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63

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GERANIACEAE

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GERANIACEAE

ABDUL GHAFOR

Herbs or shrubs, with $\pm$ fleshy root stocks. Leaves alternate or opposite, sometimes in basal rosettes, mostly stipulate and petioled, simple or compound, pinnately or palmately veined, incised or serrate, crenate or dentate rarely entire. Inflorescence bracteate, axillary, pseudoumbellate cymes on usually long peduncles, rarely flowers solitary. Flowers bisexual, actinomorphic or zygomorphic, mostly pentamerous, hypogynous; disc glandular or not, glands if present alternating with the petals. Sepals (4-) 5, free or slightly united at the base, imbricate or sometimes valvate, posterior occasionally spurred, persistent in fruit. Petals 5, rarely more or fewer to absent, free, generally unequal, imbricate, rarely contorted, deciduous. Stamens (5-) 10 (-15), in 2 or 3 whorls; filaments free generally unequal, united into 1 or 5 bundles at the base; anthers dithecal, usually versatile, all fertile or 3-5 anthers abortive to form staminodes. Ovary (3-) 5-carpelled, syncarpous, superior, (3-) 5-loculed, each locule with 1-2 pendulous, superposed, anatropous ovules on axile placenta; style simple, long with (3-) 5 ligulate, clavate or filiform, rarely capitate stigmas. Fruit generally a long beaked schizocarp, dehiscing septicidally from base upwards along the persistent central axis into 5, monospermous rostrate mericarps with hygroscopic, often united awns. Seeds with little or no endosperm, pendulous, smooth or inconspicuously punctate reticulate, embryo usually curved or rarely straight.

A family of 5 genera and more than 750 species, widely distributed in temperate and subtropical regions; represented by 4 genera and 28 species in Libya. Specimens cited here are present in our herbarium (ULT). Taxa marked with an asterisk are known here from cultivation only.

- | | | |
|----|---|---|
| 1. | + Leaves longer than broad, pinnately veined,
unlobed to pinnately incised | 2 |
| | - Leaves broader than long, palmately veined,
unlobed to palmately incised | 3 |

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- | | |
|---|------------------------|
| 2. + Petals truncate or lobed. Stamens 15 in 5 bundles of 3 each, all fertile | 1. Monsonia |
| — Petals neither truncate nor lobed, entire. Stamens 10, monadelphous at the base, 5 fertile alternating with scale-like staminodes | 2. Erodium |
| | |
| 3. + Flowers zygomorphic. Posterior sepal spurred and adnate to pedicel. Stamens 10, only 5-7 fertile, declinate. Beak of mericarps twisting spirally at dehiscence. | 2. Pelargonium* |
| — Flowers actinomorphic. Posterior sepal neither spurred nor adnate to pedicel. Stamens 10, all fertile, not declinate. Beak of mericarps rolling upwards at dehiscence | 4. Geranium |

1. MONSONIA

L., Syst. Nat. ed. 12.2.: 508. 1767; Mantissa Pl. 14.1767.

Herbs, sometimes basally suffrutescent, appressedly silky pubescent, usually glandular. Leaves stipulate, petiolate, serrate, dentate or crenate, occasionally pinnately lobed or incised. Inflorescence 2-many-flowered simple umbel, rarely flowers solitary. Flowers pedicellate, bracteate, actinomorphic, pentamerous; disc glandular; glands 5. Sepals 5, membranous margined, apiculate, imbricate. Petals 5, obovate, usually truncate or lobed at the apex. Stamens 15, united in 5 anti-petalous bundles of 3 each, all fertile. Ovary pentacarpellary, pentagonal, beaked, 5-loculed; each locule 2-ovulate; style absent or minute with 5 clavate or filiform stigmas. Schizocarp dehiscing into 5, 1-seeded, oblique mericarps with persistent, internally plumose or ciliate, spirally twisting beaks. Seeds oblong-obovoid, non-endospermous.

A genus of c. 40 species, mostly distributed in Africa, South West Asia and Indo-Pakistan subcontinent; represented by the following species in Libya.

Monsonia nivea (Decne.) Decne. ex Webb, *Fragm. Fl. Aethiop.-Aegypt.* 59. 1854; Durand & Barratte, *Fl. Lib. Prodr.* 56. 1910; Pamp., *Prodr. Fl. Ciren.* 290. 1936; Corti, *Fl. & Veg. Fezzan* 156. 1942; Keith, *Prelim. Check List Lib. Fl.* 2: 672. 1965. (Fig. 1)

Erodium niveum Decne., *Fl. Sinaica* 61. 1834; *Ann. Sc. Nat. Ser.* 23: 285.

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1835; *M. nivea* (Decne.) Boiss., Fl. Or. 1: 897. 1867; *E. bonacelli* Pamp. in Agric. Colon. 20: 364. 1928 **syn. nov.**; Prodr. Fl. Ciren. 297. t. 5. fig. 3. 1931; *M. commixta* Rech. f., Aell. Esfand., Anz. Math. - Nat. Kl. Oesterr. Akad. Wiss. 87: 301. 1950.

A small perennating shrublet, up to 35 cm tall, canescent with 10-15 cm long, tortuose, $\pm$ woody rootstock; stems procumbent, densely beset with silvery-grey pubescence. Leaves with petiole up to 4.5 cm long, opposite, usually rosulate at base; lamina lanceolate-ovate or elliptic-ovate to broadly ovate, 6-25 (-30) x 4-12 (-15) mm, rounded or truncate to broadly cuneate at the base, margins crenate, obtuse to $\pm$ acute at the apex, silvery-canescens with appressed white hairs; stipules oblong-lanceolate to subulate, 2.5-3.5 mm long, tomentellous. Inflorescence scapose, 2-6-flowered; peduncle up to 15 (-20) cm long. Flowers pink, c. 1.2 cm across; pedicel 10-25 (-28) mm long, appressed canescent; bracts ovate-oblong to lanceolate, 2.5-3 mm long, acute-acuminate. Sepals elliptic to obovate-oblong, 3-4 x 1.5-2 mm, slightly mucronate, up to c. 6 mm long in fruit. Petals obovate, slightly longer than the sepals, ciliate at the base, pink. Stamens with basally ciliate and dilated filaments. Ovary hirsute. Mericarps 4.5-5 mm long, appressed hairy, with 2 transverse furrows at the apex; beak 40-50 mm long, internally plumose.

Type: Described from Tor desert, Bove 154 (P,K).

B-1 c. 1 km from Ghadamas towards Darj road before Bhaira Mujazam (Mjazzem) erect, common in sandy soil, 29.1.1977, *M.A.Siddiqi* 438; **B-4** 120 km from Bugrain (along the road from Hun) limestone roadside, 2.4.1973, *S.I.Ali* 1582; **D-3** c. 200 km from Sebha on Sebha-Hun highway, sandy depression, 31.3.1973, *S.I.Ali* 1419; c. 16 km from the main highway towards Brack, stony-sandy soil, 30.3.1973, *S.I.Ali* 1395; c. 45 km from the highway towards Brack, 30.3.1973, *S.I.Ali* 1403.

Distribution: North Africa, Eastern Sudan, Sinai, Iraq, Jordan, S. Arabia, Iran and Pakistan.

A fairly common plant in sandy wadis and may be confused with *Erodium glaucophyllum*.

