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CISTACEAE

by S.M.H. JAFRI

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CISTACEAE

S. M. H. JAFRI

Shrubs or herbs with stellate hairs, with or without simple, longer hairs. Leaves simple, often opposite, stipulate or not. Flowers solitary or in cymes, actinomorphic, bisexual, hypogynous. Sepals 5 or 3, often unequal. Petals 5 (rarely 3 or 0), free, yellow or white, rarely pinkish, or violaceous evanescent. Stamens numerous, free. Ovary superior, 3-10-carpellary with (or without) a single style, 1-celled, or incompletely 3-5 (-10)-septate at base with usually intrusive parietal placentas; ovules few to many, mostly orthotropous, rarely anatropous; stigmas 3-5, free or united. Fruit a loculicidal capsule; seed endospermic, with a $\pm$ curved embryo.

A family of 8 genera and nearly 200 species, chiefly of the Mediterranean region, is known by 4 genera and 23 species in Libya.

- | | | |
|----|--|------------------------|
| 1. | + Ovary 5 or 10-carpellary; capsules 5, 6 or 10-valved. Outer sepals not much smaller than the inner | 1. Cistus |
| | — Ovary 3-carpellary; capsules 3-valved. Outer sepals much smaller than the inner | 2 |
| 2. | + Stigmas subsessile or sessile; petals yellow with a blotch at base. (Annual herb). | 4. Tuberaria |
| | — Stigmas borne on $\pm$ elongated, geniculate style; petals yellow, rarely pinkish or purplish, without a basal blotch. (Shrubs or herbs) | 3 |
| 3. | + All stamens fertile; leaves opposite; capsules usually many seeded; ovules orthotropous | 3. Helianthemum |
| | — Outer stamens sterile, moniliform; leaves mostly alternate; capsules 3-12-seeded; ovules anatropous | 2. Fumana |

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1. CISTUS

L., Sp. Pl. 523. 1753; Gen. Pl. ed. 5: 234. 1754.

Shrubs with opposite, exstipulate leaves. Flowers large, 2 cm or more in diameter, white, pink to purplish-red. Sepals 5 (in our species) or 3, subequal in size. Stamens all fertile. Stigmas subsessile or on a straight style. Ovary usually 5- rarely, up to 10-locular. Capsules 5-10-valved; ovules orthotropous.

About 20 species, mostly in Mediterranean region: 4 species are found in Libya.

- | | | | |
|----|--|--------------------------|--|
| 1. | + Style filiform, as long as the stamens | 2 | |
| | — Style shorter than stamens or absent | 3 | |
| 2. | + Leaves usually 25-50 x 15-35 mm, flat | 1(a) <i>C. incanus</i> | |
| | | ssp. <i>incanus</i> | |
| | — Leaves usually 15-25 x 8-15 mm, distinctly undulate-crispate | 1(b) <i>C. incanus</i> | |
| | | ssp. <i>creticus</i> | |
| 3. | + Flowers pink; leaves grey-tomentose, at least beneath | 2. <i>C. parviflorus</i> | |
| | — Flowers white; leaves green (distinctly petiolate) | 3. <i>C. salvifolius</i> | |

1. *Cistus incanus* L., Sp. Pl. 524. 1753; Durand & Barratte, Fl. Lib. Prodr. 28.1910 (partly); Pamp., Prodr. Fl. Cir. 325. 1931 (partly); Keith, Prelim. Check List Lib. Fl. 367. 1965.

C. polymorphus Willk., Ic. et descr. 2: 20. tab. 79. 1857.

Shrub, up to 100 cm tall, erect or spreading with stem and pedicels densely white-villous. Leaves usually (15-) 25-50 x 15-35 mm, ovate, obovate or elliptic, flat or almost so, pubescent or tomentose with stellate hairs; petiole 3-15 mm long. Cymes 1-7-flowered, terminal, $\pm$ symmetrical, Sepals 5, ovate-lanceolate, long acuminate, with short stellate hairs hidden by long simple hairs. Flowers 4-6 cm in diam., purplish-pink. Capsules densely adpressed-villous; style long, conspicuous, somewhat persistent; seeds small, blackish.

A variable species, often split into 3 or 4 infraspecific taxa, which are

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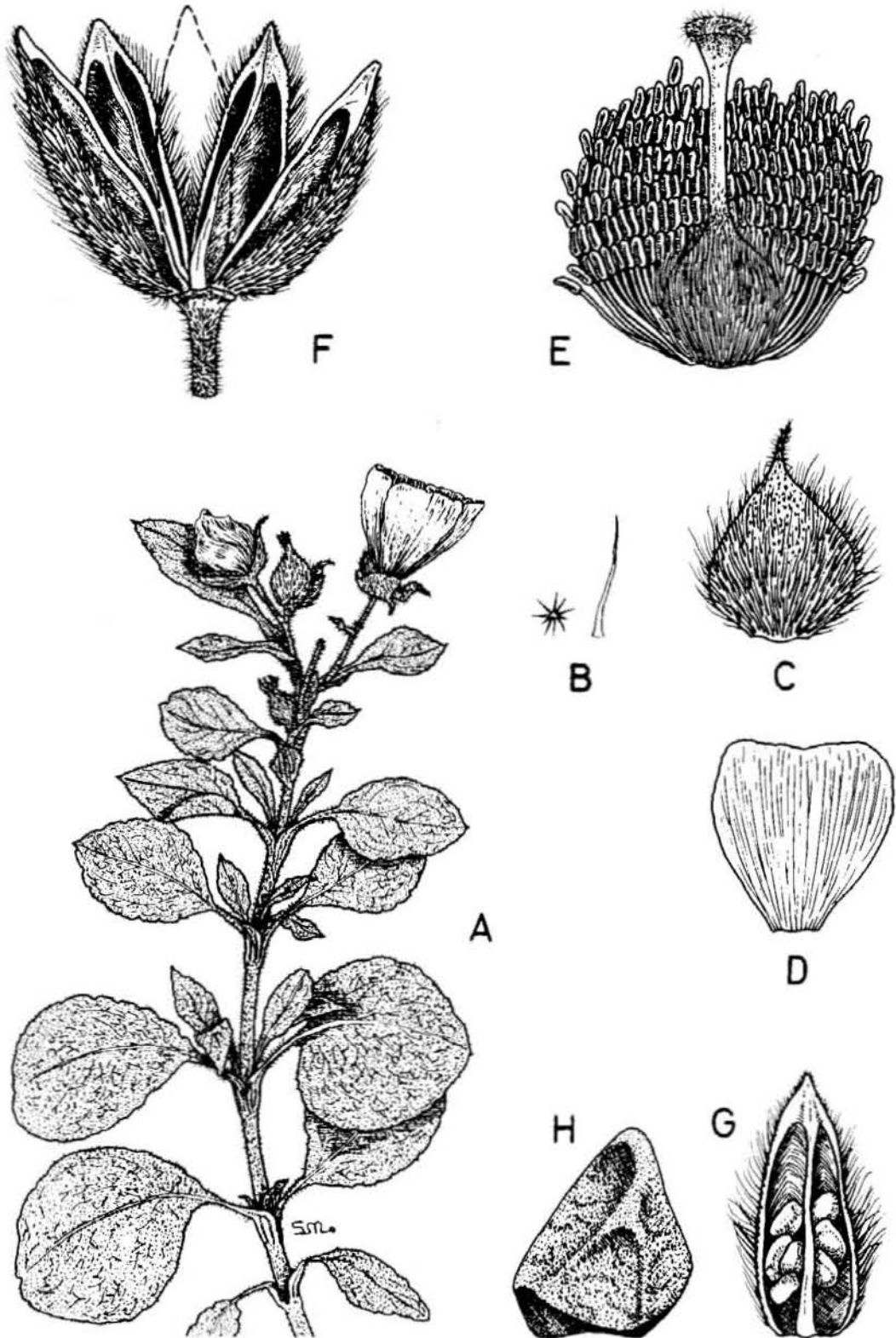


Fig. 1 *Cistus incanus* ssp. *incanus*: A, flowering branch x 2/3; B, hairs x 6; C, sepal x 2; D, petal x 1; E, stamens and gynoecium x 6; F, an open capsule valves x 4; G, capsule exposed to show seeds x 4; H, seed x 16.

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sometimes considered as separate species by some authors. The splitting do not seem very rigid and especially the leaf characters seem very variable. Among our material two subspecies can be differentiated.

(a) subsp. *incanus* (Fig. 1)

Leaves larger with flat margins and surface.

Type: Habitat in Hispania, G. Narbonensi

A-7 Gebel Akhdar, half way between Cyrene (Shahat) and Apollinia (Marsa Susa), in Wadi Roseyt, 550 m, rocky limestone slopes of wadi, in macchie, 2 ft. shrub, flowers large, purplish-pink, 27.3.1970, *P. H. Davis* 50110 (ULT); Wadi el Mahboul, Susa coastal road, flowers rose, 11.3.1968, *L. Boulos* 2177 (ULT); Wadi el Teir, c. 24 km W. Derna, along the coastal road to Susa, 19.1.1967, *L. Boulos* 1185 (ULT).

Distribution: S. Europe (Italy) & Libya (Gebel Akhdar).

(b) subsp. *creticus* (L.) Heywood in Fedde Rep. 79: 60. 1968.

C. creticus L., Sp. Pl. ed. 2: 738. 1762; *C. villosus* L., Sp. Pl. ed. 2: 736. 1762; emend. (as *C. pilosus*) in Mantissa 40. 1767; *C. tauricus* Presl, Del. Prag. 24. 1822; *C. ponticus* Juz., Spisok Rast. Herb. Fl. U.R.S.S. 13: 79. 1955; *C. incanus* var. *villosus* (L.) Murb., Cont. Fl. N. W. Afr. t. 13. 1897; Durand & Barratte, l.c. 28; Pamp., l.c. 325; *C. incanus* var. *creticus* (L.) Boiss., Fl. Or. 1: 437. 1867; Pamp., l.c. 325.

Leaves smaller, crispate-undulate.

Type: Habitat in Creta, Syria; Herb. Linn. 689/17 (LINN).

A-7 Cirenaica, Mersa a ovest di Cirene U. Tmista, 29.4.1993, *R. Pampanini* & *R. Pichi-Sarmolli* 5094 (ULT).

Distribution: Aegean islands, Greece & Libya (Gebel Akhdar).

The species seems to be confined to Gebel Akhdar area between Baida eastwards (Susa coastal road). Vern. Tarrashe Ahmer

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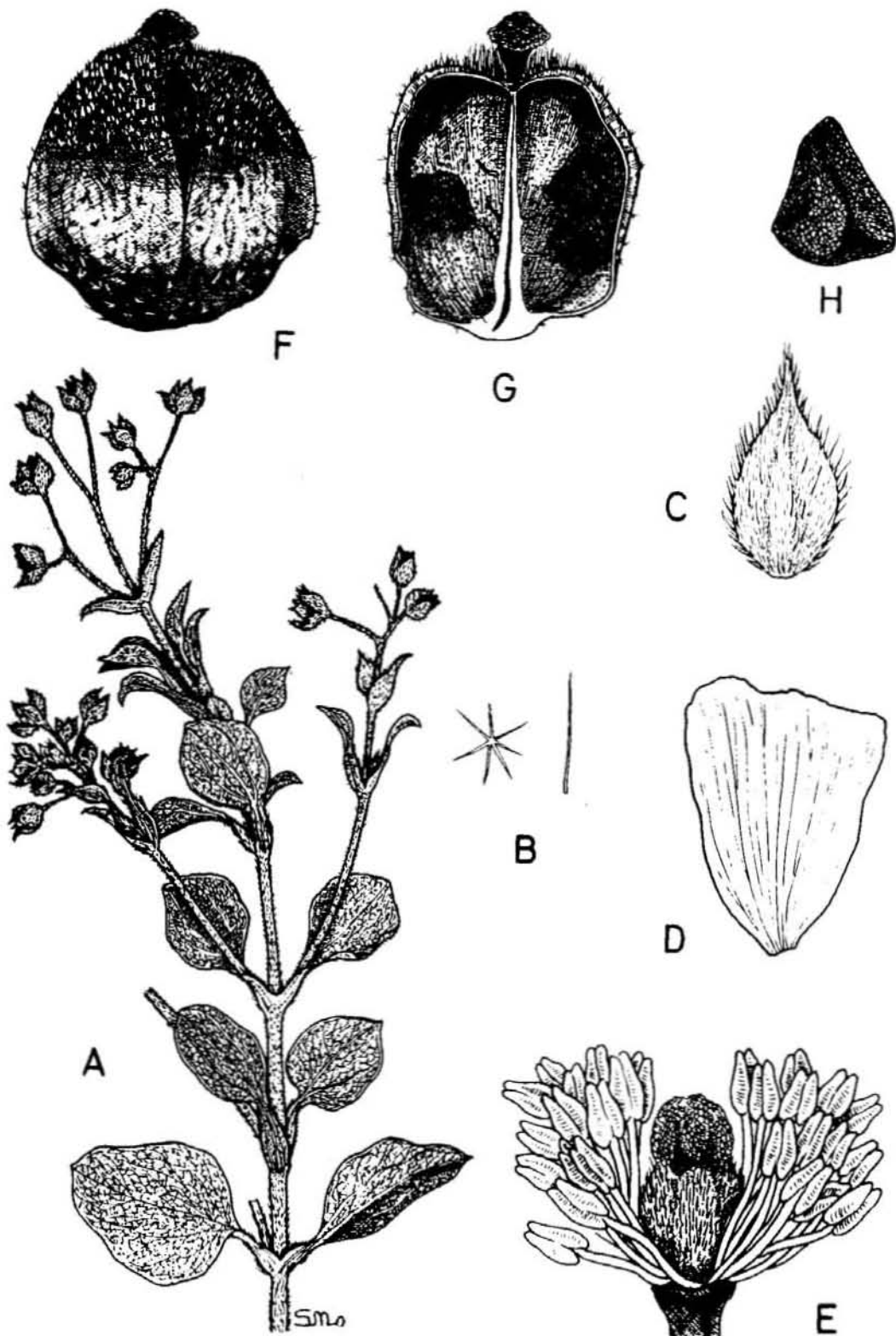


Fig. 2 *Cistus parviflorus*: A, a flowering branch x 2/3; B, hairs x 20; C, sepal x 4; D, petal x 4; E, stamens and gynoecium x 8; F, capsule x 8; G, capsule vertically opened to show seeds x 8; H, seed x 20.

