

CONTRIBUTIONS TO THE FLORA OF SINAI I:

new and confused taxa

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ABSTRACT. The following new taxa are described from Sinai: *Brassica deserti* Danin & Hedge; *Micromeria serbaliana* Danin & Hedge; *Polycarpaea repens* subsp. *tiranica* Danin; *Arenaria deflexa* subsp. *deflexa* var. *glabrata* Danin. Confused taxa of *Ephedra*, *Kickxia* and *Ifloga* are discussed.

The following new taxa and observations are the result of recent collections and investigations in Sinai carried out by staff of the Department of Botany of the Hebrew University, Jerusalem. All the cited specimens have been examined.

NEW TAXA

***Brassica deserti* Danin & Hedge, sp. nov.** (Sect. *Brassica*). Fig. 1.

Radix annua vel perennans. *Caules* erecti, 15–60 cm alti, a basi ramosi, teretiusculi, griseo-virides, villosi, pilis infirmis patulis 0.5–2 mm longis dense praediti. *Folia* petiolata, plerumque lyrata, patuloso-villosa; folia inferiora lobis duobus lateralibus, 0.5–1 cm longis subopposite disposita; lobus terminalis maximus, ovatus, $5 \times 3\text{--}5.5$ cm, margine inaequaliter crenatus vel bi-crenatus; folia media minores, lyrata, 2–4-lobata; superiora lyrata vel integra, $7\text{--}10 \times 3\text{--}6$ mm, nervifoliis obscure pennatae. *Racemus* sub anthesi corymbosus dein elongatus, 20–40-florus. *Pedicelli* villosi, filiformes, erecto-patentes, 5–10 mm longi, in fructu parum elongati. *Sepala* villulosa, pilis paucibus glandulosis tecta; sepala exteriora patentia, 5×1 mm, interiora 5×2 mm, basim leviter saccata. *Petala* flava, glabra, 14 mm longa; lamina obovata, 8×4 mm, in unguem 6×0.7 mm attenuata. *Stamina* interiora 7 mm longa, exteriora tantum 5 mm longa. *Antherae* obtusae. *Glandulae medianae* 0.5 mm longae, lateralibus valde minoribus. *Ovarium* 20–26-ovulatum, non vel breviter stipitatum. *Stylus* 1.5 mm longus, 0.5 mm diametro. *Stigma* capitatum breviter bilobatum, 1 mm diametro. *Siliquae* 2–2.5 cm longae, 2 mm latae, basi usque 1 mm stipitatae, biconvexae, in rostrum 3–5 mm longum aspermum (raro monospermum) attenuatae; valvae sub-membranaceae inter semina constrictae, nervo mediana prominenti. *Semina* globosa, 1 mm diametro, fusca, sublaevia, uniseriata. *Cotyledones* longitudinaliter conduplicatae. *Fl.* Mar.

Sinai (central): 50 km south of El Thamad at the foot of Gebel Igma, chalky wadi. $34^{\circ} 15' \text{ E } 29^{\circ} 20' \text{ N}$, 1000 m, 15 iii 1970, A. Schmida & Z. Ager (holo. HUJ; iso. E); 50 km south of El Thamad, Gebel Khudara, 1300 m, 15 iii 1970, A. Schmida & Z. Ager; 1 km SW of El Thamad, 663 m, 11 iii 1970, A. Schmida & Z. Ager.

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FIG. 1. *Brassica deserti* Danin & Hedge: a, habit $\times \frac{2}{3}$; b, ovary & honey glands $\times 6$; c, petal $\times 3$; d, inner sepal $\times 3$; e, fruit with valve removed $\times 2$; f, seed $\times 13$; g embryo $\times 13$.

B. deserti appears to occupy an isolated position in the genus without any close specific ally. The species to which it shows some degree of affinity are N African in distribution and although none is very similar there seems little doubt that *B. deserti* has some connection with them. For example the new species resembles *B. maurorum* Dur. (cf. Maire, Flore de l'Afrique du Nord 12: 169-171, 1965), endemic to N Africa, but clearly differs in its villous to villulous indumentum, large flowers, smaller, unseeded beak, bilobed stigma and upper leaves which are smaller and never linear. *B. deserti* also shares points of similarity with the widespread and polymorphic N African *B. fruticulosa* Cyrillo but differs in having a patulose villous indumentum (not hispid adpressed) which covers the stems, leaves and sepals much more densely; furthermore, linear leaves do not occur in *B. deserti* nor do deep incisions of the lateral lobes of basal leaves.