Fl. Feb.-May Vern. Azren, Tazrent

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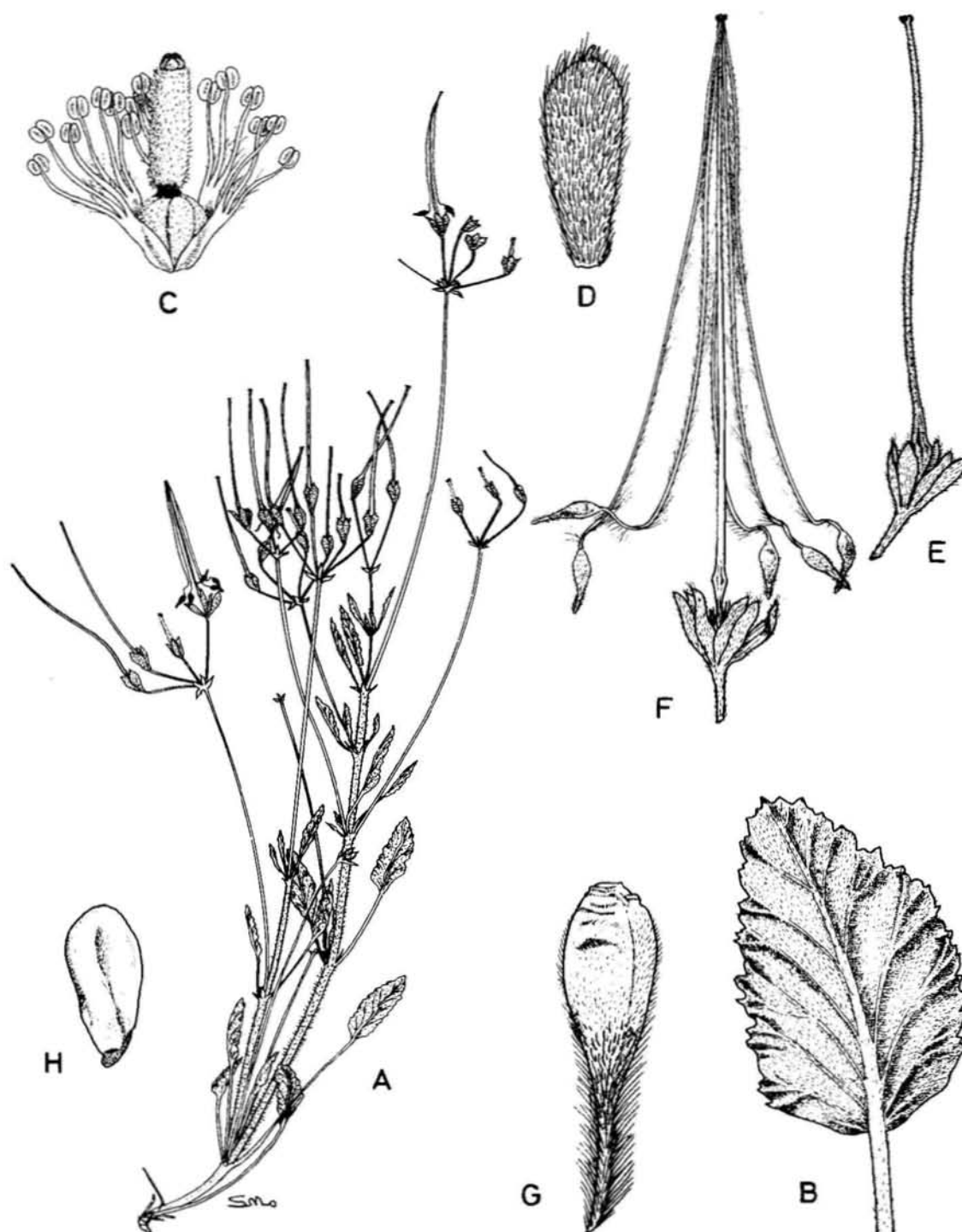


Fig. 1, *Monsonia nivea*: A, fruiting branches x 1/2; B, leaf x 2; C, stamen bundles and ovary x 10; D, sepal x 5; E, undeveloped fruit x 2; F, dehiscent fruit x 2; G, mericarp x 10; H, seed x 10.

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2. ERODIUM

L'Her. ex Aiton, Hort. Kew. 2: 414. 1789.

Herbs, $\pm$ woody at the base. Leaves stipulate, petiolate, mostly opposite, basal and cauline; pinnatifid to pinnatisect or rarely pinnate compound, rarely unlobed and dentate, mostly appressed hairy. Inflorescence a many-flowered, long peduncled, simple, bracteate umbel, rarely (1-) 2-flowered. Flowers pedicellate, actinomorphic or subzygomorphic because of unequal petals, purple or pink; disc with 5 glands. Sepals 5, free, not spurred, mucronate. Petals 5, free, equal or unequal, entire, imbricate. Stamens 10, antipetalous, filaments united at the base, 5 fertile alternating with 5 sterile ones. Ovary 5-carpellate, 5-angled, beaked, 5-loculed, each locule 2-ovuled; style long, $\pm$ terminal, with 5 filiform stigmas. Mericarps 5, splitting from the base upwards, each 1-seeded, foveolate, indehiscent, with persistent or rarely deciduous, internally villous or barbate, spirally twisted or straight beaks.

A genus of c. 90 species, distributed in Europe, Central and S.W. Asia, Africa, temperate Australia and tropical South America; represented by 15 species in Libya.

- | | | |
|----|---|----------------------------|
| 1. | + Fruit beak soft silvery plumose on inner side,
deciduous from mericarps when ripe | 2 |
| | -- Fruit beak with short and long bristle-like hairs
on inner side, persistent and spirally coiled
when ripe | 4 |
| 2. | + Leaves entire, 3-lobed | 3 |
| | -- Leaves deeply uni - or bipinnate partite or - sect
into ovate-oblong, narrow decurrent segments
with small acutish lobules | 1. E. hirtum |
| 3. | + Flowers usually more than 2 cm across with
deep purple centre. Petals broadly
obovate-orbicular. Mericarps c. 8 mm long | 2. E. arborescens |
| | -- Flowers usually less than 2 cm across without
deep purple centre. Petals obovate. Mericarps
3-5 (-6) mm long | 3. E. glaucophyllum |
| 4. | + Leaves imparipinnate compound, leaflets
distinctly dentate-pinnatifid or pinnatisect | 5 |

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- Leaves simple, either entire or pinnately shallowly to deeply incised or 3-lobed, sometimes compound at the base with only 1 (-2) pairs of distinct leaflets

8
- 5. + Pits of mericarps glandular. Sepal mucro with 1 or 2 long bristles

6

— Pits of mericarps not glandular. Sepal mucro without bristles

7
- 6. + Leaflets shallowly incised-dentate or $\pm$ pinnatifid. Stamnodes glabrous. Apical pits of mericarps very wide and steeply sloping

4. **E. moschatum**

— Leaflets pinnatisect into dentate or incised lobules. Stamnodes hirsute. Apical pits of mericarps not steeply sloping

5. **E. touchyanum**
- 7. + Furrow below the apical pit of mericarp absent or faint. Beak of mericarp 2.5-3.5 (-4) cm long

6. **E. cicutarium**

— Furrow below the apical pit distinct, narrow. Beak of mericarp 4-6 cm long

7. **E. tocranum**
- 8. + Mericarps up to 6 mm long. Beak usually less than 6 cm long

9

— Mericarps 6 mm or more long. Beak usually more than 6 cm long

12
- 9. + Mericarps with a single furrow beneath pits

10

— Mericarps without furrow or with a faint furrow beneath pits

11
- 10. + Leaves entire or shallowly lobed; lobes mostly broader than long, crenate. Mericarp pits and often furrows also glandular

8. **E. malacoides**

— Leaves deeply lobed; lobes, at least of lower leaves, longer than broad, acutely incised dentate. Mericarp pits and furrows glabrous

9. **E. neuradifolium**
- 11. + Leaf lamina broadly cordate-ovate or

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- triangular-ovate to ovate-elliptic or oblong-elliptic, undivided and irregularly serrate or variously dissected, basal 3-7-fid or partite, upper often almost bipinnatisect into linear-lanceolate, entire or trifid segments. Bracts usually 2, suborbicular, 5-8 mm long
10. **E. laciniatum**
- 13
12. + Stamminodes and fertile filaments glabrous at the base. Mericarps 5-5.5 mm long; beak 4-5 cm long
11. **E. keithii**
12. **E. chium**
13. + Sepals 3-4 mm long in flower; enlarged up to 7 x 2.5 mm in fruit. Mericarps not more than 6 mm long
10. **E. laciniatum**
- 14
13. + Sepals more than 4 mm long in flower; enlarged up to more than 7 mm in fruit. Mericarps more than 6 mm long
14. + Greyish-white tomentose, perennial. Flowers deep violet with black centre. Sepal mucro 1-2 mm long. Mericarps 7-9 mm long
13. **E. guttatum**
- 15
14. + Annual or biennial, not greyish-white. Flowers purple or purplish violet, without black centre. Sepal mucro 2-7 mm long. Mericarps 8-15 mm long
15. + Flowers 1.5-2 cm across. Sepal mucro usually 2-4 mm long. Petals, stamens and staminodes ciliate at the base. Mericarp pits narrow, deep, glandular hairy, with furrow beneath
14. **E. ciconium**
15. + Flowers 2.5-3.5 cm across. Sepal mucro usually 4-7 mm long. Petals, stamens and staminodes

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glabrous at the base. Mericarp pits wide, deep, eglandular, deeply pitted, with a wide furrow beneath

15. *E. gruinum*

1. ***Erodium hirtum*** (Forsk.) Willd., Sp. Pl. 3: 632. 1880; Durand & Barratte, Fl. Lib. Prodr. 55. 1910; Trotter, Fl. Econ. Lib. 224. 1915; Pamp., Prodr. Fl. Ciren. 294. 1931; Ozenda, Fl. Sahara 307. 1958; Keith, Prelim. Check List Lib. Fl. 465. 1965 (Fig. 2).