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2. **Cistus parviflorus** Lam., Encycl. Meth. Bot. 2: 14. 1786; Durand & Barratte, Fl. Lib. Prodr. 28. 1910; Pamp., l.c. 325 (Fig. 2)

C. cymosus Dunal ex DC., Prodr. 1: 265. 1824.

Smaller, subspreading shrub, up to 60 (-90) cm tall. Leaves ovate or ovate-elliptic, 10-30 mm long, grey-tomentose (whitish in appearance below) with short stellate hairs and long simple hairs, 3-parallel-veined in the lower half at least, entire, petiolate; petioles broad (like a sheath at least below). Cymes (1-) 2-5 (-6)-flowered, usually terminal, $\pm$ congested and symmetrical. Flowers pink, 2-3 cm in diameter; pedicels 5-10 mm. Sepals 5, equal, persistent, thick, densely hairy, entire at the base, shortly acuminate at apex. Stigmas sessile.

Type: L'Isle de Candie (Crete), *Tournefort*.

A-3 *Leptis magna* (Lebda), 1.5.1974, *Milad*, K. 422 (ULT); Tarhuna, 30.3.1975, *Zenab*, A. 208 and 221 (ULT); **A-7** Gebel Akhdar, c. 30 km from Lamluda, stony roadside, erect, c. 60 cm in fruits, 13.6.1972, *S. I. Ali* 713 (ULT); Half way between Shahat and Marsa Susa, wadi Roseyt, 550 m, rocky limestone gorge, in macchie, 1-2 ft. shrub, flowers small, clear pink, 27.3.1970, *P. H. Davis* 50111 (ULT); 5 km w. of Baida, (El Merj-Baida), 300-500 m, limestone macchie, (*Juniperus phoenicia* - *Pistacia lentiscus*), 2 ft. shrub, flowers small, clear pink, 25.3.1970, *P. H. Davis* 49958 (ULT); 5 km E. Tocrá, 17.1.1967, *L. Boulos* 1106 (ULT); Al Bakur, near Tocrá, 10.3.1968, *L. Boulos* 2093 (ULT); Wadi El Mahboul, Susa coastal road, flowers rose-mauve, 11.3.1968, *L. Boulos* 2175 (ULT).

Distribution: Eastern Mediterranean element: Italy, Cyprus & Libya.

Easily distinguished from the previous species by its sessile stigmas, and smaller flowers.

Fls. Feb.-April *Vern.* Torrash Ahmer

3. **Cistus salvifolius** L., Sp. Pl. 524. 1753; Durand & Barratte, l.c. 28; Pamp. Prodr. Fl. Cir. 325. 1931; Keith, l.c. (Fig. 3).

Small shrub, up to 60 (-90) cm long, spreading, hairy with short stellate hairs only. Leaves ovate-elliptic, rounded at base, green, scabrid and rugose above, with

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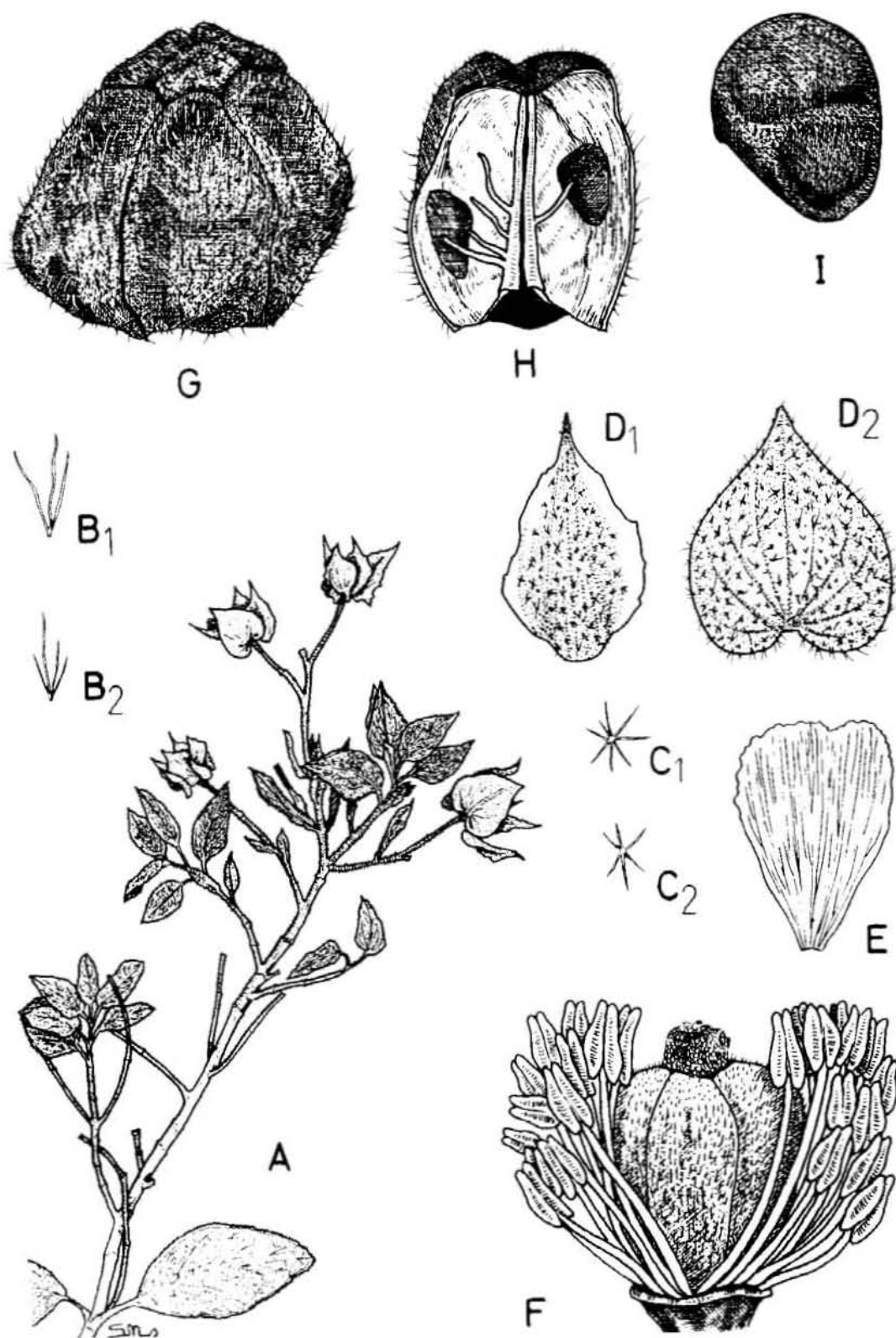


Fig. 3 *Cistus salvifolius*: A, a flowering branch x 2/3; B₁-B₂, hairs on stem x 20; C₁-C₂, hairs on leaf; D₁,D₂, sepals x 3; E, petal x 2; F, stamens and gynoecium x 6; G, capsule x 6; H, capsule vertically opened to expose seeds x 6; I, seed x 20.

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short stellate hairs on both surfaces, petiolate. Flowers (2-) 3-5 cm in diameter, white mostly solitary but sometimes cymes up to 3 (-4) flowered; pedicels usually long, (1-) 2-5 (-15) cm. Sepals 5, manifestly cordate at the base, scabrid with stellate hairs usually. Stigma subsessile or sessile. Capsules adpressed-pubescent.

Type: Described from Italy, Sicily and Narbona, Herb. Linn. 689/11 (LINN).

A-3 22 km west Khoms, on calcareous slopes, 25.4.1967, *L. Boulos* 1810 (ULT); A-7 Gebel Akhdar, halfway between Shahat & Marsa Susa, in wadi Roseyt, 550 m, rocky limestone gorge, in macchie, 1-2 ft. shrub, flowers white, 27.3.1970, *P. H. Davis* 50113 (ULT); upper stream of wadi El Kouf, 12.3.1968, *L. Boulos* 2220 (ULT); Al-Bakur, near Tocre, 10.3.1968, *L. Boulos* 2067 (ULT); 15 km S. W. Massah, 17.1.1967, *L. Boulos* 1126 (ULT).

Distribution: W. & S. Europe, N. Africa, eastwards to N. Iran.

Distinguished from the previous species by its white flowers and scabrid leaves with short stellate hairs only. Used as tannin.

Vern. Torrashe abiad

2. FUMANA

(Dunal) Spach in Ann. Sc. Nat. Ser. II. 4: 359. 1836

Helianthemum Mill. sect. *Fumana* Dunal in Dc., Prodr. 1: 274. 1824;

Fumanopsis Pomel, Mat. Fl. Atlant. 9. 1860.

Low undershrubs or dwarf shrubs with woody branches and narrow, ovate-lanceolate to linear or acicular, mostly alternate (rarely opposite) leaves, Flowers usually yellow, in raceme-like cymes, often secund, 2 outer sepals small, the 3 inner larger, scarious, prominently veined. Petals exceeding the calyx. The outer stamens sterile, moniliform, radiating. Stigma borne on filiform, $\pm$ basally curved style. Capsules 3-veined, dehiscent by 3 valves with valves usually patent after dehiscence, 3-12 seeded only.

Differs from *Helianthemum* L. by its mostly alternate leaves, sterile outer stamens and only 3-12-seeded capsules.

About 12 species in the Mediterranean region, N. Africa to S. W. Asia, 5 species are recorded from Libya.

1. + Leaves exstipulate
- Leaves stipulate

2. *F. scoparia*

2

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- | | |
|---|---|
| 2. + Leaves opposite, at least below
— Leaves alternate | 3. F. thymifolia
3 |
| 3. + Leaves linear, setaceous, less than 0.5 mm
broad
— Leaves oblong-lanceolate to ovate, more than 1
mm broad | 4. F. laevipes

1. F. arabica |

1. **Fumana arabica** (L.) Spach in Ann. Sc. Nat. Ser. II. 6: 359. 1836; Pamp., Prodr. Fl. Cir. 332. 1931; Keith, l.c. 506 (Fig. 4, A-F)

Cistus arabicus L., Sp. Pl. ed. 2: 745. 1762; *Helianthemum arabicum* (L.) Pers., Syn. Pl. 2: 80. 1807; *F. viscidula* (Stev.) Juz. in Kom., Fl. URSS. 15: 681. 1949.

Low shrub, diffusedly much branched, laxly caespitose, up to 25 cm long. Leaves 5-12 (-15) x 1-5 mm, oblong-elliptic, alternate, exstipulate, acute, flat, scarcely diminishing in size above, glandular-pubescent; stipules short. Flowers (1-) 3-6 (-7) axillary, c. 2 cm in diam., forming a distinct, lax inflorescence. Capsules 6-8 mm, globular-ovoid, (6-) 8-12-seeded; seeds small, reticulated. $2n=32$

Type: Described from Arabia, Herb. Linn. 689/67-68 (LINN);.

A-7 Omm Rezum, S.E.Derna, 13.3.1968, *L. Boulos* 2374 (ULT); Al Bakur, near Tobra, Gebel Akhdar, 10.3.1968, *L. Boulos* 2069 (ULT).

Distribution: N. Africa, Italy eastwards to Balkan, Turkey, Syria & Iran.

Larger flowers (2 cm or more in diam.), alternate, flat, stipulate leaves easily distinguishes it from others species in the area.

Fl. March-April

2. **Fumana scoparia** Pomel, Mat. Fl. Atlant. 10. 1860; Coode in Davis, Fl. Turk, 1: 520. 1965 (Fig. 5, H-L).

F. ericoides auct. non (Cav.) Pau (1883): Keith, Prelim. Check List. Lib. Fl. 506. 1965; *F. ericoides* var. *scoparia* (Pomel) Maire; Quezel & Santa, l.c. 720.