Micromeria serbaliana Danin & Hedge, *sp. nov.* (Sect. *Micromeria* = Sect. *Piperella* Benth).

Affinis *M. hispidae* Boiss. & Heldr. et *M. amanae* Rech. fil. sed calycibus minoribus, cymis densioribus differt. A *M. sinaicae* Benth. caulibus procumbentibus, pilis caulium patulis recedit.

Suffrutex humilis multicaulis, omnino patule hirsutus basi induratus. *Caules* grisei, e collo ramosi, tenuissimi, 0.2-0.3 mm diametro, obtuse quadrangulares, 5-20 cm longi, internodiis 2-10 mm longis, in dimidia vel tertia parte superiora floriferi, per totam longitudinem pilis patulis dense tecti. *Folia* caulina brevissime petiolata vel subsessilia, inferiora ovata, basi rotundata, apice acuta, $3 \times 1.5-2$ mm, margine distincte revoluta utrinque viridia; costa mediana subtus saepe indistincta, nervis lateralibus indistinctis, supra nervis indistinctis; utrinque dense scabrido-hispidi pilis numerosis simplicibus et pilis paucis glandulosis; glandulae magnae sessilia raro adsunt. *Folia superiora* sensim angustiores, ovato-lanceolata vel lanceolata; folia floralia linearia flores calycesque aequantia. *Cymae* pauci-vel multiflorae, dense vel laxae dispositae, 1-2 mm pedunculatae, 1-10-florae. *Bractaeae* minutissimae, subulatae, pedicellis dimidio breviores. *Pedicelli* filiformes, 0.5-2 mm longi. *Calyx* tenuiter tubulosus, 2.5 mm longus, sub anthesi roseo-purpureus, distincte nervosus, pilis patulis provisus, nervis pilis eglandulosis simplicibus, glandulosisque et, inter nervis, glandulis sessilibus paucis vestitus; dentes calycum 5 subaequales, 0.5 mm longi, lanceolati, triangulares. *Corolla* lilacino-purpurea, hirtula, 4 mm longa; labium inferius punctis atropurpureis instructum. *Nuculae* ovatae, fuscae, 0.8×0.2 mm. *Fl.* Apr.-Aug.

S Sinai: Gebel Serbal, cliffs of smooth red granite, NW exposure, 1850 m, 6 viii 1968, *Danin* (holo. HUI; iso. E); Jebel Musa above St. Katherina, vii 1945, *Kinross* (E); Gebel Umm Shomar, steep slopes, smooth rocks, 2100-2300 m, 27 iv 1968, *Danin* & *A. Schmida* (HUI); G. Musa, near the monastery of St. Katherina, 1500 m, 26 vi 1968, *Danin* (HUI); G. Rabba above Wadi el Arbain, (4 km SW of St. Katherina monastery), 1700 m, 5 iv 1971, *Danin* (HUI).

M. serbaliana is restricted to crevices and small fissures in smooth-faced large outcrops of red or white granite between 1400 and 2600 m. It shares many points of similarity with *M. sinaica* Benth., *M. microphylla* Benth., *M.*

TABLE I
Analytical differences between *Micromeria* species

	<i>M. serbaliana</i>	<i>M. sinaica</i>	<i>M. microphylla</i>	<i>M. amana</i>	<i>M. hispida</i>
Habit	cushion-forming	loose, ascending	ascending	ascending	cushion-forming
Leafy stem diameter	0.2-0.3 mm	0.5-1 mm	0.5-1 mm	0.2-0.3 mm	0.2-0.3 mm
Height	10 cm	20-40 cm	10-30 cm	10 cm	10 cm
Leaf	2-4 × 1-2 mm	6-8 × 2-3 mm	5 × 1.5-3 mm	4-6 × 1-3 mm	2-4 × 1-2 mm
Indumentum of: stem;	hispid, 1-3- celled hairs	retorse, 2-4- celled hairs	retorse, 1-3- celled hairs	retorse, 1-4- celled hairs	hispid, 2-6- celled hairs
leaves;	densely hispid to scabrous through- out with mostly 1-celled hairs, few 2-celled, few stalked, glandular hairs	scarcely hispid above, 1-2- celled hairs and sessile glands beneath	glabrescent to scarcely ad- pressed above large sessile glands through- out	glabrescent to scarcely scabrid above, sparsely hispid & large glands beneath	hispid with mostly 2-6 celled hairs throughout, stalked glands and sessile ones beneath
calyx	hispid with 1-3- celled hairs, stalked and sessile glands	scarcely hispid 2-4 celled hairs few stalked and sessile glands	tube scarcely hispid mainly at base	scarcely antrorse	hispid with 2-4 celled hairs stalked & sessile glands
Flowers in verticil	2-20	4-20	2-8	2-8	2-8
Calyx teeth	0.5 mm	0.5 mm	1 mm	0.5 mm	0.5-1 mm
Calyx tube	2 mm	2 mm	2 mm	2.5 mm	3-3.5 mm
Distribution	S Sinai 1400-2600 m	S Sinai, 300-1600 m N Sinai, C & N Negev, Edom	S Italy Sicily, Crete, Karpathos	Amanus (N Syria), Anti- Taurus	Crete

