S de Guerrara, dans le Mzab, 17.5.1858, *Cosson* (P); Mouydir Mts, Oued Emmeder, 18.3.1923, *Gram 459* (C); Grand Erg Oriental au N de Fort Flatters, 10.3.1940, *Lanibois* (MPU); El Oued, 15.5.1968, *Popov & Miroschnitschenko 2161* (LE); Tassili N'Ajjer, Oued Assas-sai, 20.-30.3.1952, *J. Juge 129* (G); *ibid.*, Djanet, 1100 m, 24°33'N, 9°29'E, 18.3.1980, *Podlech 33123* (G, M); 9 km NW Guelta Dider, 25°15'N, 8°25'E, 1410 m, 16.3.1980, *Podlech 33025* (M); El Hameida, à la oase de l'ezg Er Raoui, 6.4.1925, *Le Carbond* (MPU).

LIBYA: Fezzan, Wadi Berging, 9.4.1952, *Guichard KG/Lib/124A* (BM); *ibid.*, Wadi Zigzag, 9.1983, *O'Brien DT1/83* (BM).

CHAD: Tibesti-Gebirge, im Enneri Bardugue unterhalb der Toudoufou-Mündung, 13.2.1965, *Scholz 479* (B).

EGYPT: S. loc., *Coquebert de Montbret* (W); s. loc. 3.1836, *Kotschy* (L, W); upper Egypt, *Letourneux* (OXF); Oasis Farafra, 25.5.1962, *V. Botschantzev* (LE); *ibid.*, Hattine

Hadgi Walid, *Rohlfs 984* (P); *ibid.*, Farafra town, 21.3.1968, *G. Romée 639* (LD); Bahariya oasis, Al-Harra - Ain Zawya, 4.6.1980, *Abd El Ghani 2749* (K); Dakhla Oasis, 12.2.1968, *G. Romée 121* (LD); *ibid.*, near Ain Musasriya, Qasr, 18.4.1928, *Simpson 6050* (K); *ibid.*, Ain Sherif bei Kass Dachel [= Dakhla], sandiger Ackerrand, *Rohlfs 987* (P); *ibid.*, ("Dachel"), Indigofelder bei Qalamun, 2.2.1874, *Ascherson* (L, WU); *ibid.*, Mut-Oasis, fields, 16.2.1912, *MacDougal 189* (BM); Kharga Oasis, 3.1928, *Meinertzhagen* (BM); *ibid.*, Kharga town, W of coptic city, 17.2.1968, *G. Romée 257* (LD, herb. Greuter); *ibid.*, canal bank, 18.4.1961, *Abdalla* (LE); *ibid.*, El Bulaq, 6.2.1959, *Mustafa Imam* (U); *ibid.*, Kharga, 10.4.1928, *Simpson 5974* (K); El Agami W of Alexandria, 2.4.1971, *Ibrahim & Mahdi* (G); ad pyramides (prope Gise), 24.4.1908, *Bornmüller 10823* (B); *ibid.*, 3.4.1883, *Deflers* (MPU); *ibid.*, Wadi near Gebel Khahab, 15.4.1922, *Simpson 1385* (K); bei Kairo, 12.4.1904, *A. Keller 5* (BM); *ibid.*, *Bové 301* (G); *ibid.*, *Figari* (FI); Heluan, Wadi Gerrazeiten[?], 3.1896, *Schweinfurth* (Z); nel deserto di Eliopoli, *Figari* (FI); pres Manfalout, 6./7.3.1848, *Kralik* (GH, LY, W); Cairo - Suez road, 29.6.1973, *Nabil & al.* (LE); *ibid.*, km 10, 20.2.1944, *P.H. Davis 6264B* (K); *ibid.*, km 24, 14.4.1945, *Davis 10306* (K); *ibid.*, 57-85 km from Caire, 17.4.1968, *G. Romée 915* (LD); nah samah, [30°34'N, 32°01'E], 24.4.1887, *Ascherson 252* (W); West bank of Suez Canal, near Ismailia, 31.5.1946, *Lupton* (BM); Isthmo di Suez, *Figari* (FI); desert of Suez, 4.4.18[?], *Madden 30* (K); Sinai, nelle sabbie delle alte vallate, 3./4.1849, *Figari* (FI); *ibid.*, in deserte Kantiae prope Birket el haggi et altra, *Figari* (FI); Tebe, 16.2.1893, *Marchesetti* (FI, W); zwischen Keneh und Kossier, zwischen O Kale Dawi und Bir Inglés, 4.3.1864, *Schweinfurth 473* (BM, LE); zwischen Kossier und Ras Benas, Wady Kochol bei Hirra Lebara, 2.4.1864, *Schweinfurth 469* (LE); Rôd El Kharûf nf. Abraç, route Kaombo to Elba mt., 10.2.1933, *Shabetai 1461* (K); bei Rubi, *Rohlfs 313* (P); Abydos, 6.8[?].1882, *Schweinfurth 159* (Z); *ibid.*, 26.3.1881, *Letourneux 273a* (FI, G, LE, W); Da.mer., Wadi Um Lassaf, 2./3.1932, *Drar 36* (S); 7 km E von Abu Roaseh, 10.5.1885, *Volgens* (C); Da.mer., Wadi Ibib, 2./3.1932, *Drar 94, 108, 116* (S); desert à Tell-el-Amarno, 25.4.1881, *Deflers* (MPU); Habuah, 28.4.1887, *Ascherson 270a* (B, LE); *ibid.*, 23.5.1887, *Ascherson* (LD); desert arabique près de Koubah, 21.5.1890, *Burdet 325* (G).