Ascending low, undershrub, with branches up to 20 cm tall, viscid hairy at

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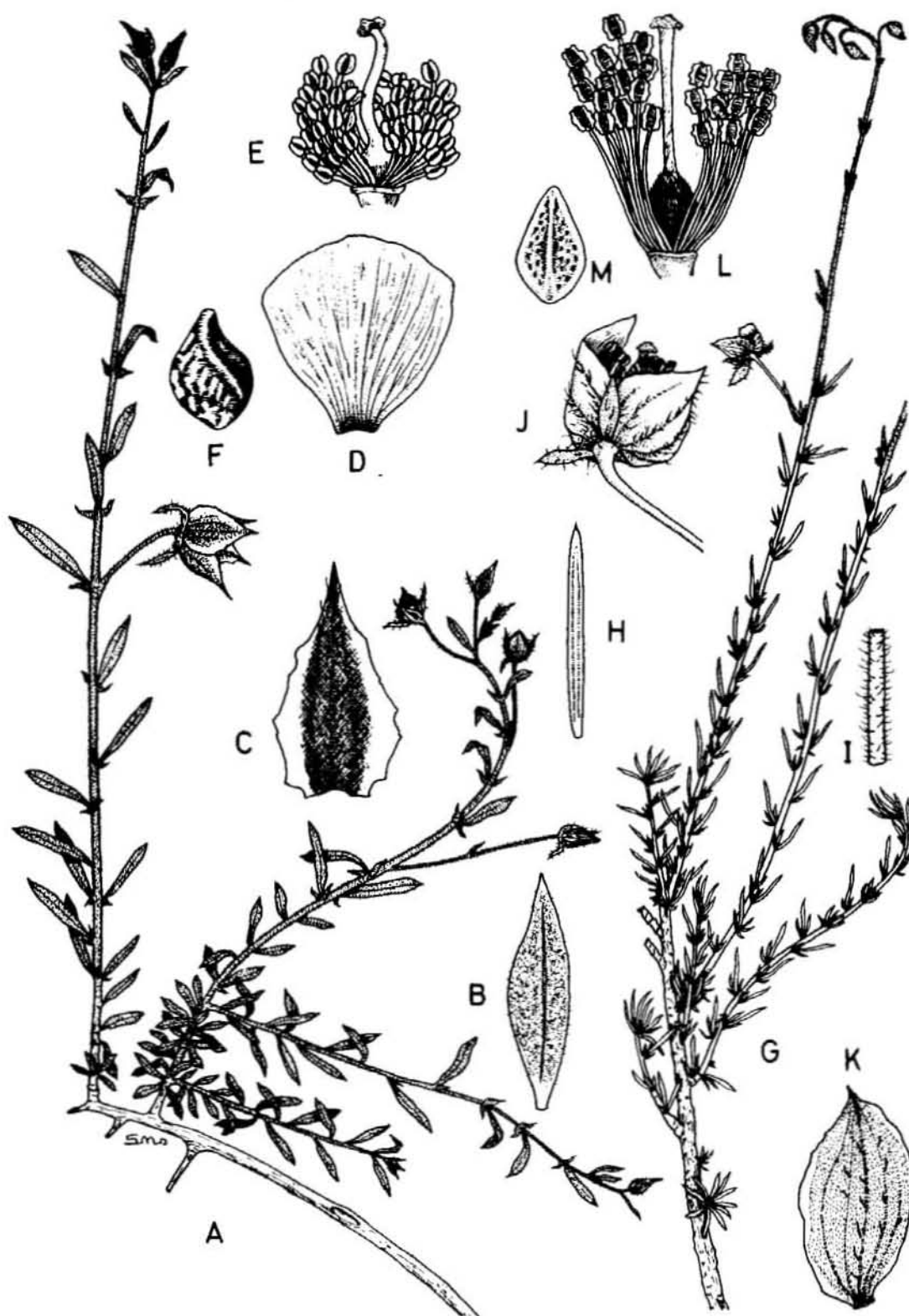


Fig. 4 **Fumana arabica**: A, flowering and fruiting branch x 1; B, leaf x 3; C, larger sepal x 5; D, petal x 7; E, fertile stamens and gynoecium x 7; F, seed x 5. **F. laevipes**: G, flowering branch x 1; H, leaf x 5; I, portion of branch with hairs x 5; J, flower (ventral view) showing smaller and larger sepals x 3; K, larger sepal x 5; L, fertile stamens and gynoecium x 7; M, seed x 5.

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least above. Leaves linear exstipulate, alternate, unequally spaced on stem, shorter and conferted below, laxer and longer above, abruptly reduced in size, forming bracts in the inflorescence. Inflorescence (1-) 2-3-flowered, mostly terminal, densely glandular-hairy with long hairs. Flowers usually nodding on pedicels exceeding the leaves. Capsules (6-) 8-12-seeded with seeds late shedding.

Type: Algeria, Djebel Amon, Sidi-bou-Zid, *Pomel* (P).

Reported from Kussabat (Trip.) by Keith (l.c.) as *F. ericoides* forma *montana*.

Distribution: N. Africa (from Morocco to Tripolitania - vide Davis, l.c.); scattered in S. Europe, W. Syria and Turkey; Mediterranean element.

Differs from *F. ericoides* (Cav.) Pau., S. W. European species, by its unequally spaced leaves, crowded below, and reduced in size in the inflorescence region.

3. ***Fumana thymifolia*** (L.) Spach ex Webb, Iter, Hisp. 69. 1838; Verlot, Pl. Vasc. Dauph. in Bull. Soc. Stat. Gren (3), 3: 43. 1872; Pamp., l.c. 332; Murbeck, Contr. Fl. Nord-Ouest Afr. 1: 25. 1897; Durand & Barratte, l.c. 31; Keith, l.c. 506 (Fig. 5, A-G).

Cistus thymifolius L., Sp. Pl. 528. 1753; *F. viscida* Spach, Hist. Veg. Phan. 6: 12. 1838; *F. viscida* var. *thymifolia* (L.) Spach in Ann. Sc. Nat. Bot. Ser. 2. 6: 359. 1836; *F. glutinosa* (L.) Boiss., Fl. Or. 1: 449. 1867; *C. glutinosus* L., Mantiss. 2: 246. 1767; *Helianthemum viride* Ten., Fl. Nap. 1: 299, t. 47. 1815; *H. thymifolium* (L.) Pers., Syn. 2: 79. 1806; *C. laevis* Cav., Ic. 2: 35, t. 145, f. 1. 1793; *F. laevis* (Cav.) Senner; Keith, l.c. 507.

Dwarf shrub, up to 20 cm tall, erect or ascending, usually glabrescent. Leaves 5-11 x 1 mm, opposite at least below, stipulate, linear to linear-oblong, linear-lanceolate or narrowly elliptic, obtuse or mucronate, often strongly revolute, glabrous to pubescent or glandular-pubescent, diminishing in size in the inflorescence. Flowers 3-8, long-pedicelled, bracteate; pedicels much longer than the subtending bract. Capsules (4-) 6-seeded, often retained within the capsule even much after dehiscence. $2n=32$

Type: Described from Narbonne.

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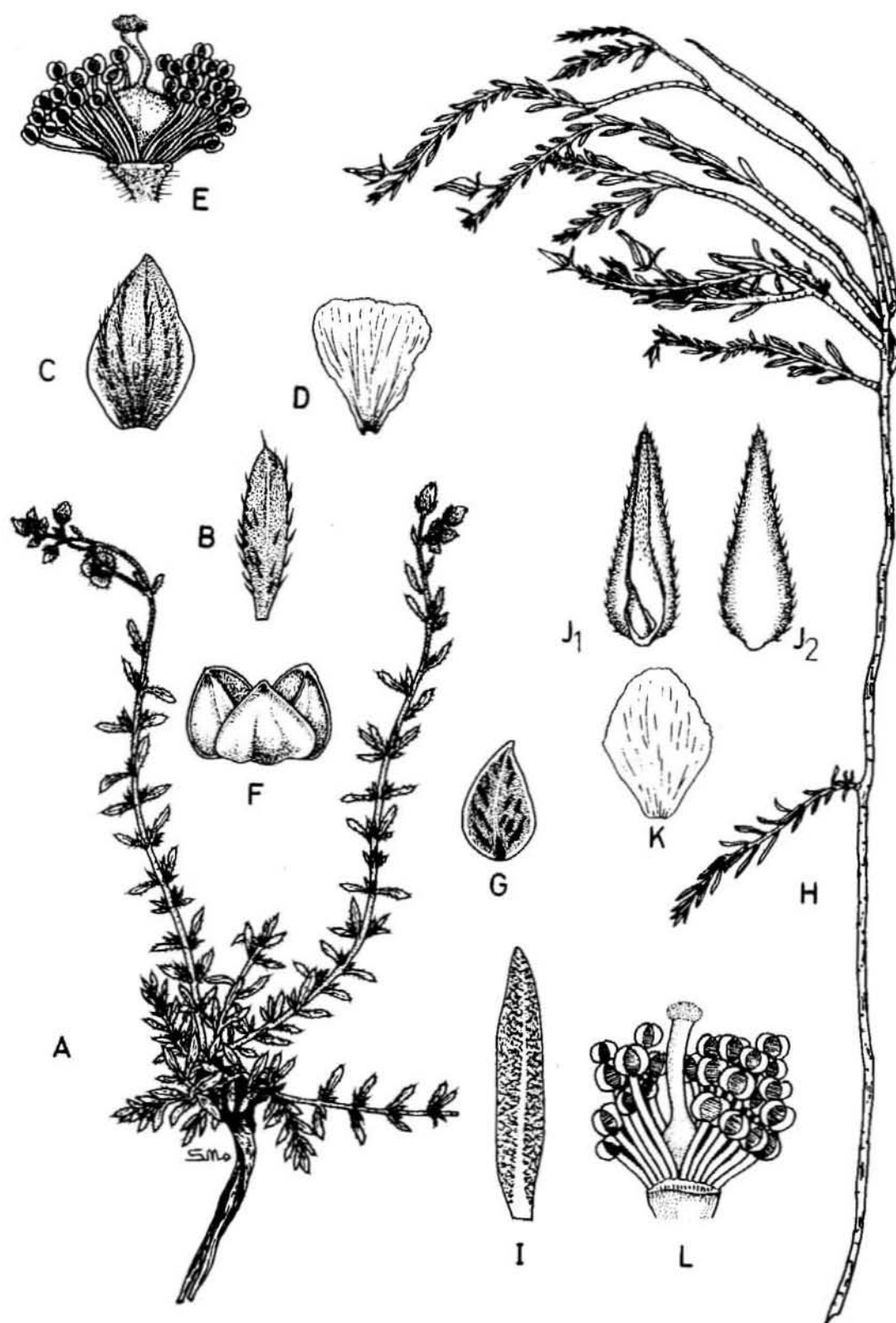


Fig. 5 **Fumana thymifolia:** A, habit x 1; B, leaf x 5; C, larger sepal x 5; D, petal x 5; E, fertile stamens and gynoecium x 5; F, dehiscent capsule x 5; G, seed x 8. **F. scoparia:** H, flowering branch x 0.5; I, leaf x 3; J1, larger sepal (inner view) x 3; the same (outer view) x 3; K, petal x 5; L, fertile stamens and gynoecium.

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A-2 Garian, outside Youth Centre, limestone hill, branches scandent, *S. I. Ali* 2116 (ULT) **A-3** Tripoli near the university, low sandy hills, 13.3.1970, *P. H. Davis* 49479 (ULT); **A-7** Gebel Akhdar, El Karsa, coastal road Derna-Ras El Hilal, 11.3.1968, *L. Boulos* 2143 (ULT).

Distribution: S. Europe, N. Africa to W. Syria & Turkey.

Two varieties are sometimes recognized; the type var. is said to have glandular pubescent youngest leaves, and the var. *viridis* (Ten) Boiss. $\pm$ glabrous and sometimes marginally ciliate youngest leaves.

4. ***Fumana laevipes*** (L.) Spach in Ann. Sc. Nat. ser. II. 6: 359. 1836; Durand & Barratte, l.c. 31; Pamp., l.c. 333; Keith, l.c. 507. (Fig. 4, G-M).

Cistus laevipes L., Cent. 1: 14. 1755; *Helianthemum laevipes* (L.) Pers., l.c.

Low shrub, much branched, laxly caespitose, up to 30 cm long with ascending, slender branches. Leaves alternate, linear-setaceous, subterete, stipulate, bright green or glaucous, glabrous or with scattered glandular hairs, (3-) 4-8 x 0.3-0.4 mm. Flowers 3-8, terminal; pedicels much longer than the bracts, straight, ascending. Capsules usually 6-seeded with widely patent valves. $2n=32$

Type: Probably not designated; (Herb. Linn. 689/27 (LINN) for *C. thymifolius* is actually *C. laevipes* L. - vide Coode in Davis, l.c. 521).

A-7 Gebel Akhdar, Wadi El-Hussaïen, along the coastal road, Rassel-Hilal, Shahat, 24.1.1967, *L. Boulos* 1420 (ULT); upper stream of wadi El-Kouf, 12.3.1968, *L. Boulos* 2211 (ULT); 7 km from Shahat, erect, 10 cm tall, flowers yellow, 28.2.1973, *A. El Tiafe* 47 (ULT).

Distribution: S. Europe (Portugal-Italy) & N. Africa (Morocco to Libya).

Very narrow, needle-like leaves easily distinguish this species.

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3. HELIANTHEMUM

Mill., Gard. Dict. Abr. ed. 4, 1754.

Dwarf shrubs or herbs, usually with opposite, decussate, stipulate, petiolate or subsessile leaves. Flowers in racemelike cymes, often curved towards one side, yellow, white or pink. Sepals 5, the 2 outer linear, much smaller than the ovate 3. Stamens all fertile. Stigmas borne on conspicuous, usually basally curved style, ovules orthotropous. Capsules ovoid, 3-valved, usually many seeded.

About 100 species, mostly in Europe, Mediterranean region, N. Africa, eastwards to C. Asia; 15 species are recorded from Libya.

- | | | |
|----|--|------------------------------|
| 1. | + Annual herbs | 2 |
| | — Perennial herbs or dwarf shrubs | 4 |
| 2. | + Leaves narrowly linear (10-35 x 1.5-3 mm);
sepals membranous ± inflated, pilose; pedicels
± deflexed | 12. H. aegyptiacum |
| | — Leaves lanceolate, oblong or obovate, more
than 3 mm broad; sepals herbaceous,
pubescent; pedicels ascending up-curved or
erect | 3 |
| 3. | + Pedicels shorter than sepals, erect, straight and
thickened | 10. H. ledifolium |
| | — Pedicels exceeding the sepals, ascending-
upcurved, not or hardly thickened | 11. H. salicifolium |
| 4. | + All leaves stipulate (stipules occasionally
caducous); style slender exceeding the stamens,
filiform, slightly sigmoid at base | 5 |
| | — Lower leaves exstipulate (the upper sometimes
stipulate); style shorter than stamens, strongly
sigmoid at base | 14. H. cinereum |
| 5. | + Inflorescence with (1-) 3-5 branches,
corymbose | 1. H. lavandulifolium |

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- Inflorescence simple (very rarely branched in *H. virgatum*) 6
- 6. + Flowers sessile or subsessile 7
 - Flowers pedicellate 8
- 7. + Sepals 3-4 mm long in fruit 8. **H. lippii**
 - Sepals 5-8 mm long in fruit 9. **H. stipulatum**
- 8. + Flowers many, in dense cymes; calyx 3-5 mm in fruit 9
 - Flowers in lax cymes; calyx more than 5 mm in fruit 10
- 9. + Calyx yellowish, ciliate; inflorescence symmetrical 2. **H. hirtum**
 - Calyx reddish, pilose; inflorescence usually 1-sided 3. **H. kahiricum**
- 10. + Petals yellow 11
 - Petals pink or white 12
- 11. + Stipules large, leaf-like; calyx usually ciliate (sometimes glabrous) 13. **H. crassifolium**
 - Stipules small, not leaf-like; calyx villous 4. **H. getulum**
- 12. + Flowers white; cymes few flowered, short 5. **H. pilosum**
 - Flowers pink or purple; cymes usually many flowered & elongated 13
- 13. + Calyx stellate-tomentose, not or hardly ciliate 6. **H. virgatum**
 - Calyx ciliate (on the ribs), glabrous to stellate tomentose between the ribs, (often inflated in fruit) 7. **H. ciliatum**
- 1. **Helianthemum lavandulifolium** Miller, Gard. Dict. ed. 8 no. 13. 1768; DC., Fl. France 4: 820. no. 13. 1768; Proctor & Heywood in Tutin et al, Fl. Europ. 2: 28. 7. 1968; Keith, l.c. 541.(Fig. 6, A-F).