amana Rech. f. and *M. hispida* Boiss. & Heldr. The differences are given in Table 1. Geographically, *M. serbaliana* is closest to *M. sinaica*, both species growing in S Sinai, but morphologically they clearly differ in indumentum and habit characters.

***Polycarpha repens* (Forssk.) Asch. & Schweinf. subsp. *tiranica* Danin, subsp. nov.** A subspec. *repenti* bracteis ciliatis, costa mediana sepalorum marginis hyalinis latiore, indumento foliorum parce adpresso differt.

Tiran Island: coastal foothills N of Gebel Tiran, small sandy wadis between low sandstone questas, 13 xii 1968, N. Tadmor & A. Danin s. 601 (holo. HJ, iso. E).

This differs from the type subspecies in its ciliate-margined bracts and the sepals with the median rib broader than each of the hyaline margins. The populations of the new subspecies in Tiran Island are mostly chamaephytic and more woody than the populations of the type subspecies which occurs in Sinai (see below) but not in Tiran Island.

P. repens* ssp. *repens

Sinai: In deserto Sinaica, 1836, Bové 174 (E, K); 7 km SW of Sharm el Sheikh, 150 m, 25 iii 1971, A. Danin (HJ).

Egypt: Kairo, Bornm. 10431 (E); Auch.-Eloy 9814 (K); Suez Road, 24 km, Davis 8542 (E); Monte "Asrak" prope Cahiram, 2 iv 1836, Kotschy (K); Giza pyramids, Davis 7880 (E).

Jordan: west of E Inab, Hunting Survey 78b (E); Wadi Rum, Gillet 16009 (K). Iraq: G. Sanam, Wheeler Haines 943 (E); 6 km W of Safwan, Guest, Rawi & Rech. f. 6950B (K). Kuwait: Halwagy 317 (K). Aden: Waring 158 (K). Arabia: Jeddah, vii 1889, Zohrab (K). Bahrain Islands: Good 274 (K).

***Arenaria deflexa* Decne. ssp. *deflexa* var. *glabrata* Danin, var. nov.** A var. *deflexae* tota planta glabra differt.

S Sinai: Gebel Serbal, in fissures of smooth rounded granite rocks, 1900–2000 m, 1968, Danin s. 482a (holo. HJ; iso. E); loc. cit., 1850 m, 6 viii 1968, Danin s. 482 (HJ). G. Umm Shomar, 2300 m, Danin & A. Schmida s. 480 (HJ); G. Katherina, A. Schmida s. 481; G. Rumhan, (near G. Umm Shomar), 2000–2300 m, Tadmor s. 483; G. Katherina, 27 v 1835, Schimper 348 (E).

The new variety is confined in S Sinai to small fissures and crevices in large, smooth-faced outcrops of pale granite or to such fissures with permanent seepage of small amounts of water. It is found within an altitudinal range of 1800–2600 m while the type variety in Sinai is between 1200 and 2600 m (e.g. Gebel Serbal, Danin s. 479). Var. *deflexa*, in addition to smooth-faced outcrops, also grows in fissures of step-like outcrops of dark granite diorite and trachyte (cf. Danin 1971); these habitats are drier than those of var. *glabrata*. The new variety is, so far as is known, endemic to Sinai while the hairy type variety has been found in Greece, Turkey, Syria, Lebanon and Israel (cf. McNeill 1963).

MISUNDERSTOOD TAXA

Ephedra L., Sp. Pl. 1040 (1753)

Considerable confusion has surrounded the number of *Ephedra* species in Sinai and their correct names. Boissier (1884), Blatter (1936) and Täckholm (1941, 1956, 1969) recorded 2 species; Blakelock & Gillett (1966) mentioned 3 species. As the useful key and illustrations in the latter work does not cover the four species now recognised, we give here a morphological key and some ecological notes.