Geranium hirtum Forsk., Fl. Aeg-Arab. 123. 1775 (non Burm. f., Sp. Geran. 48. no. 65. t. 1. 1759); *Erodium supracanum* sensu Viv., Fl. Lib. Spec. 38. 1824 (non L'Herit.).

Perennial, suberect to erect, caulescent, up to 30 cm tall, greyish-white patent hairy to glabrescent herb with $\pm$ fusiform root bearing globose to ovoid, up to c. 2 cm across tubers. Leaves with up to 4 cm long petiole, simple, puberulent to densely hispid or white pubescent or glabrescent; lamina triangular-ovate in outline, (1.5-) 2-8 (-10) x 1-2 (-2.5) cm, deeply 1-2-pinnatisect or -partite into ovate-oblong, narrow, decurrent segments with small acutish lobules; stipules ovate, 4-5 x 1.5-2 mm, purplish-brown, thick, ciliate on margins. Inflorescence umbellately 3-6-flowered; peduncle longer than the subtending leaves, hairy-glabrescent. Flowers deep pink to pale-pink with violet centre, 1.5-2 cm across; pedicels 1-2.5 cm long, glabrescent, thickened and deflexed in fruit; bracts more than 2, broadly ovate, scarious, hairy. Sepals oblong-ovate, 5-8 x 3-4 mm, not or slightly enlarged in fruit, glabrescent to hirsute, 3-nerved, acute, with c. 1 mm long mucro. Petals narrowly obovate, 8-10 (-12) x 4-6 mm, with a deep purple spot at the base, shortly clawed, claw hairy at the base. Fertile filaments basally dilated and ciliate on margin; sterile filaments lanceolate, ciliate in the upper half. Mericarps brown, 4-5 mm long, antrorse hairy, apical pits small, eglandular, each with 2 furrows beneath; beak (5-) 6-10 cm long, brown or yellowish-brown, plumose internally.

Type: Described from Egypt.

A-2 Abughilan, 74 km from Tripoli, 16 km from Garian, mountain valley, petals violet-red, branches spreading *S.I.Ali* 143; Shakshuk, 6.2.1976, *Fathi B. R.* 101; Tagma (near Yefren broadcasting station) c. 6 km from Yefren towards Garian, limestone hill, 9.4.1974, *S.I.Ali* 1876; Kabaw mountains, soil clayey, 5.4.1974, *B. Faris* 279; **A-3** Al-Nagaza, before Khoms, fls. pink, root tubers present, 21.1.1977, *S.A.Alavi* 1075; **A-7** Tokra, fls. violet, 3.3.1973, *S.I.Ali* & *S.A.Faruqi* 1303; 19-25

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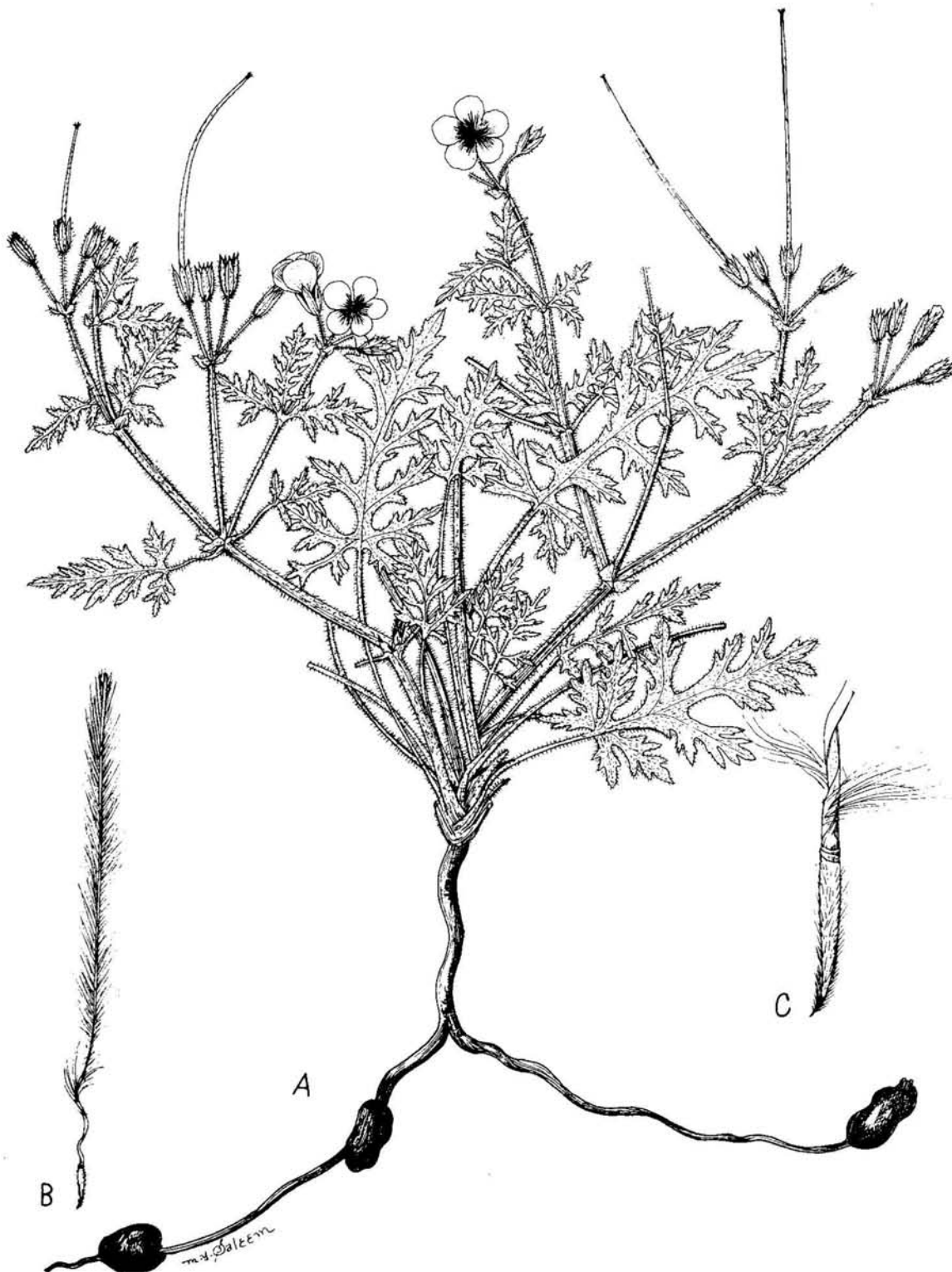


Fig. 2, **Erodium hirtum**: A, habit x 1/2; B, mericarp with beak x 1; C, a mericarp with apical pits x 4.

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km S.E.Derna, 13.3.1968, *L. Boulos* 2318; Al-Tamimi, S.E. Derna, 13.3.1968, *L. Boulos* 2261; **A-7** Al-Karsa, Derna coastal road Ras El-Hilal, Gebel Akhdar, 11.3.1968, *L. Boulos* 2128; Above Derna, on road to Martouba, 300 m, limestone plateau in *Poterium garige*, perennial, root $\pm$ tuberous below, flowers purplish-pink, 30.3.1970, *P. H. Davis* 50317; **B-1** Wadi Malah, c. 10 km from Nalut, flowers violet, 4.5.1972, *S.I.Ali* 317; c. 16 km from Nalut (Nalut-Gadames road), 27.2.1975, *S.I.Ali* 2227; c. 26 km from Nalut, flowers deep pink, 27.2.1975, *S.I.Ali* 2203; 8 km from Nalut on Ghadames road, near the road leading towards Wazin, 25.1.1977, *M.A.Siddiqi* 302; Wadi Kabao, near picnic spot, steep valley slope, sandy soil, 5.5.1972, *S.I.Ali* 332; Kabao Mountains ascent, root tubers present, 27.1.1977, *M.A.Siddiqi* 384; Kabao, bifurcation of 2 roads, one going to Jefren and the other straight to Nalut, flowers dark pink, common, 29.3.1976, *S.M.H.Jafri* 6580; **B-2** c. 37 km from Kaleba (c. 67 km from Garian) towards Mezda, 10.4.1974, *S.I.Ali* 1972.