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Fig. 6 **Helianthemum lavandulifolium**: A, flowering and fruiting branch x 1; B, larger sepal x 3; B1, a hair on sepal veins x 5; C, petal x 3; D, stamens and gynoecium x 5; E, dehiscent capsule x 6; F, seed x 10. **H. ledifolium**: G, habit x 1; H, larger sepal x 3; I, petal x 4; J, stamens and gynoecium x 5; K, dehiscent capsule x 6; L, seed x 25.

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H. racemosum Pers., Sy. 2: 79. 1819 (non (L.) Pau (1916).

Small shrub, 10-30 (-50) cm tall, densely grey-tomentose. Leaves 10-40 x 3-8 mm, linear-lanceolate, acute, with revolute margins, appressed-tomentose, stipules sometimes caducous. Flowers many in dense cymes divided from the base into 3-5 branches. Calyx c. 8(-10) mm long, tomentose, margin ciliate, Petals 6-11 mm long, yellow; pedicels deflexed, usually about as long as the calyx. Capsules shorter than calyx. $2n=20$

Type: Described from the Mediterranean region.

B-2 Jado, rocky mountains, corolla yellow, 6.6.1974, *B. Faris* 443 and 451 (ULT); 15 km before Jado, corolla yellow, 10.6.1974, *B. Faris* 634 (ULT).

Distribution: Europe, N. Africa.

H. syriacum (Jacq.) Dum.-Cours., seems hardly different from this species. It has larger primary leaves tapering conspicuously into a petiole. It may also be found within our area.

Fl. Feb.-April

2. **Helianthemum hirtum** (L.) Mill., Gard. Dict. ed. 8, no. 14. 1768; Quezel & Santa, Fl. Alg. 2: 710. 1963. (Fig. 7, A-G).

Cistus hirtus L., Sp. Pl. 528. 1753; *C. ruficomus* Viv., Fl. Lib. Spec. 27, t. 14, fig. 5. 1824; Durand & Barratte, l.c. 29 (in synonymy of *H. Kahiricum*); *H. ruficosum* (Viv.) Spreng., Spet. 2: 589. 1825; Gross. in Engler, Pflanzenr. 14. 1903; *H. hirtum* var. *deserti* Coss. & Dr. in Ann. Sc. Nat. Ser. IV. 1: 238. 1854; *H. desertorum* Willk., l.c. et deser. 2: 137, tab. 154. 1856; Durand & Barratte, l.c. 31; Keith, l.c. 540; *H. hirtum* ssp. *ruficosum* (Viv.) Maire in Jehand. Maire, Cat. Pl. Maroc. 900. 1934; Quezel & Santa, Nouv. Fl. Alger. 2: 710. 1963; *H. eremophilum* Pomel, Nouv. Mat. 350. 1875.

Small, caespitose shrub, up to 10-20 (-30) cm tall, much branched from the base, usually erect, rigid, with dense appressed hairs on the branch and leaves and long, ciliate hairs on the calyx, somewhat yellowish in the flowering parts. Leaves elliptic to oblong-elliptic, lower often suborbicular, (3-) 5-15 (-20) x 4-8 mm,

CISTACEAE



Fig. 7

Helianthemum hirtum: A, flowering and fruiting branch x 1; B, leaf x 4; C, larger sepal x 5; C1-C4, hair variations x 10; D, stamens and gynoecium x 5; E, petal x 3; F, dehiscent capsule x 5; G, seed x 8. **H. kahiricum:** H, flowering branch x 1; I, leaf x 5; J, larger sepal x 10; K, petal x 10; L, stamens and gynoecium x 10; M, dehiscent capsule x 10; N, seed x 15.

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subsessile to shortly petiolate (petiole up to 4 mm long), stipulate, subrevolute at the margins; stipules linear, about as long as the petiole. Flowers yellow or yellowish, in dense, 1-3, terminal, subcorymbose branches, c. 1 (-1.5) cm. in diameter, pedicellate; pedicels shorter or absent, as long as the calyx, spreading-ascending to recurved, not thickened. Calyx densely hispid, 3-4 (-5) mm long, outer sepals linear, about half as long as the inner, ovate-acute, sub-membranous, 3-veined sepals. Capsules small, hirsute, included within the calyx.

Type: "Habitat in Hispania, Narbona", Herb. Linn. 689/61 (LINN).

A-1 c. 11 km from Nalut, (Nalut-Gadames road), on limestone, flowers yellow, 18.4. 1975, *S. I. Ali* 2840 (ULT); **A-2** Garian, Bou Yader, 8.4.1974, *Milad, K.* 155 (ULT); Soffet, 57 km from Garian, 9.4.1974, *El Jaley* 120 (ULT); Soffet, flower clusters yellow, 9.4.1974, *G. Faris* 347 (ULT); El Kaleba, yellow flower, *Karima, R.* 87 (ULT); Abu Zian, 2 km before Kaleba, *El Jaley* 20 (ULT); 4 km. west Ain Zarga, 8.5.1970, *M. Khalifa* s.n. (ULT); Gebel Nafousa, Yefren-Giado, 700 m, sandy *Lygeum* sub-desert, flowers yellow, 15.3.1970, *P. H. Davis* 49556 (ULT); Gebel Nafousa, 23.3. 1971, *L. Boulos* 3548, 3493 & 4474 (ULT); El Rumiya, yellow flowers, 10.4.1975, *K. Sifaw* 278 and 294 (ULT); Mangel Bahr, 8.4.1974, sandy soil, yellow flowers, *A. Razig* 128 (ULT); Tagma, 5 km from Yefren, radio station, 9.4.1974, *El Jaley* 195 (ULT); 1 km from Yefren, 21.3.1974, *B. Faris* 252 (ULT); Mangh el Bahar, 2 km before Kaleba, cult. field, sandy soil, fls. yellow, common, 8.4.1974, *S. I. Ali* 1707 (ULT); Tagma, near Yefren «radio station», c. 6 km towards Gharian, limestone hill, common, flowers yellow, *S. I. Ali* 1880 (ULT); Garian, limestone hill, exposed place, fls. yellow, *S. I. Ali* 2107 (ULT); **A-3** Shirshara, sandy soil, 25.3.1976, *M. A. Terbello* 20 (ULT); *Muftah, M. Z.* 37 (ULT).

Distribution: S. W. Europe, Algeria, Mauritania, Libya.

A common species in the N.W. arid hills of Libya (Gebel Nafousa). Our plants are sometimes considered a variety or subspecies, *ruficosum*, but without enough justification.

3. ***Helianthemum kahiricum*** Delile, Fl. Egypt 237, tab. 31, fig. 2. 1813; Durand & Barratte, l.c. 29 (excl syn. *C. ruficomus* Viv.; Quezel & Santa, l.c. 713, pl. 69, fig. 2081; Corti, Fl. Fezzan 196. 1942; Keith, l.c. 540 (Fig. 7 H-N).

CISTACEAE

H. libycum Pomel, Nouv. Mat. Fl. Atl. 352. 1875; *C. stipulatus* var. *B.* Forsk., Fl. Aeg. - Arab. 101. 1775.

Small shrub, much branched from the base, erect to ascending, up to 30 cm tall, whitish tomentose and villous with appressedly stellate hairs and scattered longer hairs. Leaves, very variable, linear-oblong to oblong-obovate, up to 20 x 7 mm, subrevolute or revolute at the margins, shortly petiolate; stipules small, up to 3 x 1 (-1.5) mm, elliptic-ovate or elliptic, about as long as or shorter than the petiole. Flowers small, lemon yellow, 1 cm in diameter, in 5-15-flowered, terminal cymes; pedicels shorter to exceeding in length than the calyx. Calyx 3.5-5 mm long, elliptic or elliptic-lanceolate, usually reddish or violaceous, villous-tomentose.

Type: Described from Egypt(?); *Delile*, l.c. tab. 31

A-1 25 km from Nalut, towards Wazen, soil clay rocky, 7.6.1974, *B. Faris* 594 (ULT); Ejwabir, soil rocky, corolla yellow, 8.6.1974, *B. Faris* 534 (ULT); **A-2** Abou Gilan, 22.11.1969, *A. M. Abughnia* s. n. (ULT); Garian, 25.3.1968, *L. Boulos* s. n. (ULT); 4 km from Abou Alal, flowers yellow, 28.11.1976, *Zenab.*, 34, (ULT); 2 km before Abougilan, *Fathi, B. R.* 77 (ULT); Gharian, youth hostel compound, sandy soil, 12.4.1974, *S. I. Ali* 2199 (ULT); Cabaw, soil sandy, 7.6.1974, *B. Faris* 479 (ULT); 3 km from Yefran, 21.3.1974, *B. Faris* 241 (ULT); Wadi al Atel, very common, calyx violaceous, 29.3.1976, *S. M. H. Jafri* 6557 (ULT); Between Bir Shakshuk and Qasre Al Haj, roadside, very common, calyx violaceous, 29.3.1976, *S. M. H. Jafri* 6623 (ULT); Jado, rocky mountainous zone, yellow corolla, 6.6.1974, *B. Faris* 434; **C-4** c. 82 km from Bu Ngem (towards Hun), sandy roadside, *S. I. Ali* 2426 (ULT).

Distribution: N. Africa, Egypt, Palestine & Arabia Petrea.

Similar to the previous species in flower size etc., but softly hairy on reddish or violaceous calyx, pedicels deflexed.

Fl. March-April. Vern. Chapal, Chabbal, Zefzaf.

4. ***Helianthemum getulum*** Pomel, Nouv. Mat. Fl. Atl. 353. 1875; Quezel & Santa, l.c. 714, Pl. 69. fig. 2082. (Fig. 8)

H. metilense Coss. et Durieu ex Batt. & Trab., Illust. Fl. Atlant. 1: 112., t. 71. 1890.

CISTACEAE

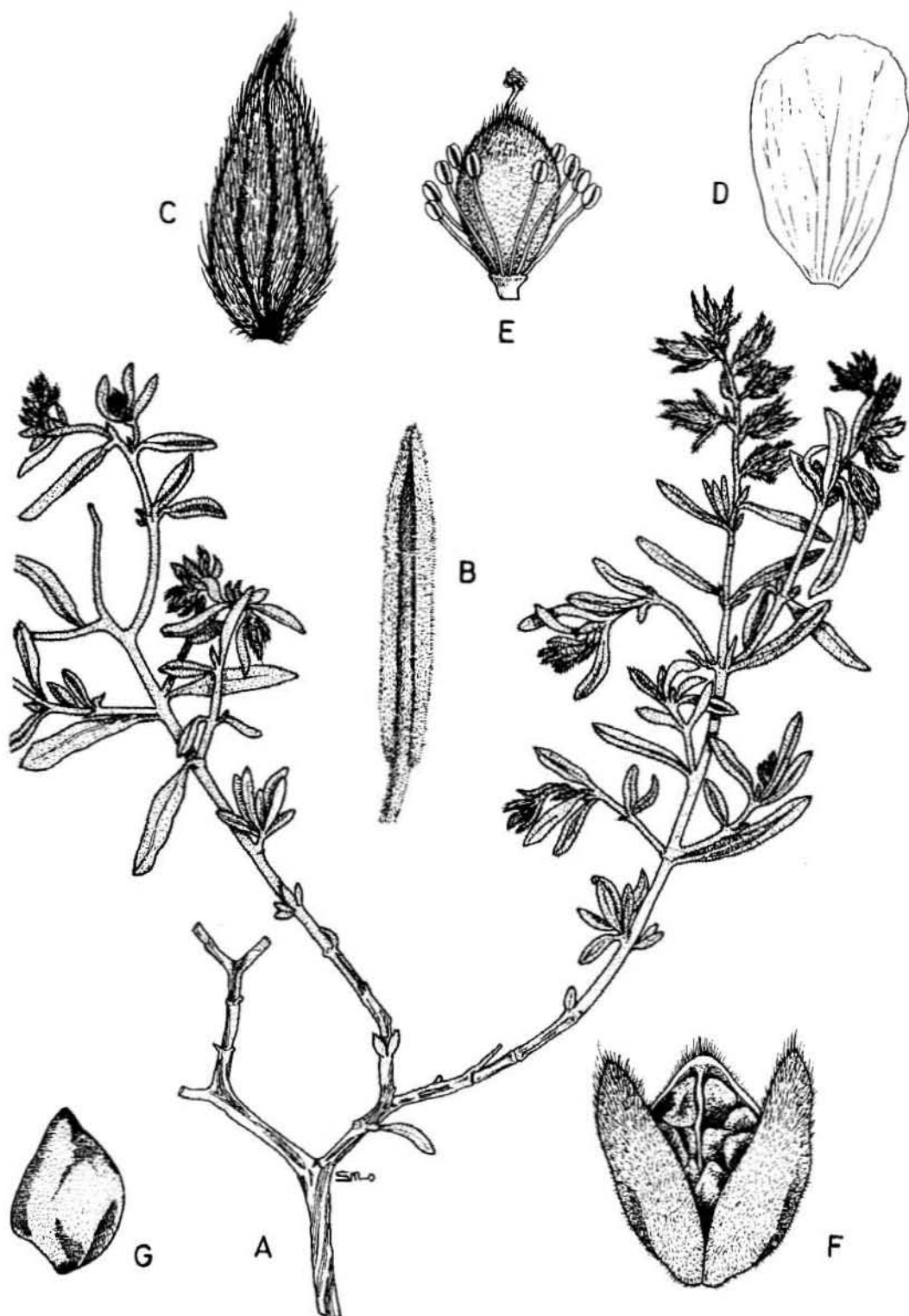


Fig. 8

Helianthemum getulum: A, habit x 1; B, leaf x 3; C, larger sepal x 5; D, petal x 8; E, stamen and gynoecium x 5; F, dehiscent capsule with seeds x 8; G, seed x 15.