1. Shrubby decumbent plants up to 1 m high; scarious leaf sheath, at least of young shoots, 1–2 mm long, as long as the diameter of the subtended stem and longer than leaf rudiments 2
- + Climbing or prostrate plants often with long lignified stems; if forming a shrub (after grazing), scarious sheath shorter than diameter of subtended stem, and shorter than leaves 3
2. Bracts of fruiting involucre 10–12, membranous, obovate, with erose margin never becoming fleshy, free to base, anthers 3–5, stalked. Plants of sandy plains, chalky or gravelly wadis from 100 to 1400 m. *E. alata* Decne.
- + Bracts of fruiting involucre 6–8, becoming fleshy (but rarely developing in Sinai), adpressed with entire margin, pairs with connate base; anthers 6–10, sessile; female flowers mostly with one nutlet. Chasmophytes, growing in smooth-faced granite outcrops and hanging from granite cliffs; on highest peaks in narrow stony gorges from 1440 to 2600 m *E. pachyclada* Boiss.
3. Fleshy ripe fruiting bracts red, free part of leaf mostly less than 3 mm long, flowering branchlets always from thicker stems with green bark; general colour green *E. aphylla* Forssk.
- + Fleshy ripe fruiting bracts white to grey, free part of leaf 3–10(–30) mm long; flowering branchlets mostly from stems with grey-white bark; general colour grey-glaucous green *E. foliata* Boiss. ex C. A. Mey.

Both *E. aphylla* and *E. foliata* grow in the magmatic massif of S Sinai in rocky-stony gorges as well as in fissured rocks.

E. alata Decne. Ic.: Zohary (1966), t. 20; Blakelock & Gillett (1966), pl. 10. Sinai: Bové 215 (iso. K).

E. pachyclada Boiss. Ic.: Migahid et al. (1959) as *E. alata*; Ghahreman (1966). Sinai: Schimper 316 (K) as *E. alata*; Kaiser 601 (K); Bové 214 (K).

E. aphylla Forssk. Syn.: *E. alte* C. A. Meyer. Ic.: Zohary (1966), t. 21 as *E. alte*. Sinai: Schimper 280 & 316 (E) pro parte, as *E. alata*.

E. aphylla was described from Rosetta (N Egypt) where it is the only species of *Ephedra* (cf. Täckholm, 1941). It was published validly, (Fl. Aegypt.-Arab. 170, 1775), and therefore is the correct name although no type specimen exists. I am grateful to Miss Hillcoat for pointing out the correct name of this species.

E. foliata Boiss. ex C. A. Meyer. Syn.: cf. Blakelock et al. (1966). Ic.: Zohary (1966) t. 23 as *E. peduncularis*; Blakelock et al. (1966), pl. 10. Sinai: Schimper 280 (K) as *E. alata*; Schimper 280 & 316 (E) pro parte as *E. alata*; Kaiser 805 & 431 (K) as *E. alte*.

A comprehensive list of *E. foliata* and *E. pachyclada* specimens from Sinai will be published later.

Kickxia Dumort, Fl. Belg. 35 (1827).

Two glabrous species of *Kickxia* occur in Sinai. Because a considerable amount of confusion has surrounded the names applied to them and also to a related third species, the characters of all three, their nomenclature and overall distribution are discussed in some detail. The three species may be keyed out as follows.

1. Seeds rounded, echinulate-tuberculate throughout; pedicels capillary, 7-30 mm long; corolla (including spur) 17-25 mm long 2
- + Seeds compressed, somewhat tuberculate only at their edges; pedicels not capillary, up to 3 mm long; corolla up to 10 mm long *K. macilentia* (Decne.) Danin
2. Leaves (1)-2-7 mm broad, with sagittate, hastate, semihastate, obtuse or rarely attenuate, bases; petioles 2-15 mm long, often tendril-like; stem herbaceous, climbing, up to 3-4 m or prostrate *K. heterophylla* (Schousb.) Dandy
- + Leaves less than 1 mm broad, with attenuate bases; petioles 1-3 mm long, sometimes the uppermost leaves with 3-4 mm long petioles, rarely coiled; stems $\pm$ lignified, mostly spinescent, ascending erect *K. spartioides* (Brouss. ex Buch) Janch.

K. macilentia (Decne.) Danin, **comb. nov.** Fig. 2.

Syn.: *Linaria macilentia* Decne. in Ann. Sci. Nat. ser. 2, 2: 252 (1834). Type: le desert du Sinai, vi 1832, Boié 75 (holo. P, iso. G, K).