Distribution: N. Africa, Jordan, Sinai, Palestine, Lebanon, Syria and Iraq.

Common in the maritime mountainous parts of Libya. The root tubers and leaves are used as pot herb.

Fl. January-May *Vern.* henet El-Gula; Khlala El-Gula

2. ***Erodium arborescens*** (Desf.) Willd., *Sp. Pl.* 3: 638. 1800; Trotter, *Fl. Econ. Lib.* 224. 1915; Keith, *l.c.* 462. 1965. (Fig. 3).

Geranium arborescens Desf., *Fl. Atl.* 2: 110. 1798; *Erodium hussoni* Boiss., *Diagn. Pl. Or. Nov. ser.* 1, 8: 119. 1849.

Perennial, erect, up to 40 cm tall, appressed hairy, basally suffrutescent herb. Tap root long, with interrupted circular tubers. Leaves with (1-) 1.5-8 (-10) cm long, appressed-puberulent to glabrescent petioles; lamina ovate-cordate; 1.5-10 (-12) x 1-7 (-8) cm, thickish, pubescent to glabrescent, irregularly crenate to sublobed, acute; stipules triangular ovate or oblong, 3-6 x 2-4 mm, densely hairy, brown, narrowly membranous margined, acute. **Inflorescence** 4-6-flowered umbel, peduncles longer than the subtending leaves; bracts oblong-ovate to $\pm$ orbicular, 4-8 x 2-4 mm, partly united at the base, brown, membranous margined, hairy. Flower c. 2-3 (-4) cm across, pink with deep purple centre; pedicels 0.8-3 cm long, puberulent. Sepals oblong, 6-10 x 3-5 mm, densely soft hairy outside, subhooded and mucronate at apex. Petals broadly obovate-orbicular, 10-13 (-20) x 8-12 (-15) mm, with a dark purple spot at the glabrous base, truncate at the apex. Antherless filaments ciliate at

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Fig. 3, *Erodium arborescens*: A, habit x 1/2; B, petal x 1; C, mericarp with beak x 1; D, mericarp showing apical pits x 4.

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the base; anthers squarish-oblong, 2 x 1 mm, purple. Mericarps oblong-lanceolate, c. 8 mm long, patent hairy, apical pits with 2-furrows beneath each; beak 7-8 cm long, plumose.

Type: « Habitat in Montibus Cafsae », Herb. Desf. (P).

B-1 Near Wadi Malah, c. 3 km from Nalut, flat limestone rocks, 18.4.1975, *S.I.Ali* 2852; c. 26 km from Nalut, 27.2.1975, *S.I.Ali* 2210; Wadi Malah, c. 10 km from Nalut, root with circular tubers, 4.5.1972, *S.I.Ali* 272 and 273; Wazin (Libyan - Tunisian border), 25.1.1977, *M.A.Siddiqi* 284; 13 km off Ghadames, road on way to Wazin, near road construction company's office, 25.1.1977, *M.A.Siddiqi* 283.

Distribution: Tunis, Libya, Egypt, Jordan, Palestine and Syria.

A common plant in limestone and sandy hills in N.W. Libya (Gebel Nefousa).

The plant is a relished forage of goats and camels and is said to be odorous (Trotter, l.c.). It could, however, be cultivated for its decorative, large, pink flowers with a deep purple spot at the base.

Fl. January-April Vern.: Marghed; Merghed

3. ***Erodium glaucophyllum* (L.) L'Herit in Ait., Hort. Kew 2: 416. 1789; Pamp., Prodr. Fl. Ciren. 296. 1931; Corti, Fl. & Veg. Fezzan 156. 1941; Ozenda, Fl. Sahara 307. fig. 101. 1958; Quezel & Santa, Nouv. Fl. Alg. 2: 576. 1962; Keith, l.c. 1: 464. 1965. (Fig. 4).**

Geranium glaucophyllum L., Sp. Pl. 679. 1753; *Erodium tordilioides* Viv., Fl. Lib. Spec. 39. 1824 (non (Desf.) L'Herit 1802); *E. glabrum* Pomel, Nouv. Mat. Fl. Atl. 342. 1875.

Perennial, glabrescent to glabrous, glaucous, dichotomously branched, prostrate to ascending or suberect, up to 40 (-50) cm tall herb, with oblongly swollen, interrupted roots and articulated, thickened nodes. Leaves radical and cauline, radical with up to 8 cm long puberulent petioles, cauline short petioled to sessile; lamina triangular-ovate to trullate-elliptic to oblong, 10-50 x 5-40 mm, ± fleshy, entire to 3 (-5)-lobed or crenate-dentate to serrate, cordate to cuneate at the base, glabrous-glaucous to very sparsely pubescent; stipules triangular-ovate, 1.5-3.5 mm long, puberulous, acute. Inflorescence 3-5-flowered; peduncle longer than the

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Fig. 4, ***Erodium glaucophyllum***: A, habit x 1/2; B, A mericarp with beak x 1; C, mericarp showing apical pit x 4.

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subtending leaves, glabrous. Flowers purple or violet-red, c. 2 cm across; pedicel 1-2 cm long, hispid to glabrous, deflexed in fruit; bracts similar to stipules. Sepals ovate-oblong, 5-6 x 1.5-2.5 mm, elongating up to c. 9- x 3 mm in fruit, outer 5-nerved, inner 3-nerved, appressed hairy on nerves to glabrous, membranous margined with c. 1-1.5 mm long purplish mucro. Petals obovate, 8-10 (-11) x 4.5-5.5 mm, cuneate and hairy at the base. Fertile filaments dilated towards the base, sparsely ciliate in middle, sometimes 2-toothed in upper part. Sterile filaments lanceolate, $\pm$ ciliate at the apex or glabrous. Mericarps brown, 3-5 (-6) mm long, antrorsely brown hairy, apical pits absent, furrows 2; beak thin, 5-8 cm long, lower part not plumed, densely plumose in upper part.

Type: «Habitat in Aegypto» *Van Royen* (L).

A-2 Cabaw, soil sandy, 7.6.1974, *B. Faris* 491; c. 37 km from Kaleba (c. 67 km from Garian) towards Mesda, prostrate, 10.4.1974, *S.I.Ali* 1974; Tilel, c. 11 km from Sabrata on way to Zuara, 3 km towards North from Highway, sandy soil, prostrate, flowers bluish-purple, 25.11.1976, *A.Ghafoor* 55; Tagma (near Yefren broadcasting station), c. 6 km from Yefren towards Garian, limestone hills, 9.4.1974, *S.I.Ali* 1871; Gebel Nefousa, 23.3.1971, *L. Boulos* 3517; Between Janawan & Shakshook, 24.1.1977, *M.A.Siddiqi* 230; Wadi Al Aital, common, flowers pink violet, 29.3.1976, *S.M.H.Jafri* 6581; **B-1** c. 5 km from Gadames (towards Berber Castle), dry stony ground, prostrate, branches scandent, c. 5-7 cm, 25.2.1975, *S.I.Ali* 2144 & 2417; c. 9 km after Sinawan, c. 100 km from Nalut (Gadames-Nalut road), stony roadside with small stones, prostrate, flowers red, 26.2.1975, *S.I.Ali* 2168; **B-2** 27 km before Mezdah, 10.4.1974, *G.H.Faris* 386 (ULT); 24 km from Mizda towards Alghariat, *M.A.Siddiqi* 39; **B-4** Near Bugrain, c. 70 km from Bugrain 27.2.1976, *S.M.H.Jafri* 6412; c. 4 km from Bugrain (going towards Misrata), sandy ground with pebbles, 28.3.1975, *S.I.Ali* 2477; Near Al Kararim, 8.3.1968, *L. Boulos* 1929; **C-4** c. 17 km from Hun towards Tripoli, limestone, flowers violet-red, root swollen, 2.4.1973, *S.I.Ali* 1540; c. 50 km from Hun (between Hon and Bugrain), root tuberous, fairly common in sandy ground with *Heliotropium* etc., 27.2.1976, *S.M.H.Jafri* 6394.