CISTACEAE

Similar to the previous species but yellow flowers about twice as large, pedicels shorter, spreading or subdeflexed and calyx not reddish or violaceous.

Type: Described from Algeria.

B-2 Jado, Turmisa, rocky mountains, yellow corolla, 6.6.1974, *B. Faris* 435 (ULT).

Distribution: Algeria & N. W. Libya.

Recorded for the first time from Libya.

5. ***Helianthemum pilosum*** (L.) Pers., Syn. Pl. 2: 79. 1806; Proctor & Heywood in Tutin et al, l. c. 288; Keith, l.c. 543.

Cistus pilosus L., Sp. Pl. 528. 1753.

Shrubs, lax or caespitose, much branched, up to 30 cm long with usually white-tomentose branches with appressed hairs. Leaves 10-20 x 1-4 mm, the upper longer than the lower, linear to linear-oblong, greenish-pubescent above, greyish tomentose beneath or $\pm$ tomentose on both surfaces; margins strongly to slightly revolute. Cymes 4-10 (-15)-flowered. Calyx 5-6 mm long, glabrous or stellate-tomentose on the ribs. Petals white with a yellow claw. Capsules shorter than the persistent calyx.

Type: "Habitat in Monspelli"; Herb. Linn. 689/55 (LINN).

Reported from Garian by Keith (l.c.) as var. *perganum*.

Distribution: W. Mediterranean element: Europe, N.Africa.

This is probably also reported by Durand & Barratte (l.c. 30) as *H. virgatum* var. *racemosum* (white flowered). Pampanini (Prodr. Fl. Cir. 331. 1931) refers it also as a variety under *H. virgatum* but considers it to be mixed.

6. ***Helianthemum virgatum*** (Desf.) Pers., Syn. Pl. 2: 79. 1806; Durand &

CISTACEAE

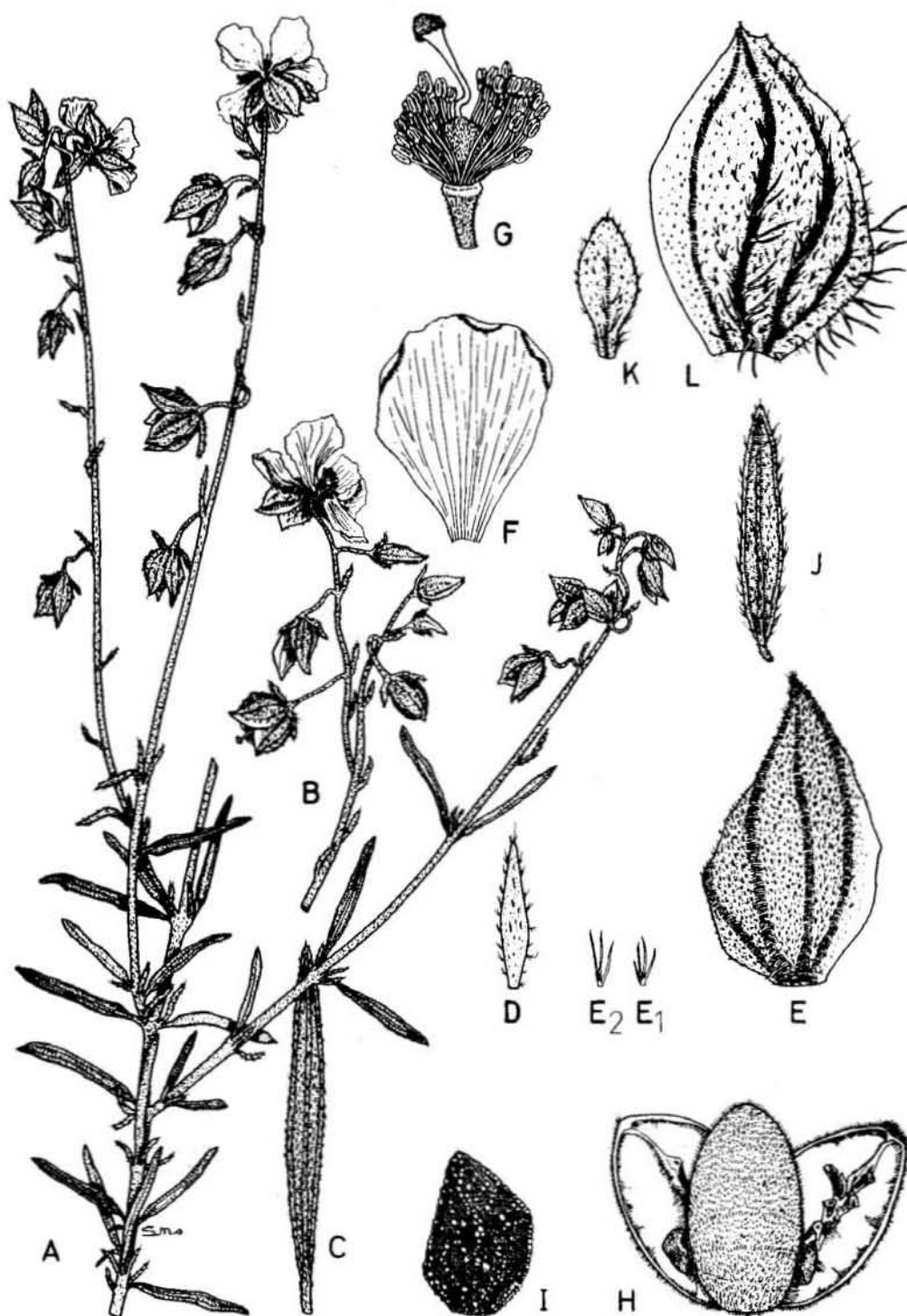


Fig. 9

Helianthemum virgatum: A, flowering branch x 1; B, a branched inflorescence x 1; C, leaf x 2; D, smaller sepal x 5; E, larger sepal without ciliate hairs. x 5; E1, E2, hairs on sepal x 25; F, petal x 3; G, stamens and gynoecium x 5; H, a dehiscent capsule x 5; I, seed x 15. **H. ciliatum:** J, leaf x 2; K, smaller sepal x 5; L, larger sepal with ciliate hairs on veins x 5.

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Barratte, l.c. 30 (p.p.); Pampanini, l.c. 329 (p.p.); Negre, Fl. Maroc. 2: 78, fig. 485. 1962; Keith, l.c. 544; Quezel & Santa, Nouv. Fl. Alg. 2: 707, Tab. 68, fig. 2066. 1963.

Cistus virgatus Desf., Fl. Atlant. 1: 422. 1798; *H. racemosum* (L.) Pau in Treb. Inst. Cat. Hist. Nat. Barcelona. 1916 - *nom. illegit.* (non Pers (1819)).

Small shrubs, up to 30 cm long. Leaves 10-30 x 2-8 mm, linear to linear-lanceolate, lower smaller, often caducous, stellate-tomentose with revolute margins. Cymes lax, (3-) 5-10-flowered. Calyx 7-9 (-10) mm long, ovoid, stellate-tomentose, at least between the ribs, canescent hardly ciliate on the ribs. Petals c. 10 mm long, pink, or pink-violet when dried, (rarely white). Capsules shorter than the calyx.

Type: Described from the Western Mediterranean region.

A-1 Wadi Malah, c. 3 km from Nalut, flat limestone rocks, 18.4.1975, S. I. Ali 2859 (ULT); A-2 Abugilan, rocky soil, 29.4.1976, M. A. Tarbello 80 (ULT); Gebel Nafousa, 23.3.1971, L. Boulos 3514 (ULT); El Rymia, shrublet, prostrate, flowers pink, 9.11.1974, A. M. A. Razig 249 (ULT); Rumia, limestone hill, 15 km from Yefren, 9.4.1974, flowers pink, S. I. Ali 1837 (ULT); Near Kabau, roadside valley, fls. pink. 5.5.1972, Ali & Khalifa *327 (ULT).

Distribution: Morocco, Algeria, Tunisia, Libya and probably in Spain.

A species of dry arid, calcareous or limestone habitats of N. W. Africa, which seems rare in our area.

H. racemosum (L.) Pau (*nom. illeg.* - non Pers.) do not seem different from it. However, Durand & Barratte (l.c.) treated it as a variety of this, but because of the white flowers and hairless condition of calyx mentioned by them, their variety seem more like the *H. pilosum*. However, the type specimen of *C. racemosus* L. looks very much like *H. virgatum*; the inflorescence seems very rarely branched in our gatherings cited above, (see Ali & Khalifa 327* cited above) but leafy branches ending in flowers from one stem is a fairly common condition.

Fl. March-April. Vern. Erga, Regiga, Ergiga.

CISTACEAE

7. ***Helianthemum ciliatum*** (Desf.) Pers., Syn. Pl. 2: 79. 1806; Tackholm, St. Fl. Egypt, ed. 2: 364. 1974 (Fig. 9, J-L)

Cistus ciliatus Desf., Fl. Atlant. 1: 421. tab. 109. 1798; Viv., Fl. Lib. Spec. 27. 1824; *H. asperum* Lag. ex Dunal in DC., Prodr. 1: 283. 1824; *H. vesicarium* Boiss., Diagn. Ser. 1.8:30. 1849; Tackholm, l.c. 364; Keith, l.c. 544; *H. vesicarium* var. *ciliatum* (Desf.) Zoh., Fl. Palest. 2:340. 1972; *H. virgatum* var. *vesicarium* (Boiss.) Durand & Barratte, l.c. 30; Keith, l.c. 545; *H. virgatum* var. *ciliatum* (Desf.) Coss. ex Durand & Barratte, l.c. 30; Keith, l.c. 545. *H. garianicum* Borzi & Mattei in Boll. Ort. Bot. Palermo 11: 239. 1912 (*syn. nov.*)

Very similar to the previous species but calyx often densely ciliate on the veins with bulbous based hairs usually and stellate tomentose to glabrous (very variable) between the veins, often inflated, loose in fruit, flowers usually pink-violet (sometimes turning violet on drying).

Type: Described from the W. Mediterranean region (probably Spain).

A-2 Bugilan, rose flower, 29.4.1976, Amina, A.Z. 55 (ULT); Fathi, B.R. 93 (ULT); 2 km before Garian village, flowers pink turning violet after drying, 28.11.1975, S. M. H. Jafri 6239 (ULT); A-3 Leptis magna, G. H. Faris 602 (ULT); Lebda, 24.3.1975, Fauzia 200 (ULT); Shirshara, sandy soil, fls. pink, 25.3.1976, Muftah, M.Z. 48 (ULT); Tarbello, M.A. 26 (ULT); Gebel Nafousa, 23.3.1971, L. Boulos 4509 & 4559 (ULT); Ain Rumya, Fauzia 331 (ULT); El Asabah, G. Faris 320 (ULT); El Kaleba, violet flowers, Karima, R. 92 (ULT); Tagrema, 5 km north Jafren, rocky soil, red flowers, M. Godeh 111 (ULT); Gebel Nafousa, near Yefren, 700 m, rocky calcareous slopes, (with *Artemisia herba-alba*), flowers pink, 15.3.1970, P. H. Davis 49532 (ULT); 1 km from Yefren, prostrate, 21.3.1974, B. Faris 253 (ULT); 16 km before Rumia, between Josh & Rumia, cult. field, sandy soil, fls. violet-pink, S. I. Ali 2270 (ULT); A-7 Baida to Shahat, 700 m, grassy banks, flowers pink, 28.3.1970, P. H. Davis 50191 (ULT); El Ghagab, S. E. Cirene, 28.4.1934, R. Pampanini & P. Sarmoli 5277 (ULT), Al Tamimi; S.E.Derna, 13.3.1968, L. Boulos 2248, 2288, 2297, 2316 and 2303 (ULT).

Distribution: Spain, N. Africa, Egypt, Palestine, Arabia Petrea.

A more common species in Libya, from Gebel Nafousa eastwards to Gebel

CISTACEAE

Akhdar. Degree of indumentum seem extremely variable and experimental works are needed to prove its absolute identity from the previous species. *H. vesicarium* Boiss., which is sometimes treated as variety of *H. virgatum*, is actually related to *H. ciliatum* in having larger calyx and more dense inflorescence but calyx usually pubescent with or without ciliate nerves. However, it resembles *H. virgatum* in having calyx minutely pubescent all over, with varying degree of ciliate hairs. *H. garianicum* Borzi & Mattei with violet dried flowers and flat leaves is not different from this species.

Fl. March-April. *Vern.* Erghet ghazel

8. ***Helianthemum lippii*** (L.) Dum. Cours., Le Bot. Cult. 3: 130. 1802; Pers., Syn. Pl. 2: 78. 1806; Durand & Barratte, l.c. 30; Pamp., l.c. 320; Keith, l.c. 541; Quezel & Santa, l.c. 714, Pl. 69, fig. 2086.(Fig. 10, K-L).

Cistus lippii L., Mantissa 2: 245. 1767; Keith, l.c. 544.