S Sinai: Wadi Hebran (30 km N of El Tur), Schimper 147 (K, MPU); ibid, pro parte (E); near St. Katherine monastery, 1500 m, Danin s. 4772 (HUJ); Wadi Tlah, 9 km NW of the monastery, 1400 m, Danin, Orshan & Tadmor s. 4770 (HUJ); Gebel Rabba, 4 km SW of the monastery, 2200-2300 m, Schmida s. 4773 (HUJ); Wadi Sulaf (c. 17 km NW of the monastery), Schmida s. 4775 (HUJ); near Gebel Iqna (c. 45 km NW of monastery), 1100-1200 m, Tadmor s. 4774 (HUJ); Gebel Serbal, 1100-1150 m, Danin s. 4766a; loc cit., 1500-1600 m, Danin s. 4766 (HUJ).

Distribution: endemic to S Sinai.

K. macilenta is a mostly glabrous plant with small flowers on short pedicels. A clear-cut species, endemic, as far as is known, to S Sinai, it is confined to crevices of smooth-faced outcrops of granite. Its name has for long been erroneously applied to *Kickxia spartioides* (Brouss. ex Buch) Janchen as a result of a mixed collection by Schimper.

In 1835 Schimper collected two taxa in Wadi Hebran, Sinai, and distributed them labelled as *Linaria macilenta* Decne.—no. 147. The sheets were not homogeneous; thus on one sheet (E) the two taxa are mounted together, on another (E) only *K. spartioides* is found. At Kew, only *K. macilenta* is represented on no. 147 and there is a different sheet—no. 146 (of *K. spartioides*) with notes of Hochstetter who thought it was different from *K. macilenta*. Other specimens often cited as *K. macilenta* are listed later. Bentham (in DC., Prodr. 10: 271, 1846), repeated the original description of *K. macilenta* which fitted Bové's specimens in his herbarium; he added to it the description of *K. spartioides* while citing a specimen of Schimper 147. Boissier, in Fl. Or. 4: 370 (1879), gave the description of what he named *Linaria macilenta* Decne. from specimens both of Schimper and Aucher-Eloy, which were all *K. spartioides*, and from one of the Bové isotypes of the true *L. macilenta*. His description does not agree completely with either of the two taxa concerned. Because of that mistake, repeated in later works, e.g. Blatter (1921), Schwartz (1939) Eig *et al.* (1948), the common *Kickxia* of desert areas in Sinai, Israel, Arabia, parts of Egypt and Sudan and C Sahara, has been misidentified.

K. spartioides (Brouss. ex Buch) Janchen in Österr. Bot. Zeitschr. 82: 152 (1933). Fig. 2.

Syn.: *Linaria spartioides* [Brouss. ex] Buch, Phys. Besch. Can. Ins. 143 & 163 (1825).

L. scoparia [Brouss. ex] Spreng., Syst. Veg. 2: 789 (1825).

Elatinoides spartioides (Brouss. ex Buch) Wettst. in Engler & Prantl, Natürl. Pflanzenfam. iv. 3b: 58 (1891).

Type: Canary Islands, Tenerife, Baranco St. Andrea, frequent at Puerto los Christianos, Broussonet (?).

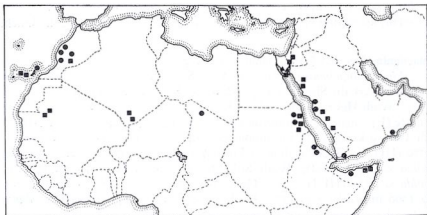


FIG. 2. Distribution of: ● *Kickxia heterophylla*; ▲ *K. macilenta* and ■ *K. spartioides*.