Distribution: N. Africa, Jordan, Sinai, Palestine, Syria, Iraq, Kuwait, Arabia and Iran.

A very common plant in calcareous, sandy soils in N. W. parts of Libya (Gebel Nefousa) and Hun area.

Fl. Novembre-April *Vern.:* Dahma, Ragma, Fruit (Bomalic)

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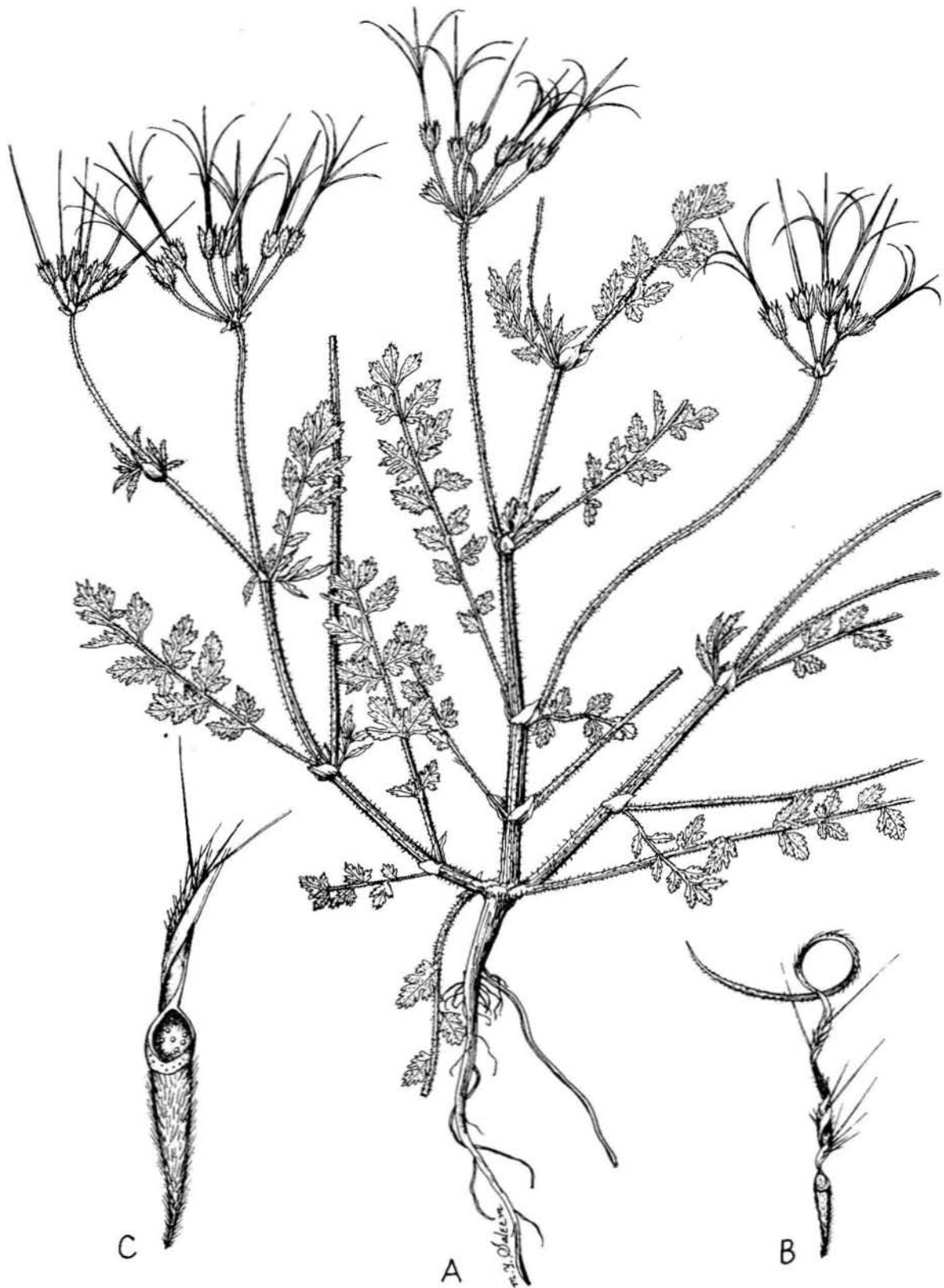


Fig. 5. **Erodium moschatum**: A, habit x 1/2; B, mericarp with beak x 3; C, mericarp showing glandular pits x 6.

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4. ***Erodium moschatum*** (L.) L'Her. in Aiton, Hort. Kew. 2: 414. 1789; Durand & Barratte, l.c. 54; Pamp., Prodr. Fl. Cir. 291. 1931; Quezel & Santa, l.c. 578; Keith, l.c. 468 (Fig. 5).

Geranium cicutarium L. var. *moschatum* L., Sp. Pl. 680. 1753; *G. moschatum* (L.) L., Syst. Nat. ed. 10. 2: 1143. 1759.

Annual or biennial, procumbent to suberect, caulescent, up to 50 cm tall, musky herb, beset with white deflexed hairs all over and pale tipped glands on younger parts. Leaves imparipinnate compound, oblong-lanceolate in outline, up to 20 cm long; leaflets (5-) 7-13, lateral alternate, ovate, 5-45 x 2-30 mm, oblique at the base, obtuse, incised-dentate with acute serrations or $\pm$ pinnatifid; terminal leaflet obovate-cuneate, 3-5-fid; stipules broadly ovate to oblong-orbicular, 8-13 x 7-11 mm, scarious white, obtuse, glabrous. Inflorescence (3-) 5-12 (-13)-flowered; peduncle up to 25 cm long, always longer than the subtending leaves, glandular-hairy. Flowers pinkish-purple or violaceous, c. 1-2.5 (-3) cm across; pedicel up to 15 mm long, villose and glandular hairy, pale; bracts ovate-oblong to suborbiculate, 2-4 x 2-3 mm, ciliolate, free or subconnate at the base. Sepals lanceolate to lanceolate-oblong, 4-5 x 1.5-2 mm, enlarged to c. 8 x 3 mm in fruit, 5-nerved, glandular hairy outside, with 0.5-1 mm long stout non-bristly mucro at the apex. Petals oblong-ovate to obovate, 5-15 mm long, claw short, hairy. Fertile filaments broadened and 1-toothed on either side at base, glabrous. Sterile filaments lanceolate-oblong, glabrous. Mericarps brown, 4-6 mm long, erect-patent hairy, apical pits very wide and steeply sloping, glandular, each with a wide deep furrow at the base; beak (2-) 2.5-4 cm long, persistent, barbate, barbs long below becoming shorter towards apex.

Type: Described from Europe, Herb. Linn. 858/44 (LINN).

A-2 Garian stadium, rocky soil, 12.4.1974, *M. Godeh* 285; **A-3** Tripoli, near university campus, Hadaba Sharqia along the street, under shade, flowers violaceous, c. 1 cm across, 30.4.1976, *S.M.H.Jafri* 6635; **A-7** Shahat, prostrate, fls. umbellate, 28.2.1973, *S.I.Ali & S.A.Faruqi* 978; 19-25 km S.E.Derna, 13.3.1968, *L. Boulos* 2322; Shahat (Cyrene) to Faidia, S. of Beida crossroads, 700 m, limestone pasture, annual, flowers pale mauve, 1 April 1970, *P.H.Davis* 50520 (with *E. cicutarium*).

Distribution: W. and S. Europe, Cyprus, Aegean Islands, N. Africa, W. Asia; introduced and naturalized in N. America, E. & S. Africa etc.

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Fig. 6. **Erodium touchyanum**: A, habit x 1; B, mericarp with beak and apical pits x 5.

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The plant has musk-like odour and smells obnoxiously to livestock.

Flowers are said to be used as pot herb in Sinai, Palestine, and Syria. The decoction of the plant parts is used to cure diarrhoea and dysentery and is considered to be antipyretic, diuretic and diaphoretic.

Fl. Feb.-May Vern. Missaykah

5. **Erodium touchyanum** Delile in Godron, Fl. Juv. 15. 1853; in Mem. Acad. Sc. Montp. (Sect. Medicine) 1: 423. 1853; Guitt. in Boissiera 20: 106. 1972. (Fig. 6).