A very variable small shrub, up to 60 cm tall, lax to intricately much branched, rigid when old and often subdichotomously branched and ending spinosely, stellately pubescent, whitish to dark greenish. Leaves varying according to season, lanceolate, elliptic to small linear, 5-15 (-20) x (1-) 2-6 (-8) mm, sparsely to densely stellate-tomentose, subsessile to shortly petiolate, stipulate. Stipules as long as or exceeding the petiole, linear to elliptic. Flowers dense or lax on 3-15-flowered terminal spikes, sessile or subsessile, small, yellow, with petals hardly or not exceeding the calyx. Calyx 3-4 mm in fruit, appressed-tomentose and villous, greenish to whitish; inner sepals broadly ovate-elliptic, subacute to acute mucronulate, 4-5-veined. Capsules villous, as long as or exceeding the calyx.

A variable species and widely distributed from S. Europe (S. Italy & Sicily), throughout N. Africa, Egypt, W. Asia, eastwards to Pakistan; often split into 2 varieties, with integrading forms. The type variety, *lippii*, seems to be more widespread in W. Asia to Pakistan, the other, *sessiliflorum* is confined to S. Europe, while both of them are found in N. Africa.

- + Cymes usually more than 7-flowered, with flowers placed closely; branches usually intricate, spinescent when old. (a). var. ***lippii***
- Cymes laxly, 3-7-flowered with flowers distantly placed; branches usually not so (b). var. ***sessiliflorum***

CISTACEAE

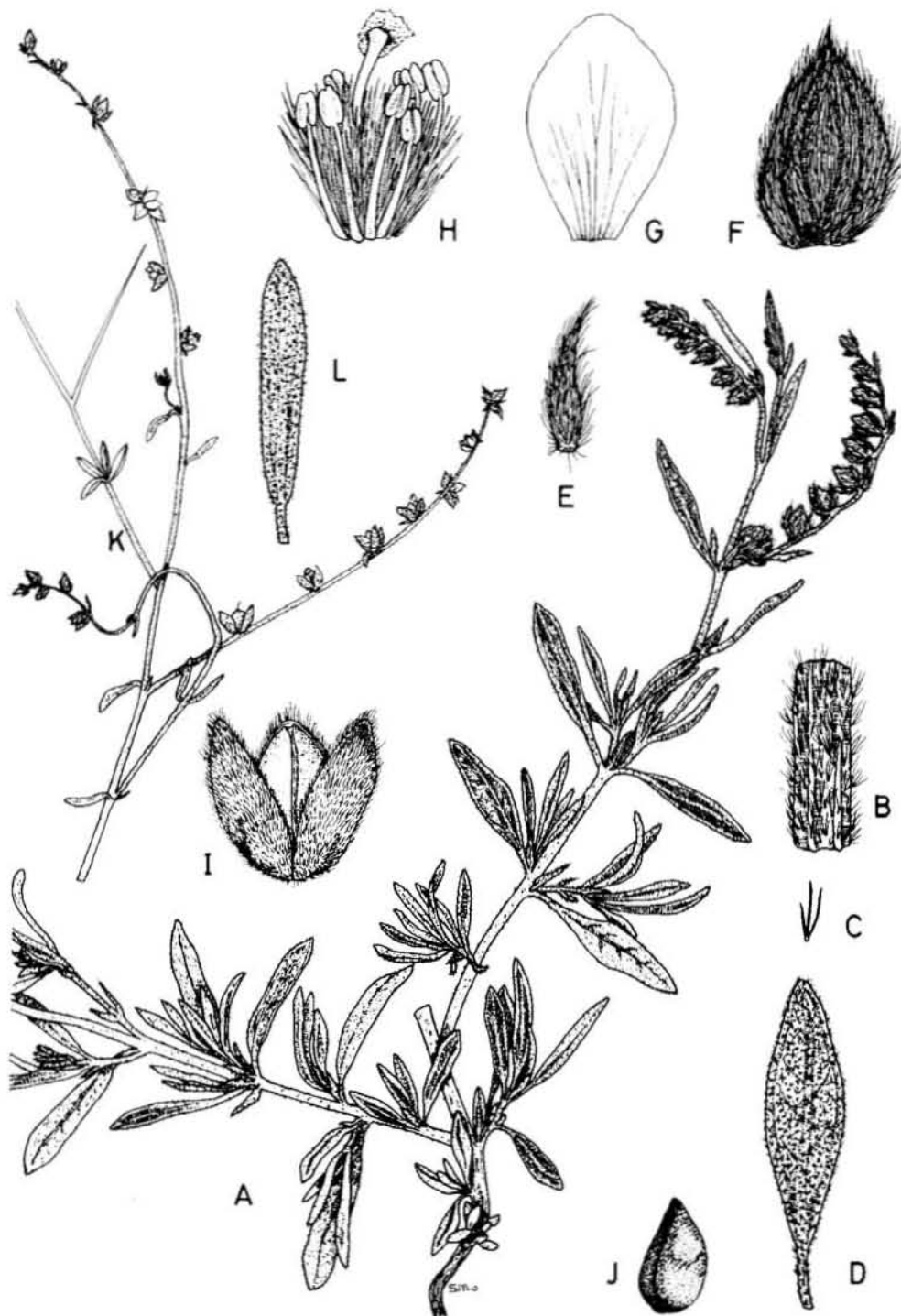


Fig. 10 **Helianthemum stipulatum**: A, habit x 1; B, portion of stem x 5; C, hair x 10; D, leaf x 3; E, smaller sepal x 6; F, larger sepal x 6; G, petal x 10; H, stamen and gynoecium x 10; I, a dehiscent capsule x 6; J, seed x 15. **H. lippii**: K, fruiting branch x 1; L, leaf x 5.

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(a) var. **lippii** (Fig. 10, K-L)

Intricately branched with branches usually becoming spinescent and white glossy after flowering.

Type: Described from Egypt.

A-1 22 km from Nalut, *S. I. Ali* 2189 (ULT); c. 65 km from Derj towards Nalut, sandy roadside with small stones, branches probument, *S. I. Ali* 2157 (ULT); Wadi Al Aital, 10.4.1975, *K. Sifaw* 248 (ULT); *A. Gommudi* 361 (ULT); **A-2** Gharian, 15 km from El Kaleba, 10.4.1974, *Milad, K.* 320 (UL); Gharian, 31.3.1968, *L. Boulos* s. n. (ULT); Gebel Nafousa, *L. Boulos* 3514 (ULT); near Ragag Tejween, 11.5.1970, *M. Khalifa* s.n. (ULT); c. 37 km from Kaleba towards Misda, flowers yellow, *S. I. Ali* 1961 (ULT); **A-3** Misrata, *Fauzia* 148 148 (ULT); **B-1** c. 9 km after Sinwan, c. 109 km from Nalut towards Gadames, sandy roadside, with small stone, *S. I. Ali* 2170 (ULT); 10 km before Sinwan, c. 96 km from Derj (Nalut-Gadames road), *S. I. Ali* 2163 (ULT); **B-4** 25 km W. Syrte, 8.3.1968, *L. Boulos* 1933 (ULT); **C-4** c. 254 km from Sebha, towards Hun, loamy dry flat, 31.3.1973, *S. I. Ali* 1434 (ULT); c. 80 km from Hun, limestone, dry place, 3.4.1973, *S. I. Ali* 1569 (ULT).

Distribution: N. Africa, Arabia, W. Asia eastwards to Pakistan.

b) var. **sessiliflorum** (Desf.) Murb., Contr. Fl. N.W. Afr. (Tunisie) 1: 17. 1897; Quezel & Santa, l.c. 714; Keith, l.c. 542; Corti, Fl. Fezza. 197. 1942.

C. sessiliflorus Desf., Fl. Atl. 1: 417, tab. 106. 1798; *H. sessiliflorum* (Desf.) Pers., Syn. Pl. 2: 78. 1806; Pamp., l.c. 329; Keith, l.c. 544; Zohary, Fl. Palest. 1: 342., pl. 505. 1972.

Erect or ascending, sparingly branched; branches becoming yellowish-grey after flowering, not spinescent.

A-2 Kaleba, Garian, 30 km, 10.4.1974, *S. El Jaley* 268 (ULT); Abu Gilan clay soil, *A. M. Garud* 55 (ULT); 4 km from Abou Alan, 28.11.1975, *Zenab, A.* 38 (ULT); **A-3** 27 km before Mizda, 10.4.1974, *G. H. Faris* 388 (ULT); 10-20 km E. Tripoli, along the coastal road, 22.11.1966, *L. Boulos* 1014 (ULT); Barley field, facing Faculty of Science, in sandy soil, 18.4.1967, *L. Boulos* s.n. (ULT); **B-2** Gebel, Nafousa, 23.3.1971, *L. Boulos* 3561 (ULT); 4 km W. Ain Zarga, 8.5.1970, *M. Khalifa* s.n.

CISTACEAE

(ULT); Gebel Nafousa, Cabaw, soil sandy, corolla yellow, 7.6.1974, *B. Faris* 497 (ULT).

Distribution: S. Europe & N. Africa.

Integrating forms, in the placement of flowers on the cymes, are not lacking between the 2 varieties.

Fl. Feb.-April *Vern.* Lerga, regig.

H. confertum Dunal (= *H. brachypodium* Chevall.; *H. confertum* var. *brachypodium* (Chev.) Maire) has been reported from N. of Sinauan by Keith (l.c. 358). This is a very closely related species with the variety *sessiliflorum* of the previous species, but more taller (upt to 1.5 m) with shortly pedicelled flowers having somewhat larger, entire-apexed, broader sepals. The two may be easily confused with each other. I have not seen any authentic material of this species from our area. It is also very similar to the following species but flowers smaller.

9. **Helianthemum stipulatum** (Forsk.) C. Chr. in Dansk. Bot. Ark. 4(3): 20. 1922; Davis, *Fl. Turk.* 1: 511. 1965; Proctor & Heywood in Tutin et al, *Fl. Europ.* 2: 289. 1968 (Fig. 10,A-J).

Cistus stipulatus var. *a.* Forsk., *Fl. Aeg.-Arab.* 101. 1775; *C. ellipticus* Desf., *Fl. Atl.* 1: 418. t. 107. 1800; *H. ellipticum* (Desf.) Pers. *Synops.* 2: 78. 1807; Pamp. *Prodr. Fl. Cir.* 328. 1831; Keith, l.c. 540; *H. ehrenbergii* Willk., *lc. & desert.* 2: 99, tab. 128. 1856; *H. rosmarinifolium* Presl var. *ehrenbergii* (Willk.) Murb., l.c. 17; Durand & Barratte, l.c. 29; *H. lippii* var. *ellipticum* (Desf.) Boiss., *Fl. Or.* 1: 443. 1867; var. *ehrenbergii* (Willk.) Boiss., l.c.; var. *rosmarinifolium* (Presl) Beg. et Vacc. in *Ann. di Bot.* 12: 102. 1913.

Very similar to the previous species, *H. lippii* (L.) Pers., but flowers about twice as large.

Type: Described from Egypt, "Alexandriae circa salinus in collibus siccimis".
Forskal

CISTACEAE

A-3 c. 12 km W. Tripoli, near the sea shore, 24.3.1967, *Boulos, Tawil & Bouni* 1592 (ULT).

Distribution: N. Africa, Greece, Anatolia, Egypt, Arabia to Iraq.

A species of maritime sands and seems rare or under-collected in our area.

Fl. March-April Vern.: Regag, argoh, lergah.

H. sancti-antonii Schweinf. ex Boiss. with distinctly pedicelled remote flowers (but as large as this species) may also be found in our area.

10. *Helianthemum ledifolium* (L.) Mill., Gard. Dict. ed. 8, no. 20. 1768; Durand & Barratte, l.c. 29; Pamp., l.c. 326; Negre, Fl. Maroc. 2: 75, fig. 482. 1962; Keith, l.c. 541, (Fig. 6, G-L).

Cistus ledifolius L., Sp. Pl. 527. 1753; *C. niloticus* L., Mantissa 246. 1757; *C. langinosus* Viv., Fl. Lib. Spec. 28, tab. 14, fig. 3. 1824; *H. niloticum* auct. non Moench. (1794): (L.) Pers., Syn. 2: 78. 1806; Keith, l.c. 543; *H. lanuginosum* (Viv.) Spreng., Syst. 2: 589. 1825; *H. lasiocarpum* Desf. ex Jacq. & Her., Man. Gen. Pl. 1: 120. 1847; Willk., l.c. 88, t. 22.

Annual herb, up to 60 cm tall, erect or ascending, variable in habit, hairiness and size of parts, usually villous or tomentose. Leaves elliptic-oblong to lanceolate or obovate, 10-50 x 3-12 mm, usually greenish above, greyish beneath, sometimes only greyish; stipules c. half as long as the leaf, linear to lanceolate. Cymes 3-12-flowered, scorpioid; flowers yellow, variable in size; pedicels erect in fruit, as long as or shorter than calyx. Calyx 6-10 mm long, with acuminate or accrescent sepals. Petals shorter than sepals, cuneate. Capsules varying in size according to the size of flowers, 4-5 (-7) mm or 9-12 mm long, broadly ellipsoid; seeds smooth or papillose.

A variable species in size of flowers and fruits and often 2 varieties are recognized on these characters.

10(a) var. *ledifolium* (Fig. 6, G-L)

Flowers and fruits 9-10 (-12) mm long; pedicels 6-7 (-11) mm.

Type: Described from Montpellier, Herb. Linn. 689/47 (LINN).

CISTACEAE

A-2 Ain El Rumiah, 9.4.1974, *G. H. Faris* 361 (ULT); Gebel Nafousa, *L. Boulos* 3954 (ULT); A-7 19-25 km S. E. Derna, 13.3.1968, *L. Boulos* 2314 (ULT).

Distribution: Dry places S. Europe, N. Africa, eastwards to Iraq.

Fl. Feb.-March

10(b) var. **microcarpum** Coss. ex Willk., Ic. et descr. 2: 87, tab. 121. 1856; Durand & Barratte, l.c. 29; Keith, l.c. 541.

Flowers and fruits about half the size of the type variety; pedicels 2-5 mm; capsules 6-7 x 3-5.

Type: Many syntypes from throughout the range of the type variety.