Sinai: *Auch-Eloy* 81 (herb. DC.—photo!); *Auch-Eloy* 1901 (K, BM); Wadi Hebran, *Schimper* 146 (K); Wadi Hebran, *Schimper* 147 pro parte (E); Wadi el Ain (c. 20 km NW of Nuweiba), 590 m, iii 1884, *Hart* (K, BM); 14 km NW of Eilat, *Danin & Schmida* s. 4755 (HUJ); Wadi Wirgan, 20 km E of El Tur, 30 xii 1968, *Orshan* (HUJ); Gebel Umm Alak (c. 20 km SSE of monastery), c. 1200 m, *Tadmor* s. 4758 (HUJ); *Kaiser* 50 (G, MPU, Z). Israel: Nahal Roded (c. 7 km NW of Eilat), 19 iv 1966, *Zohary* (HUJ); 26 km N of Eilat, 1 iv 1967, *Zohary & Heller* (HUJ); Wadi Haiyani (75 km NNE of Eilat), *Nachmoni* 56042 (HUJ); Arava Valley, Wadi Mahalle (20 km S of Hazeva?), *Feinbrun* 56046 (HUJ); Wadi Ideid, near Qa'at Greiq (Hameishar, c. 100 km N of Eilat), 21 iv 1946, *Tadmor* (HUJ). Arabia: S Median, El Wijh to Coady Hamz, ix 1878, *Burton* (K); C Median, Zurazmat el Himar, 1878, *Burton* (K); Taif, 144 km E of Jedda, 1680 m, *Trott* 1212 (K); Umm Wamir, 30 v 1936, *Philby* (BM); base of Gabal Shithata, 17° 44' N 43° 30' E, 2130 m, *Mandaville* 2543; *ibid*, 2530 m, *Mandaville* 2523 (BM); Andhali escarpment below top of Jhina pass, 2040 m, *Lavranos & Smith* 854 (K); Bishan to Ninas, *Popov* 69/277 (BM); Abha pass, *Popov* 71/267 (BM)—atypical material with corolla 8 mm long. Somalia: 32 km W of Laskore, *Bally, B.* 11222 (K); NE Somaliland, Damaleh, 48° 16' E, 11° 04' N, *Newbold* 871 (K). Sudan: G. Uaratab NW of Suakin, *Schweinfurth* 1867: 235 (K, BM); Nubia: 21° N, sea coast to between 920–1220 m, 1896, *Bent* (K) pro parte; Nubia, 30 iv 1885, *Johnston* (E, K); Erkowit, near J. Tatasay, *Andrews, A.* 3632 (K). Egypt: Gebel Elba, *Newberry* 1928: 212 & 218 (BM). Algeria: Hoggar mts., 12 km NE of Tamanrasset, 3 iii 1933, *Maire* (MPU); *Meinertzhagen* 173 & 188 (K); Oued Tamanrasset, *Meinertzhagen* 102 (K); Sud-Oranais: rôtchers au dessus du Col de Zenaga, 850 m, 25 iv 1938, *Faure* (E, MPU). Morocco: Ouarzazate, 130 km SE of Marrakech, 1220 m, *E. K. Balls, B.* 2628 (E); *ibid*, 10 v 1932, *Maire* (MPU). Mauritania: near Drar Ifan, 210 m, *Popov* 1959: 47 (BM); Chudeam, *Maire* (K). Canary Islands: Tenerife: Guimar, Montas de los Guirres, 13 xii 1851, *Botte* (E); *Broussonet* (MPU)—as *Antirrhinum scoparium*. Gran Canaria: near Volsequillo, 500 m, *Burchard* 249 (E); San-José, *Bourgeau* 1460 (E, K).

Distribution: Canary Islands, Morocco, Mauritania, Algeria, Egypt, Sudan, Somalia, Arabia, Sinai, Israel.

Broussonet wrote the two specific epithets *spartioides* and *scoparia* on the type herbarium sheets (cf. *Chavannes*, 1833). In 1825, *Sprengel* and *Buch* described it independently and it is not clear whose epithet is earlier. *Chavannes* (l.c.) said that he adopted the name *L. spartioides* as it fitted the plant better. *Bentham* (in DC., *Prodr.* 10: 271, 1846), *Wettstein* (in *Engler & Prantl, Natürl. Pflanzenfam.* iv. 3b: 58, 1891) and *Janchen* (1933, l.c.) have followed *Chavannes*.

Kickxia heterophylla (Schousb.) Dandy in *Andrews, Fl. Pl. Sudan* 3: 137 (1956). Fig. 2.

Syn.: *Antirrhinum heterophyllum* Schousb., *Vextr. Marokko* in K. Dansk. Vidensk. Selsk. Skr. 1, 1: 194, t. 3 (1800).