S U D A N: About 21°N, sea coast to between 3000 and 4000', 1896, *Bent* (K); Mersa Bela, 5.1.1951, *N.B. Marshall 14* (BM).

S A U D I A R A B I A: Midian, bei Muëleh [= Muwaylih], in der Nähe des Meeresstrandes, Kalksteinregion, 24.3.1892, *A. Kaiser* (G); 40 km SE Jaharah (26°30'N, 39°00'E), 1100 m, 9.3.1982, *Baierle & König 82-50* (BSB); near Rabigh, c. 22°50'N, 39°02'E, 20.4.1969, *G. Popov 69/169* (BM); Jeddah, 4.1872, *Hildebrandt 129* (BM, W), *132* (BM); *ibid.*, N of town, 14.3.1934, *G.L. Bates 2009c* (BM); *ibid.*, nr. town, 26.3.1934, *G.L. Bates 2166, 2166a* (BM); *ibid.*, *S. Fischer 182* (BM, BR, FI-W, K, L, LE, W); *ibid.*, *Kruijt* (FI, L); *ibid.*, ridge 4 miles N of, 0 m, 23./25.1.1950, *A.C. Trott 1564* (K); Hadda oasis, 27 miles NE of Jeddah, 200', field, 1.1940, *A.C. Trott 57* (K); near Jiddah, c. 21°30'N, 39°10'E, 15.3.1969, *G. Popov 69/52* (BM); near Qfeyah or Hafar, 27°30'N, 41°10'E & 27°40'N, 41°15'E, 21./22.3.1962, *Zeller 6801, 6810, 7203* (BM); between Tatlith & Khamis Mushayt, W of Hamdah camp, 4400', 26.3.1977, *Collenette 191* (K); Buraidah, 5.1983, *Chaudhary* (RIY); near Riyadh al Khabra, W of Buraydah, 2000', 13.2.1980, *Collenette 1827* (K); 24°46'N, 44°38', 2900', 10.3.1983, *Collenette 4110[a]* (K); Riyadh, 9.1.1983, *Chaudhary & Riaz Bhatti* (RIY); Al Kharj Riyadh, 26.10.1966, *Mosnier 2769* (K); Arama-Plateau, c. 25 km W Rumah (c. 100 km N Riyadh), 25.3.1985, *Baierle & Kürschner 85-183a* (BSB); Safaniyah, c. 140 km NW of Al Jubayl, 22.4.1982, *Naylor & Craighead 14/82* (E); Arafjan[?], 1935, *Dickson 115A* (K).

U N I T E D A R A B E M I R A T E S: B A H R A I N: SE of Saar, sandy plain, 100', 21.3.1986, *Phillips 111* (K). - A B U D H A B I: Western region, 20 km W of Jebel Dhanna, coast, opp. of Island Shuwaihat, 50 m, 10.6.1983, *R.A. Western 601* (E).

O M A N: Oman sands (inland from Trucial coast), 1937, *Maxwell Darling 449* (K); Bada Mughani, 4.1952, *Lee-Oldfield FNLO.210* (BM).

I R A N: Minab, Gourband to Hassanlangui, 6.4.1949, *Behboudi 611E* (W); entre Jiroft et Delfar, 19.6.1960, *Dadashzadeh DK 703* (G).