A-2 Abougilan, 2 km before Kaleba, 8.4.1974, *S. El Jaley* 34 (ULT); Gebel Nafousa, 23.3.1971, *L. Boulos* 4513 (ULT).

Distribution: Same as above.

11. **Helianthemum salicifolium** (L.) Miller, Gard. Dict. ed. 8, no. 21. 1768; Pers., Syn. 2: 78. 1806; Durand & Barratte, l.c. 29; Pamp., l.c. 327; Negre, Fl. Marco. 2: 75, fig. 483. 1962; Keith, l.c. 29 (Fig. 11, A-G).

Cistus salicifolius L., Sp. Pl. 527. 1753; *C. micranthus* Viv., Fl. Lib. Spec. 28, tab. 14, fig. 4. 1824; *H. denticulatum* Thib. ex Pers., Syn. 2: 78. 1806; *H. salicifolium* var. *intermedium* Thib. ex Pers., l.c.; *H. intermedium* (Thib. ex Pers.) Dunal in DC., Prod. 1: 272. 1824.

Annual, up to 30 cm long, erect to ascending or procumbent, often much branched from below, subtomentose-villous. Leaves obovate-oblong, lanceolate to elliptic-oblong, 5*30 X 3-10 (-14) mm, scarcely revolute at the margins; stipules linear to ovate-lanceolate, exceeding the narrowed basal part of leaf. Flowers small, in simple or branched, 5-20-flowered inflorescence, apparently solitary axillary; pedicels long, spreading upcurved in fruit, 1-2 times as long as the calyx; bracts simple, leaf-like but smaller, extipulate. Calyx 6-12 mm long in fruit, open, subtomentose. Petals shorter or scarcely exceeding the sepals, sometimes absent. Capsules glabrous, 3.5-6 mm long, ovoid-globular. 2n=20

CISTACEAE

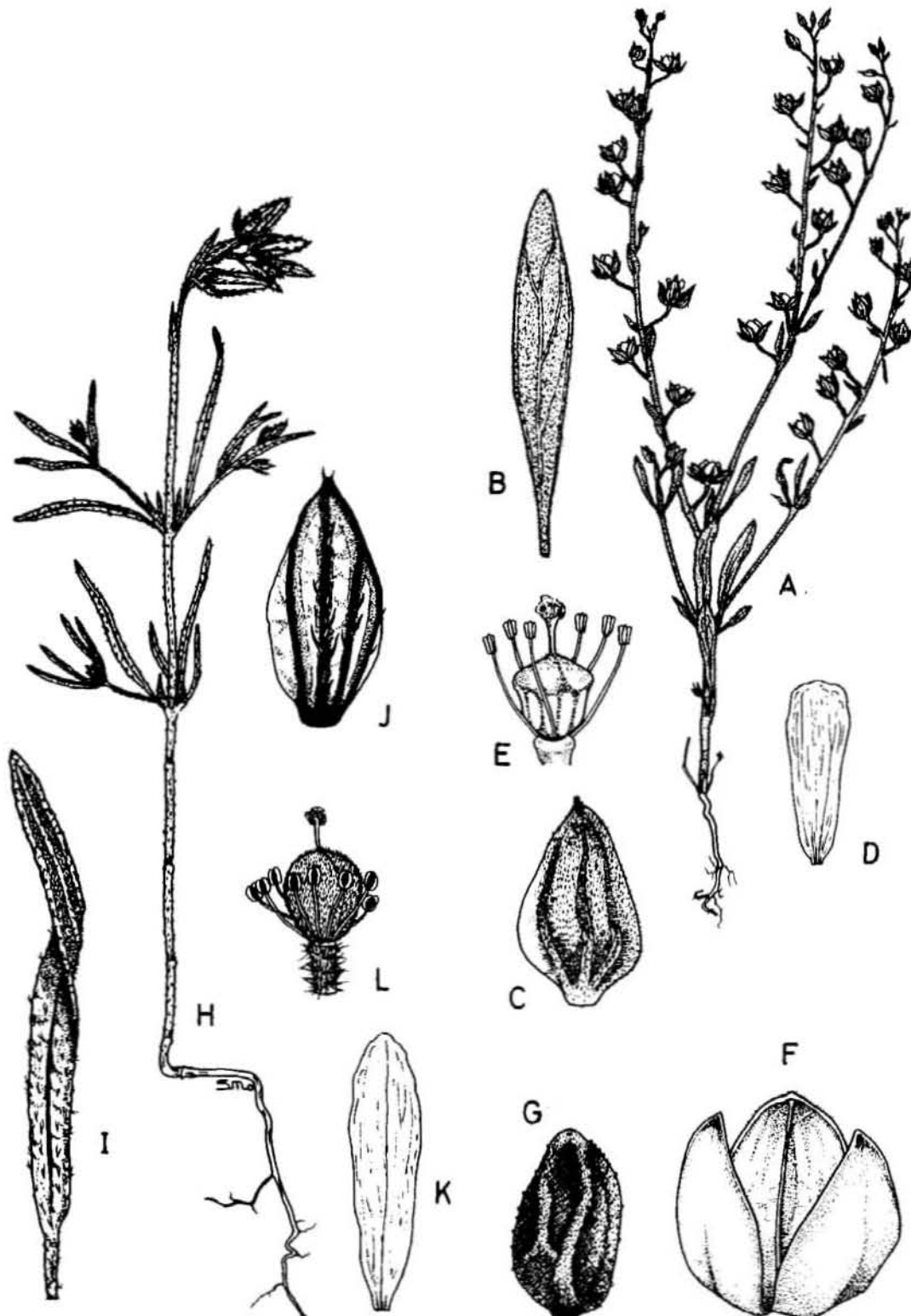


Fig. 11

Helianthemum salicifolium: A, habit x 0.5; B, leaf x 2; C, larger sepal x 5; D, petal x 6; E, stamen and gynoecium x 6; F, dehiscent capsule x 6; G, seed x 25. **H. aegyptiacum:** H, habit x 1; I, leaf x 3; J, larger sepal x 3; K, petal x 6; L, stamen and gynoecium x 3.

CISTACEAE

Type: Described from Portugal and Spain, Herb. Linn. 689/48 (LINN).

A-7 Slonta to Marawa, S. road from Derna to El Merj 750 m, *Cuprassus & Pistacia* macchie/forest, annual, 1.4.1970, P. H. Davis 50553 (ULT); without locality, L. Boulos 3954 B (with *H. ledifolium*) (ULT); Ruins of Cyrene, annual, 26.3.1970, P. H. Davis 50087 (ULT).

Distribution: Europe, N. Africa, Arabia, S. W. Asia, Turkey eastwards to Iran.

Fl. Feb.-March

12. ***Helianthemum aegyptiacum*** (L.) Miller, Gard. Dict. ed. 8, no. 23. 1768; Durand & Barratte, l.c. 29; Pamp., l.c. 328; Negre, Fl. Maroc. 2: 76, fig. 484. 1962; Keith, l.c. 538 (Fig. 11, H-L).

Cistus aegyptiacus L., Sp. Pl. 427. 1753.

Small, erect, annual herb, up to 20 (-30) cm tall, simple or scarcely branched, sparsely villous. Leaves 10-25 (-35) x 1.5-3 mm, linear-oblong, or lanceolate, usually with revolute margins; stipules linear, 1/4-1/3 as long as the leaves, much exceeding the petiole-like narrowed portion of leaf. Cymes lax, 3-5 (-9)-flowered. Flowers seemingly solitary, axillary, yellow; pedicels deflexed in fruit, slender, scarcely longer than calyx; bracts lanceolate-linear, usually exceeding the pedicels. Calyx 6-10 mm long, with prominent, dark-red nerves, sparsely setose, exceeding the yellow petals. Capsules c. 10 mm long, ovoid-trigonous appressed-tomentose, enclosed within the calyx.

Type: Described from Egypt; Herb. Linn. 689/50 (LINN).

A-7 Slanta, fl. buds red, 2.3.1973, S. I. Ali & S. A. Faruqi 1214 (ULT).

Distribution: Sandy places, throughout the Mediterranean region of Europe, N. Africa, Anatolia, Syria, Iraq & Iran.

Fl. March-April.

13. ***Helianthemum crassifolium*** Pers., Syn. 2: 77. 1806 (non. *Cistus crassifolius*

CISTACEAE

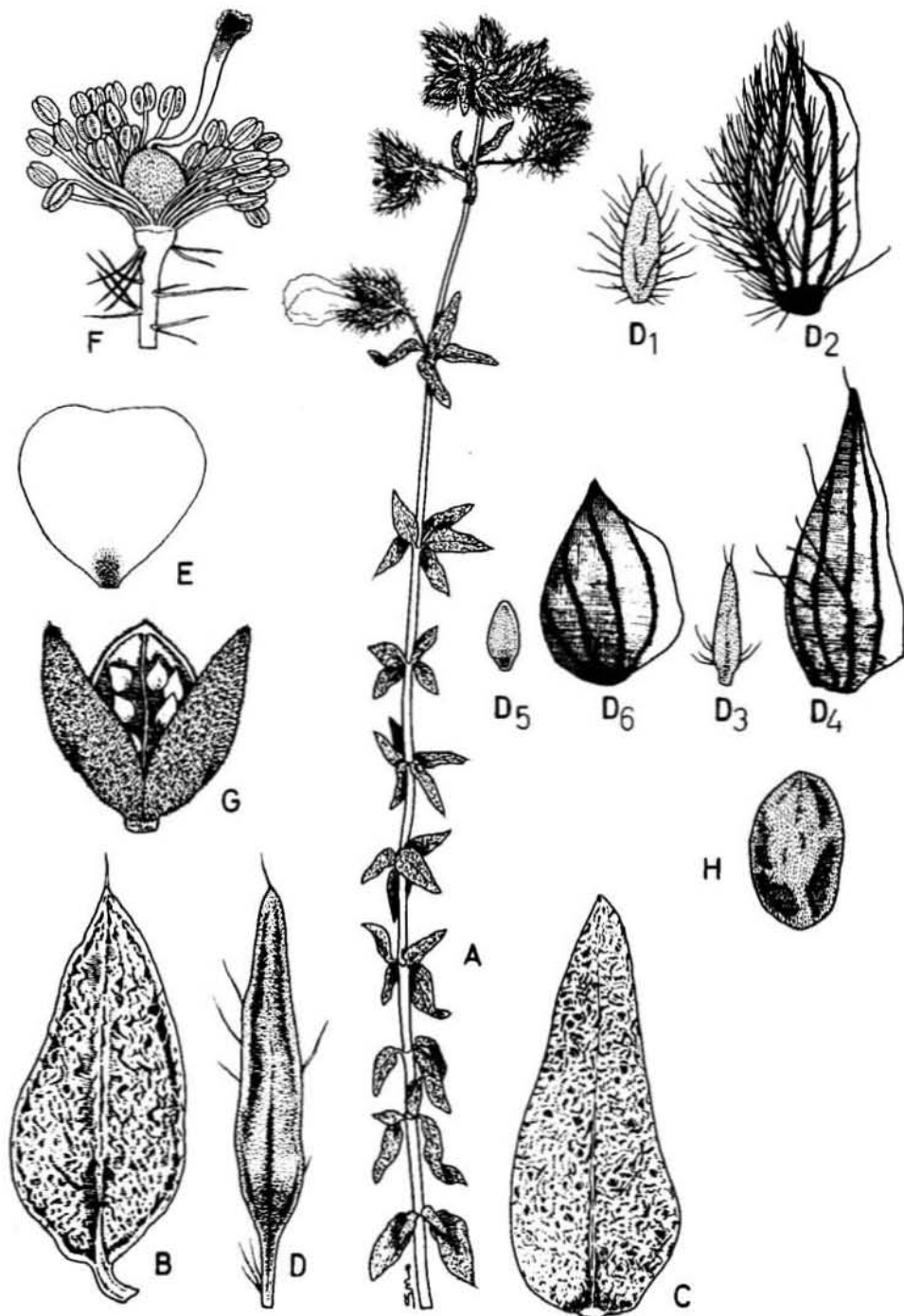


Fig. 12 *Helianthemum crassifolium*: A, flowering branch x 1; B, lower leaf x 5; C, upper leaf x 5; D, bract x 5; D1 and D2, densely ciliate smaller and larger sepals x 4; D3-D4, the same sparsely ciliate x 4; D5, D6, the same without any ciliate hairs x 4; E, petal x 2; F, stamen and gynoecium x 5; G, dehiscent capsule x 3; H, seed x 15.

CISTACEAE

Poir., nec *H. crassifolius* Dunel ex DC., l.c. 278); Keith, l.c. 538.(Fig. 12)

H. tunetanum Coss. et Kral. in Bull. Soc. Bot. 4: 58. 1857; Durand & Barratte, l.c. 31; Keith, l.c. 544; *H. sphaerocalyx* Gauba & Janchen in Oest. Bot. Zeit. 79: 349. 1930; *H. crassifolium* var. *sphaerocalyx* (Gauba & Janch.) Pamp. in Arch. Bot. 12(1): 38. 1936; *H. crassifolium* ssp. *sphaerocalyx* (Gauba & Janch.) Maire; *H. glaucum* auct. non (Cav.) Pers.: *H. crassifolium* ssp. *glaucum* (Desf.) Maire & Weill; *C. glaucus* Desf., Fl. Atl. 1: 428. 1798 (non Cav.).

Erect to ascending or spreading, caespitose shrublet, up to 25 (-30) cm long, glabrous to ciliate canescent on calyx. Leaves fleshy, flat to subrevolute, sessile or subsessile, glabrous, conspicuously large stipulate, lower often broader, upper narrower, ovate-subtriangulate to linear-oblong, up to 20-8 (-10) mm ascending to deflexed; stipules large, like smaller leaves. Raceme-like cyme c. 10-flowered, simple. Flowers 2-3 cm in diameter, yellow, with leaflike (exstipulate) bracts, pedicellate; pedicels up to 1 cm long, filiform, ascending to spreading, subcurved; calyx 6-8 mm long, ovate, acute, glabrous to sparsely or densely ciliate on the nerves. Capsules shorter than calyx, pubescent.