- Linaria gracilis* R. Br. in Salt, Abyss. App.: 64 (1814), *nomen*.
L. propinqua R. Br., *l.c.*, *nomen*.
Antirrhinum sagittatum Poir. in Encyc. Method., suppl. 4: 19 (1816).
Linaria heterophylla (Schousb.). Steud., Nom. ed. I: 482 (1821).
L. heterophylla (Schousb.) Spreng., Syst. Veget. II: 790 (1825).
L. sagittata (Poir.) Steud., Nom. ed. I: 483 (1829).
L. circinata Sweet in Brit. Fl. Gard. ser. 2, 3: 6. 235 (1835).
L. lancerottae Delile, Sem. Hort. Monsp. 1836: 26 (1836).
L. gracilis R. Br. ex Benth. in DC., Prodr. 10: 269 (1846).
L. gracilis var. *propinqua* Benth. *l.c.* 10: 270 (1846).
L. sagittata (Poir.) Hook. f. in Bot. Mag. 99: 6060 (1873).
L. patula Baker in Kew Bull. 1895: 222 (1895).
L. scalarum Schweinf. ex Blatter in Rec. Bot. Surv. India 3: 343 (1921) *nomen*.
Kickxia sagittata (Poir.) Rothm. in Fedde Rep. Beih. 136: 116 (1956).
Type: Morocco, in fruticetis prov. Hahoe, *Schousboe* (?).

As the variation of leaf shape is considerable in *Kickxia* we give here some notes on the shape of the base of the cauline leaves; the juvenile elliptic leaf rosettes are mostly absent from herbarium specimens.

Arabia: Jidda, sea shore, 1937, *Trott* (K)—obtuse at base; Jidda, *Bates* 2040a (BM)—leaves sagittate, semihastate and obtuse at base; 8 km S of Rabigh, Red Sea Coast, *Mandaville* 3002 (BM); Aden, 1884, *Beever* (K)—obtuse at base; Aden, 1884, *Yebury* 15 (BM)—obtuse at base; Uossil (Wassil), 1400 m, *Schweinfurth* 1149 (K, BM)—leaves sagittate and hastate—type of *L. scalarum* Schweinf.; Dhofar Mts, Merbat, 1895, *Bent* 2 (K)—depauperate specimen with very small leaves.

Somalia: *Gillett & Aylmer*, K. 181 (K)—sagittate and entire leaves with obtuse bases.

Ethiopia: Mescillit pass, 1370 m, *Bally* 6685 (K)—sagittate leaves. Mont Alam Kale (NW of Aidersó), *Schweinf. & Riva* 1655 (K)—obtuse, sagittate and hastate at base; Addi Caieh (Adi Kaie), 80 km SE of Asmara, *Tekle Hagos* 158 (K)—obtuse at base.

Sudan: Nubia, 21° N, sea coast to between 920–1220 m, 1896, *Bent* (K) pro parte—obtuse at base; Erkowit-Sinkat road, *Aylmer* 254 (K)—leaves hastate.

Egypt: Gebel Elba, Wadi Rabdeit, 21 i 1933, *Shabetai* (K)—obtuse bases; G. Elba, Wadi Rabdeit, x 1933, *Palmer* (K)—leaves obtuse, sagittate or hastate at base.

Chad: Tibesti, *Hinchinbrooke* 35 (K)—lower leaves linear-filiform, upper ones broader, obtuse at base.

Morocco: Demnate, near Marrakech, 920 m, *Richmond* 16 (K)—sagittate leaves; Ait Majin, 610 m, *Whiting & Richmond* 147 (K)—sagittate leaves; Shedma (Chaidma ?), iv-v 1871, *Hooker* (K)—sagittate leaves; S of Mogador iv 1902, *Bainbridge* (K)—most leaves sagittate, uppermost entire with obtuse bases; Safi, *Jahandiez* 26 (E)—sagittate leaves; N of Tamri, *Davis*, D. 48433 (E)—sagittate leaves; Imouzzerdès—Ida—Outanane to Oulma, 500 m, *Davis*, D. 48512 & D. 48505a (E)—obtuse at base; foot of Djebel Lekst, near Taфраoute, 1100–1300 m, *Davis*, D. 48786 (E)—sagittate leaves. Canary Islands: Lancerotta: *Bourgeau* 319 (K)—leaves obtuse at base,

some sagittate; *Burchard* 925 (K)—obtuse at base; *Burchard* 277 (E)—obtuse at base, some sagittate. Gran Canaria: 1929, *Trethewy* (BM).

Distribution: Canary Islands, Morocco, Chad, Egypt, Sudan, Ethiopia, Somalia, Arabia.

Although the specimens cited above vary appreciably in leaf shape, particularly at the base, they are otherwise fairly uniform. There are, however, several specimens which are atypical. Some of them are rather intermediate between *K. heterophylla* and *K. spartioides* in having linear leaves with attenuate bases but long petioles.

Somalia: Golis Nange, near Widaba, v 1895, *Cole & Philips* (K). This is the type of *Linaria patula* Baker.