E. muliebre Durieu in Batt., Fl. Alg. 2: 128. 1888- *nom nudum*; *E. redolens* Durieu in Batt., l.c. *nom. nudum*; *E. moschatum* subsp. *desertii* Eig. in Beih. Bot. Centralb. 50 (2): 232. 1932; *E. desertii* (Eig.) Eig. & Zoh. in Palest. Journ. Bot. Ser. 1:(3): 311. 1939; Schonbeck-Temesy. in Rech. f., Fl. Iran. 69: 56. 1970.

Annual or biennial, caulescent, up to 20 cm tall herb, beset with white eglandular and glandular hairs all over, branches prostrate or ascending. Leaves imparipinnate compound, oblong-lanceolate in outline, up to 8 cm long; leaflets 5-13, lateral ones obliquely ovate-lanceolate, 5-20 x 2-10 mm, deeply bipinnatifid to sect, lobules obtuse, terminal leaflet obovate, 3-fid, cuneate; stipules broadly ovate-oblong, 5-8 mm long, membranous, obtuse to acutish, ciliolate on margins. Inflorescence 2-8-flowered; peduncle up to 8 (-12) cm long, glandular or eglandular hairy to glabrous. Flowers pink, c. 1.5 cm across; pedicels 8-12 mm long; bracts triangular-ovate to suborbicular, c. 2-2.5 mm long, membranous, obtuse, ciliate on margins. Sepals elliptic-oblong to lanceolate-ovate, (3-) 4-5 x 1.5-2 mm, enlarged up to 6-7 x c. 2 mm and obovate-oblong in fruit, broadly membranous margined, densely hirsute to glabrescent and setulose at the base, with c. 0.5 mm long mucro. Petals obovate to oblong-elliptic, up to c. 6 x 1.5 mm, claw hairy. Staminodes lanceolate-ovate, hirsute to glabrous. Fertile filaments 1 or 2-dentate and sparsely hairy to glabrous. Mericarps 4-5 mm long, apical pits glandulose, each with a large, distinct eglandular furrow beneath; beak 2.5-4 cm long, with 7-8 spirals, barbate.

Type: June 1839, *Delile* (MPU).

A-6 Dariana, c. 40 km from Benghazi, saline flat, 16.6.1972, *S.I.Ali* 494; A-7 c. 2 km from Faidia, near Alaigan, stony roadside, fls. violet-pink, 21.6.1972, *S.I.Ali* 811; c.

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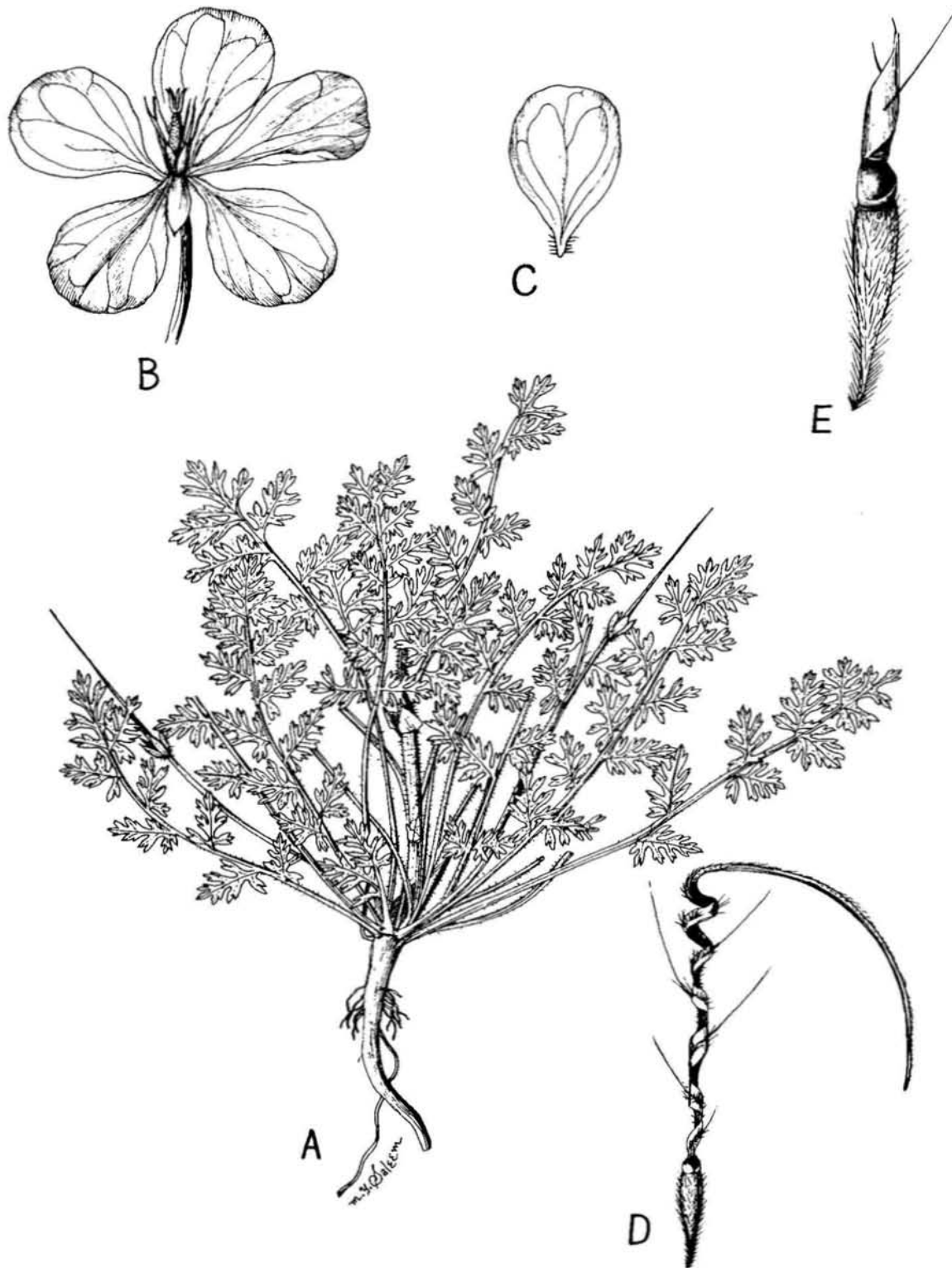


Fig. 7, *Erodium cicutarium*: A, habitat x 1/2; B, flower x 3; C, petal x 3; D, mericarp with beak x 3; E, mericarp with apical pit x 6

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16 km from Labrag (c. 30 km from Lamluda), stony roadside, c. 25 cm tall, 13.6.1972, *S.I.Ali* 732; c. 20 km from Taknes, 17.6.1972, *S.I.Ali* 574; c. 20 km from Alaigan (Derna-Martuba), stony area, flowers violet, 21.6.1972, *S.I.Ali* 818a; c. 55 km from Baida towards El-Marj, Northern Road, along roadside, flowers violet, branches ascending, 10-15 cm tall, 23.6.1972, *S.I.Ali* 188.

Distribution: Libya, Egypt, Palestine, Jordan, Kuwait, Iraq, S. Arabia and Iran.

Common in the N.E. parts of Libya (Gebel Akhdar area).

Fl. March-June

6. ***Erodium cicutarium* (L.) L'Herit.** in Aiton, Hort. Kew. 2: 414. 1789; Durand & Barratte, l.c. 54; Pamp., Prodr. Fl. Ciren. 291. 1931; Quezel & Santa, l.c. 599; Keith, l.c. 463 (Fig. 7).

Geranium cicutarium L., Sp. Pl. 680. 1753; *G. bipinnatum* Cav., Monad. Class. Diss. Dec. 5: 273. t. 126. f. 3. 1790; *E. bipinnatum* (Cav.) Willd., Sp. Pl. 3: 62. 1800; Keith, l.c. 463; *E. cicutarium* (L.) L'Herit. ssp. *bipinnatum* (Cav.) Tourlet, Cat. Pl. Indre Loire 102. 1908.