Type: Described from Spain (?)

A-1 26 km from Nalut, *S. I. Ali* 2220 (ULT); A-2 Gebel Nafousa, Shikshuk, 6.2.1976, *Fathi, B.R.* s.n. (ULT); B-2 28 km before Mizda, flowers yellow, 10.4.1974, *B. Faris* 77 (ULT).

Distribution: Spain (?), N. Africa.

A very variable species with glabrous to very densely ciliate calyx. Smaller forms have been called *H. sphaerocalyx*. The leaves seem heteromorphic, the broader ones often pointing downwards and the narrower ones spreading or ascending. It is confined to Gebel Nafousa in Libya and seems to grow on arid. rocks.

Fl. Feb.-April

14. ***Helianthemum cinereum*** (Cav.) Pers., Syn. Pl. 2:76. 1806; Proctor & Heywood

CISTACEAE

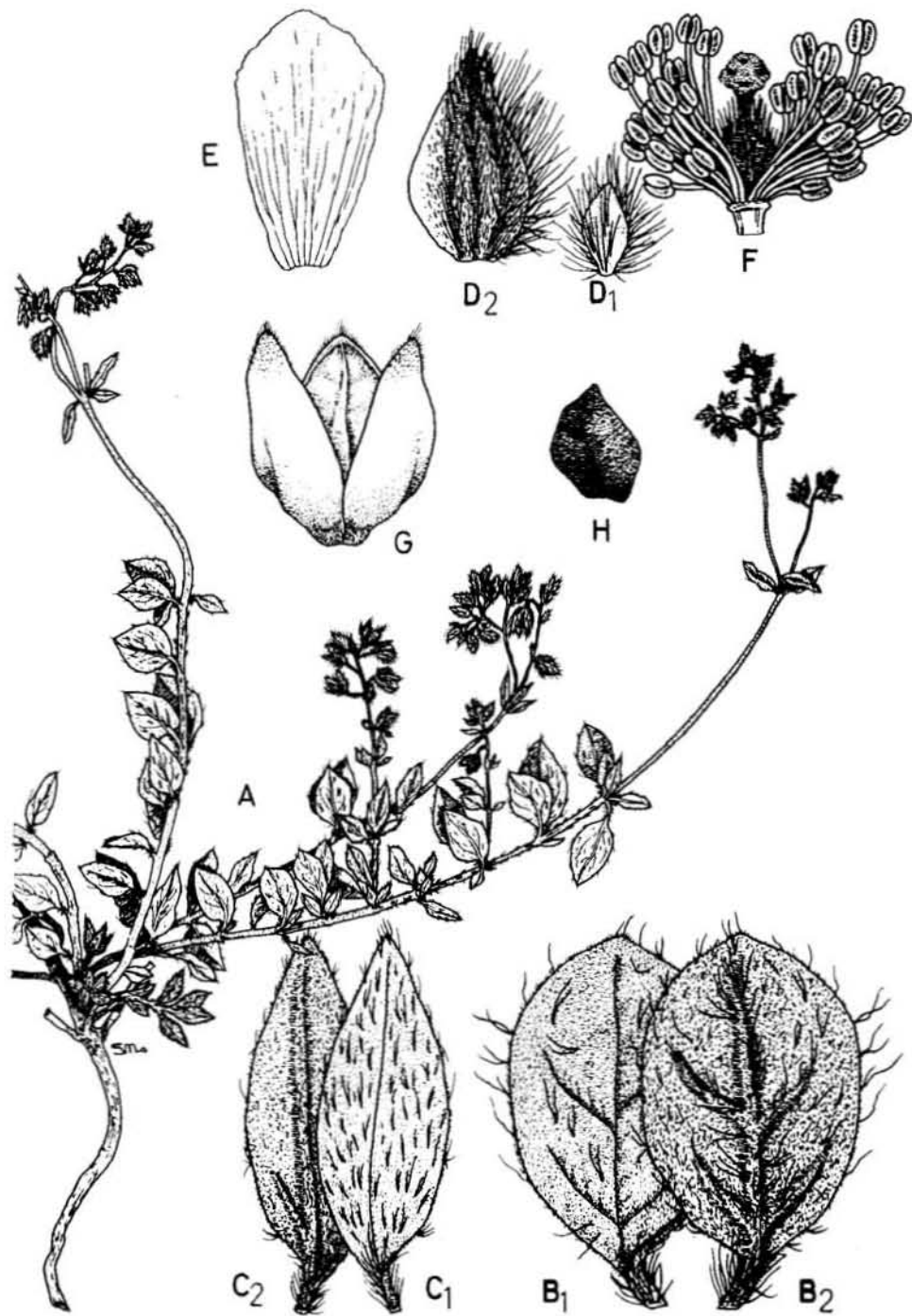


Fig. 13 **Helianthemum cinereum**: A, habit x 1; B1-B2, dorsal and ventral views of lower leaves x 5; C1-C2, dorsal and ventral views of upper leaves x 4; D1-D2, smaller and larger sepals x 8; E, petal x 5; F, stamen and gynoecium x 10; G, dehiscent capsule x 8; H, seed x 15.

CISTACEAE

in Tutin et al, Fl. Europ. 2: 290. 1968; Quezel & Santa, l.c. 717. (Fig. 13).

Cistus cinereus Cav., Ic. et descr. 2: 33, tab. 141. 1793; *H. rubellum* auct. non Moench. (1802): Presl., Delic. Prag. 25. 1822; Keith, l.c. 543; *H. paniculatum* Dunal ex DC., Prodr. 1: 278. 1824; *H. prostratum* Pomel, Nouv. Mat. Fl. Atl. 354. 1875; *H. tenuicaulis* Pomel, l.c. 222; *H. floribundum* Pomel, l.c. 223; *H. cinereum* ssp. *rubellum* (Presl) Murbeck, l.c.; Quezel & Santa, l.c.; var. *paniculatum* (Dunal) Pau, l.c.

A small, caespitose shrublet, up to 15 cm long, spreading or ascending, often with pinkish or purplish filiform branches, minutely whitish-tomentose. Leaves ovate-orbicular to linear-lanceolate, shortly petiolate, with rounded or subcordate base, rarely subcuneate, green above, whitish tomentose beneath, flat, lower exstipulate, upper usually stipulate. Inflorescence paniculate-corymbose or subumbellate, (5-) 10-20-flowered. Flowers small, exstipulate, yellow, c. 1 cm across. Calyx subglobose, reddish, ciliate pubescent, obtuse. Petals as long as or exceeding the sepals; pedicels usually exceeding the sepals, filiform, pubescent. Capsules included within the calyx.

Type: Described from Spain.

A-7 Wadi Qala'a, above the Ras Hilal, 350 m, macchie, perennial, flowers gold, 27.3.1970, P. H. Davis 50152 (ULT); Baida to Shahat (Cyrene), 700 m, *Pistacia lentiscus* Scrub, perennial, ascending, flowers gold, 28.3.1970, P. H. Davis 50189 (ULT).

Distribution: S. Europe, N. Africa (except Egypt).

A very variable species in leaf shape and stipule conditions. It seems confined to the Gebel Akhdar area in Libya (and report from Garian by Keith (l.c.) needs confirmation)

Fl. March-April.

CISTACEAE

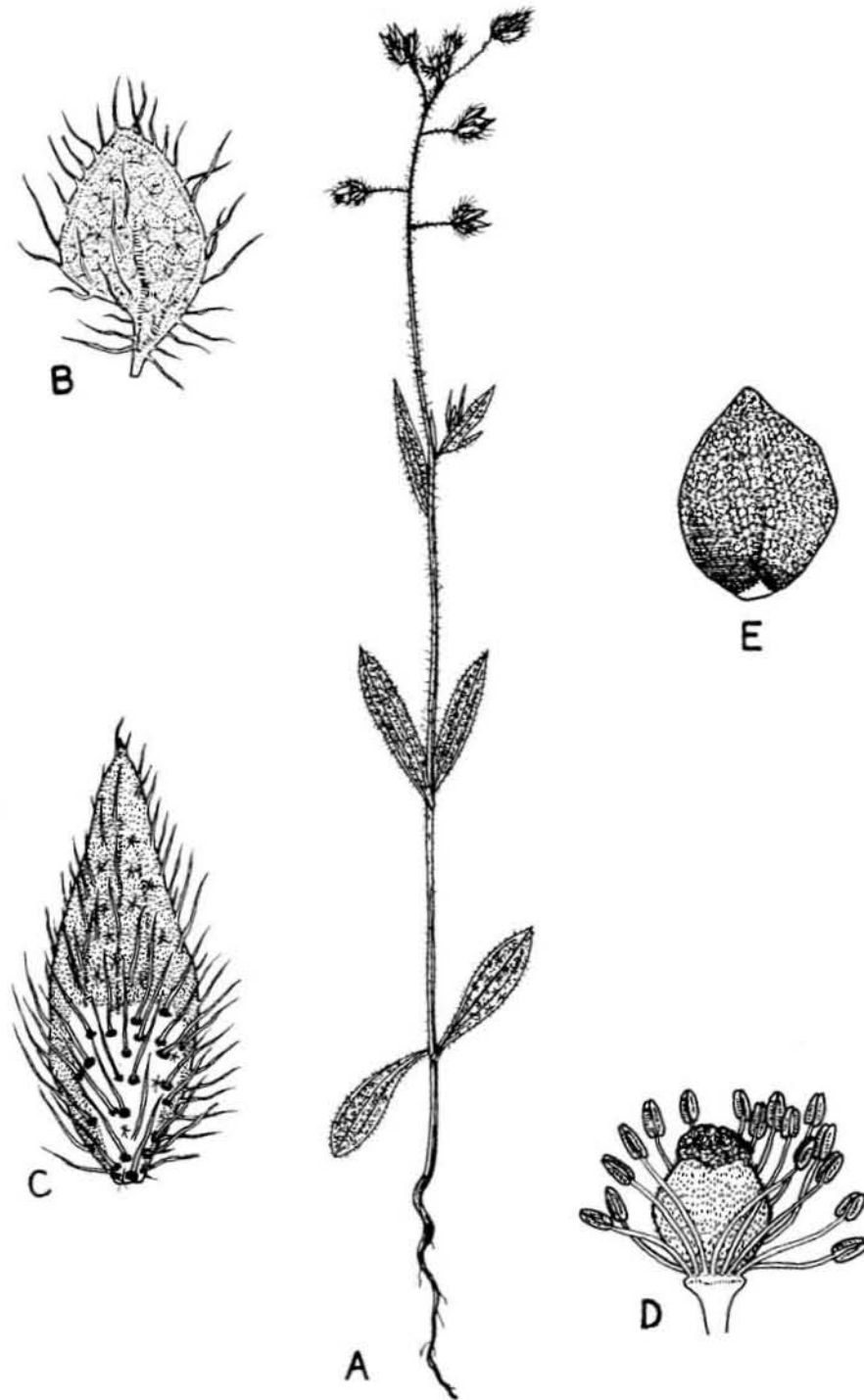


Fig. 14 *Tuberaria guttata*: A, habit x 2/3; B, smaller sepal x 10; C, larger sepal x 10; D, stamen and gynoecium x 10; E, seed x 20.

CISTACEAE

4. TUBERARIA

(Dunal) Spach in Ann. Sc. Nat. Ser. 11.6: 364. 1836.

Helianthemum sect. *Tuberaria* Dunal in DC., Prodr. 1: 270. 1824.

Herbs usually with a basal rosette of leaves and erect flowering stem. Leaves simple, obovate to oblong-linear, 3-veined at least at base, subsessile. Flowers yellow, in terminal cymes. Sepals 5, the 2 outer much smaller than the inner sepals; inner sepals often asymmetrical, membranaceous with scarcely distinct nerves. Petals present or absent, larger or smaller than the inner sepals. Stamens all fertile. Stigma $\pm$ sessile. Capsules 3-valved, incompletely 3-locular.

About 12 species in Europe and the Mediterranean region, only 1 species is reported from Libya.

***Tuberaria guttata* (L.) Fourr.** in Ann. Soc. Linn. Lyon. N.S. 16: 340. 1868; Keith, l.c. 989.

Cistus guttatus L., Sp. Pl. 526. 1753; *T. variabilis* Will., Ic. et descr. pl. 2: 73. 1856; *Helianthemum guttatum* (L.) Mill., Gard. Dict. ed. 8. 1768; Boiss., Fl. Or. 1: 440. 1867; *C. plantagineus* Willd., Sp. Pl. 2(2): 1197. 1799.

Annual, erect herb, up to 30 cm tall, villous, with a basal rosette of leaves, persisting or not. Basal and lower cauline leaves elliptical or obovate exstipulate; lower leaves larger or smaller than the cauline leaves; upper cauline leaves linear-oblong or linear-lanceolate, $\pm$ revolute, stipulate or not; all leaves stellately hairy or simple haired above. Flowers 1-2 cm in diameter, long-pedicellate, in terminal raceme-like cymes; pedicels up to 3 times or more as long as the sepals, slender, spreading. Outer sepals much smaller than the inner. Petals exceeding to subequal to the sepals, suppressed or absent, yellow, often dark-spotted at the base. Stigma subsessile or sessile. Capsules incompletely 3-locular. $2n=24$.

Type: Described from Narbonne and Italy, Herb. Linn. 689/44 (LINN).

A-7 Al-Gharceba, Gebel Akhdar, erect herb, c. 15 cm tall, not common, fruiting stage, A. Ghaffoor 364 (ULT).

Also reported from Tarhuna, Zanzur, Ain Zara etc. by Keith (l.c.)

Distribution: Euro-Siberian and Mediterranean: Libya (coastal area).

CISTACEAE

A very variable species in hairiness, leaves (including persistence of basal rosette) and petal size, often split into a number of infraspecific taxa of uncertain status.

Acknowledgement: I am thankful to Dr. Guido Moggi (FI) and Mr. I.C. Hedge (E) for their help.

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