Ethiopia: Adi Conzi near Acrou, 1900 m, *Schweinf. & Riva* 1169 (K).

Arabia: near Taif, c. 21° 15' N, 40° 21' E, *Popov* 69/187 (BM).

Israel: Arava Valley, 3 km N of Ein Hosb (Hatzeva), 25 iii 1950, *D. Zohary* 56041 (HUJ).

Morocco: El Ardija, *Pitard* 3648 (K).

Algeria: Hassi Insokki, 16 xii 1899, *Battandier* (MPU). This specimen was determined by Battandier as *Linaria sagittata* var. *linearifolia* Batt. (in Bull. Soc. Bot. France 47: 252, 1900). It was also collected at the same locality by L. Chevallier (No. 960, MPU) whose specimens form transitions between *Kickxia spartioides* and the form of *K. heterophylla* with narrow leaves, attenuate bases and long petioles. Most specimens determined by Maire (in MPU) as *L. sagittata* var. *linearifolia* are in fact *Kickxia spartioides*.

Canary Islands: iv-v 1887, *Scott Elliot* (E).

Another anomalous specimen is from the Sudan: Kasala province, Toka dist. Karora hills, Khon Kadow, *Robbie* 9 (K). Stems and leaves hairy, leaves sagittate to hastate.

The correct status of all these gatherings can only be finalised with information from population studies in the field.

***Ifloga rueppellii* (Fresen.) Danin, comb. nov.**

Syn.: *Gnaphalium rüppellii* Fresen. in Mus. Senckenb. 1: 79 (1833). *Ifloga spicata* (Forssk.) Sch. Bip. var. *condensata* Boiss., Fl. Or. Supp.: 295 (1888) p.p. excl. *Schweinf.* 59 (G).

This species was ignored for many years partly because most earlier collections (e.g. *Schimper* 408) were either inadequate or rather immature. Boissier, who compared some of these gatherings with adult material of *I. spicata*, reduced it to varietal rank of that species. But in Sinai it has a clear distribution pattern correlated with distinct morphological characters and it seems worthy of independent specific rank. It does not agree with either of the subspecies of *I. spicata* recently described by Chrtek from Egypt (1969).

The following table gives diagnostic differences between *I. rueppellii* from Sharm el Sheikh, G. Umm Shomar and Mt. Sinai (*Schimper* 408) and *I. spicata* from Bir Gifgafa and Tel Aviv.

	<i>I. rueppellii</i>	<i>I. spicata</i>
general colour	grey	yellowish-green
habit	ascending-decumbent	erect
leaf surface	crisped lanate throughout	adaxial-adpressed lanate, abaxial-glabrous papyraceous when dry, mucilaginous when wet
stem indumentum	lanate	absent to papyraceous
leaf shape	linear lanceolate	acicular
leaf length	2-4 mm	5-8 mm
involucrate leaves	0.5-1.5 times longer than capitula	3-4 times longer than capitula
phyllaries	white, cuspidate	golden-yellow, acute to acuminate
median phyllaries	cordate at base	obtusate to cuneate at base

The most useful diagnostic field characters of *I. spicata* are the colour and habit of the plant and the marked degree of sand adherence to the leaves and stems. As the involucrate leaves are much longer in *I. spicata* this species at flowering time looks like a small pine seedling.

S Sinai: in monte Sinai, *Schimper* 408 (E); Gebel Umm Shomar, Wadi Rumhan, *Danin & Schmida* s. 1533 (HUJ); 30 km N of Sharm el Sheikh, 300 m, 25 iii 1971, *Danin* (HUJ, E); Wadi Hashabi, 10 km W of Sharm el Sheikh, *Danin & Orshan* s. 1531 (HUJ).

Ifloga spicata (Forssk.) Sch. Bip.

N Sinai: 22 km SE of Bir Gifgafa, *Danin* s. 1525 (HUJ).

Israel: Herzelia near Tel Aviv, *Eig, M. Zohary & Feinbrun* 95 (E).

Jordan: Wadi Ram, 910 m, *Davis* 9012 (E).

Persia australis: (Laristan), near Bander-Abbas, *J. Bornmüller* 382 (E).

Iraq: Faluja desert, *Wheeler Haines* 163 (E).

L. Egypt: foot of Khanka dunes, *Davis* 8145 (E); Wadi Abu Silly (Halmar), *Davis* 10591 (K); near Cairo, *Kotschy* 757 (K).

Algeria: Ghardaïa, *Chevallier* 312 (E).

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