Annual or biennial, mostly caulescent, up to 50 cm tall, $\pm$ foetid herb with ascending to suberect, glandular-eglandular whitish hairy branches from the base. Leaves imparipinnate compound, oblong-lanceolate in outline, up to 15 cm long, sparsely to densely hairy; leaflets 5-13, lateral ones alternate, ovate, 5-20 (-25) x 2.5-10 (-12) mm, $\pm$ oblique at the base, deeply uni- to bipinnatifid or -sect, lobules obtuse or acute-acuminate, terminal leaflet obovate, deeply 3-5-fid or sect; stipules narrowly triangular or lanceolate-ovate, (2-) 4-7 x 2-4 mm long, ciliate on margins, acute-acuminate. Inflorescence (2-) 3-6 (-10)-flowered; peduncle longer than the subtending leaves, sparsely glandular-hairy to eglandular. Flowers mauve or purplish-pink, lilac or rarely white, c. 1-1.5 cm across; pedicel 8-20 mm long, appressed eglandular hairy to glandular-villose, patent or deflexed in fruit; bracts several, basally connate up to middle, triangular-ovate, 1.5-2 mm long, brownish, cuspidate to apiculate, sparsely hairy, margins ciliolate. Sepals narrowly lanceolate-ovate to oblong-elliptic, 3.5-5 x 1-2 mm, enlarged up to c. 7 x 2.5 mm in fruit, 3-5 nerved, appressed hairy outside, with 0.2-0.5 mm long mucro usually bearing 1-3, long terminal bristles. Petals narrowly obovate, 5-8 x 2-3.5 mm, claw minute, stiff hairy. Fertile filaments slightly dilated at the base, glabrous. Sterile filaments similar to fertile ones. Mericarps dark brown, $\pm$ patent hairy, 4-6 (-7) mm

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long, apical pits eglandular, each with or without a shallow furrow beneath; beak 2.5-3.5 (-4) cm long, persistent, barbate.

Type: Described from Europe, Herb. Cliff. (BM), Herb. Linn. 858/43 (LINN).

A-2 Garian, Youth Centre Compound, prostrate, 11.4.1974, *S.I.Ali* 2094; Ibid, limestone hill, prostrate, flowers violet-pink, 12.4.1974, *S.I.Ali* 2109; Ibid, prostrate, flowers white, small, sandy soil, 12.4.1974, *S.I.Ali* 2083; **A-3** Faculty Garden, Tripoli, violet flowers, prostrate, 24.4.1972, *A.A.Letief & O. Khweldi* s.n.; Tripoli, Hadaba Tool road, near Saidlia, opposite Petrol pump, prostrate, $\pm$ fleshy herb fls. pinkish-purple, 4.4.1978, *A. Ghafour* s.n.; **A-7** 22 km S.W.Massah, Gebel Akhdar, 17.1.1978, *A. Ghafour* s.n.; **A-7** 22 km S.W.Massah, Gebel Akhdar, 17.1.1967, *L. Boulos* 1116; Shahat (Cyrene) to Faïda, S. of Beida crossroads, 700 m, limestone pasture, annual, flowers pale-mauve, 1 April 1970 *P.H.Davis* 50520 and 50521.

Distribution: Europe, N. Africa, S. W. and C. Asia.

A highly polymorphic species in which a number of subspecies and varieties are recognised, although intermediates are not uncommon. Davis (Fl. Turk. 2: 487, 1967) recognises two subspecies, ssp. *cicutarium* and ssp. *bipinnatum* (Cav.) Tourlet. The latter is differentiated from the former by its mericarps without or with a very faint furrow beneath apical pits, similar basal and cauline leaves and leaflets with obtuse laciniae. Our material could be distinguished into these subsp. on the basis of presence or absence of furrow below apical pits of mericarps but the leaf character fails in maintaining their separate subspecific identity.

Common on stony mountainsides, fields and in gardens in sandy and calcareous soils up to 700 m in the Gebel Nefousa and Gebel Akhdar area.

Fl. March-April *Vern.* Dahmiyet abu-bakr; Dahmiyet el-ghazl.

7. ***Erodium tocranum*** Guitt. et Le Houerou, Bull. Soc. Bot. France 115: 596. 1968; Guitt. in Boissiera 20: 109. 1972; Keith, l.c. 468.

Annual, caulescent herb. Leaves paripinnate compound; leaflets entire to pinnatifid; stipules membranous, ovate, acuminate, ciliate on margins. Inflorescence 3-6-flowered; bracts membranous, free, nerves green, ciliate. Sepals lanceolate, 3-5-nerved, with c. 0.5 mm long or obsolete mucro. Petals rosy, lanceolate, slightly unequal, 3-nerved, claw ciliate. Fertile filaments with violaceous anthers. Antherless filaments narrowly lanceolate, glabrous. Mericarps narrowly

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oblanceolate-oblong, 5-6 mm long, antrorsely-spreading hairy; apical pits glabrous with a narrow furrow beneath; beak 4-6 cm long, barbate.

Type: Libya « Cyrenaique, sommet de la falaise entre Tocrâ et Barce (Aguba et Bakkor), dans un champ de blé à 100 m ex arrière de la falaise, *Le Houerou* 23046406, Herb. Afr. (P).

Distribution: Known from the type gathering only.

Differs from *E. cicutarium* by its slightly longer beak (4-6 cm long) and with distinct furrow below the apical pits of mericarp. Further studies are needed to ascertain its absolute identity from the preceding species.

8. ***Erodium malacoides*** (L.) L'Her. ex Aiton, Hort. Kew. ed. 1. 2. 415. 1789; Willd., Phytogr. 1: 10. 1794; Durand & Barratte, l.c. 55; Pamp., Prodr. Fl. Ciren. 293. 1931; Quezel & Santa, Nouv. Fl. Alger 2: 578. 1963. p.p.; Keith, l.c. 467. (Fig. 8).

Geranium malacoides L., Sp. Pl. 680. 1753.

Annual or biennial, procumbent or ascending to erect herb, up to 60 cm tall, with deflexed or often glandular hairs on grooved stem. Leaves simple, with up to 15 cm long petiole; lamina of basal and cauline leaves cordate-ovate, 2-10 x 1-5 cm, crenate to dentate or sometimes pinnatifid, (3-) 5-7-lobed, lobes often broader than long, subappressed hairy; stipules whitish-membranous, broadly triangular-ovate to broadly ovate, 3-8 mm long, $\pm$ obtuse to acute, ciliate on margins. Inflorescence (3-) 5-7 (-8)-flowered; peduncles much longer than the subtending leaves, eglandular or glandular hairy. Flowers pink or mauve-pink, 1.2-2 cm across; pedicel 1-2 cm long, glandular hairy; bracts usually 4-6, whitish, ovate-orbicular, 2-3 mm long, ciliate. Sepals ovate-oblong to narrowly obovate-oblong, (3-) 4-6 (-7) x 1.5-2.5 mm, 5-nerved, glandular and simple hairy outside, with up to 1 mm long purplish mucro bearing 2-bristles. Petals obovate, as long as to 1.5 times longer than the sepals, claw hairy. Fertile and sterile filaments glabrous. Mericarps brown, 4-5 mm long, antrorsely whitish-hairy, apical pits gland dotted, each with a single, sometimes gland dotted, furrow beneath; beak (1.8-) 2-2.8 (-3.8) cm long, barbate.

Type: Described from Italy and England, Herb. Cliff. (BM).

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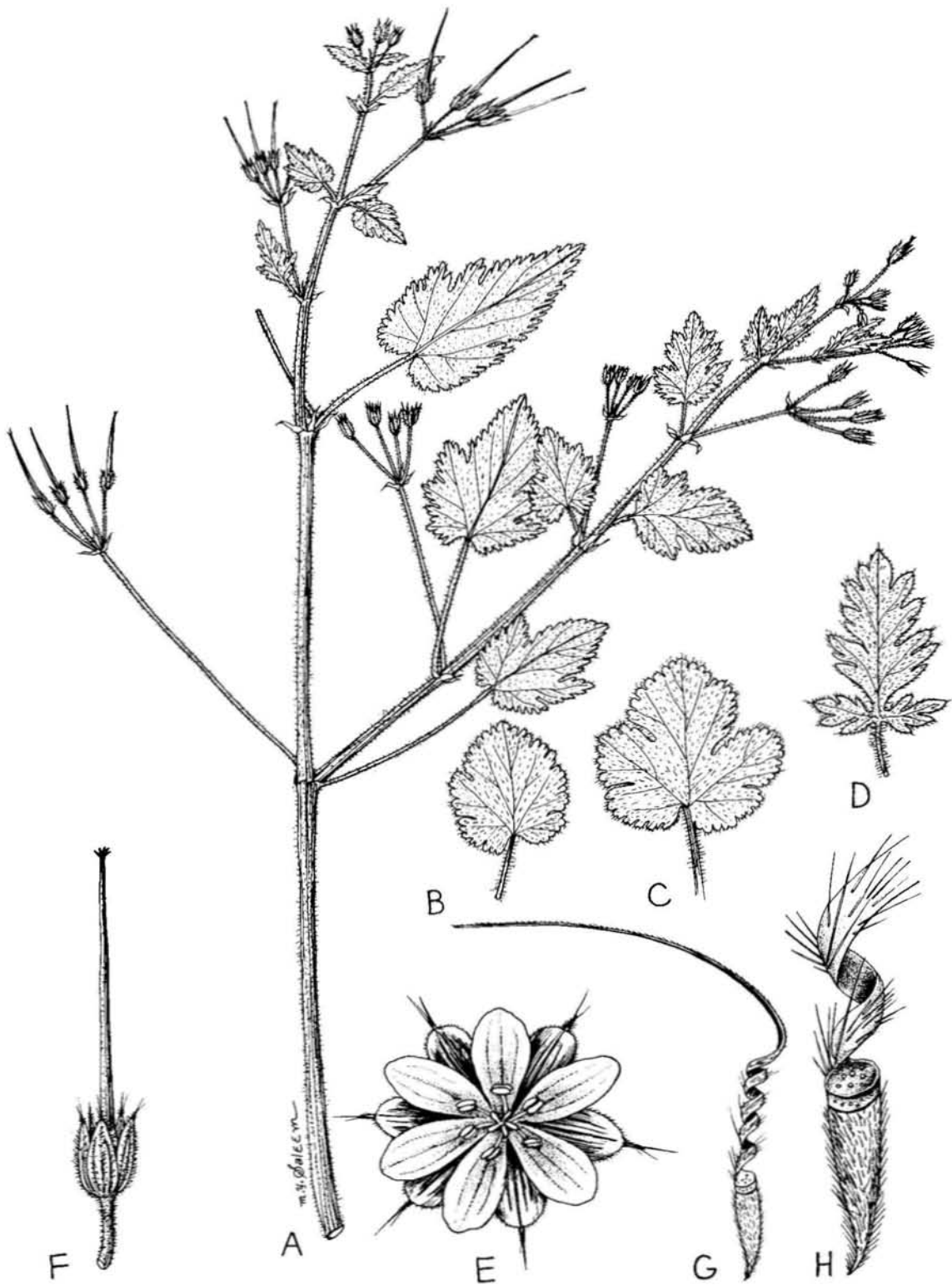


Fig. 8, ***Erodium malacoides***: A, flowering & fruiting branch x 1/2; B, C, leaf variation x 1/2; D, deeply dissected leaf x 2; E, flower (surface view) x 3; F, fruit x 2; G, mericarp with beak x 4; H, mericarp with glandular apical pits x 8.

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A-2 Gebel Nefousa, 23.3.1971, *L. Boulos* 4535; Garian-Youth Hostel Compound, sandy soil, prostrate, flowers violet-pink, 12.4.1974, *S.I.Ali* 2089; **A-3** 22 km west Khoms, on calcareous slopes, 25.4.1967, *L. Boulos* 1784; Al-Gubba, near Derna, 1.3.1973, *S.I.Ali* 1189; **A-7** Shahat, roadside, erect herb, c. 20 cm, 28.2.1973, *A.El-Tiafe* 19; 20 km after Taknes, erect herb, 30 cm, violet flowers, 2.3.1973, *A.El-Tiafe* s.n.; Sabag, near Al-Gubba, 2.3.1973, *S.I.Ali* & *S.A. Faruqi* 1205; c. 16 km from Labrag (c. 30 km from Lamluda) stony roadside, prostrate, 13.6.1972, *S.I.Ali* 722; Gebel Akhdar, 26.2.1973, *Nuria'El-Migirbi* s.n.; Below Cyrene (Shahat) ruins, 500-600 mm, rocky limestone gulley dominated by *Phrygana*, annual, flowers mauvish-pink, 26 March 1970, *P.H.Davis* 50067; Shahat, 28.3.1973, *S.I.Ali* & *S.A.Faruqi* 999; Wadi Mahbool, coastal road from Baida to Derna, prostrate spreading branches, pink flowers, 1.3.1973, *S.I.Ali* & *S.A.Faruqi* 1138; Wadi Derna, 20.1.1967, *L. Boulos* 1310; Gebel Akhdar, Gasr El-Libya, c. 150 m from sea level, clay loam soil, prostrate to suberect herb with purplish blue flowers, fruit beaked, beaks c. 2 cm long, 5.5.1978, *A. Ghafoor* 373.

Distribution: Mediterranean region, Turcomania, Caucasia to Pakistan.

Common in the maritime hilly areas of N. Libya.

A very variable species in leaf size, shape, incision and sometimes approaching close to *E. subtrilobum* Jord., but differs in its glandular pits, smaller mericarps and beak size.

Used as a pot herb in Palestine and N. Africa.

Fl. February-April *Vern.* Rogma

9. ***Erodium neuradifolium*** Delile in Godron, *Fl. Juv.* 17.1853; Agnew in Kew Bull. 21(2): 225. 1967; Schonbeck-Temesy in Rech. f., *Fl. Iran.* 69: 51. 1970. (Fig. 9).

E. aegyptiacum Boiss., *Diagn. Pl. Or. Nov. Ser.* 2(3): 111. 1854; *E. angulatum* Pomel, *Nouv. Mat. Fl. Atl.* 341. 1874; Keith, l.c. 462; *E. aragonense* Lose ex Willd., *Illust. Fl. Hisp.* 2: 127. t. 105. 1886-92; *E. malacoides* var. *ribifolium* Brumh., *Mon. Ubers. Erod.* 45. 1905.

Annual or biennial, caulescent, up to 40 cm tall herb, beset with patulous to retrorse appressed or sometimes glandular hairs on procumbent to ascending

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Fig. 9. **Erodium neuradifolium**: A, flowering & fruiting branch x 1/2; B, flower x 5; C, mericarp with beak x 5.

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branches. Leaves radical and cauline, simple, usually with up to 5 cm long petiole; lamina ovate to broadly ovate, 1-6.5 x 0.5-4 cm, cordate at the base, $\pm$ 3-lobed or pinnatifid to pinnatipartite into acutely, incised-dentate lobes, densely appressed pubescent to subpatulous greyish hairy; stipules whitish-brown, triangular-ovate, 3-5 mm long, acute-acuminate, ciliolate on margins. Inflorescence 3-8-flowered; peduncles usually longer than the subtending leaves, up to c. 7 cm long, pubescent. Flowers mauve or purplish-pink, c. 1-1.5 cm across; pedicels (8-) 10-25 mm long, patulous hairy or sometimes glandular hairy; bracts 4-6, broadly ovate, (2-) 3-4 mm long, acute-obtuse, often $\pm$ connate below, white, pubescent. Sepals lanceolate-oblong to narrowly obovate-cuneate, 3-6 x 1-2.5 mm, prominently 5-nerved, hairy, with c. 0.5-2 mm long mucro. Petals narrowly obovate-cuneate, slightly longer than sepals, ciliate at the base. Fertile filaments and staminodes glabrous. Mericarps brown, 4-5 mm long, antrorsely whitish hairy, apical pits glabrous, each with a single glabrous furrow beneath, beak 2.5-4.5 cm long, barbate.

Type: « Port Juvenal » 1827 *Touchy* (MPU).

A-7 Qaminis-Benghazi road, 9.3.1968, *L. Boulos* 1984; Above Derna, on road to Martouba, 400 m, limestone plateau in ravine, annual, flowers mauve, 30 March 1970, *P.H. Davis* 50322; Gebel Akhdar, Gasr El-Libya, c. 150 m from sea level, clay loam soil, prostrate to suberect herb, 5.5.1978, *A. Ghafoor* 376; **A-8** Tamimi to Omm Rezem, 5-50 m, sandy wadis (flooded last autumn), annual, procumbent, flowers mauve, 30 March 1970, *P.H. Davis* 50282.

Distribution: Canaries, S.W. Europe, N. Africa eastwards to Iran and Afghanistan.

Fl. December-March *Vern.*: Henet El-Gula

10. ***Erodium laciniatum*** (Cav.) Willd., *Sp. Pl.* 3: 633. 1800; Durand & Barratte, *Fl. Lib. Prodr.* 54. 1910; Pamp., *Prodr. Fl. Ciren.* 292. 1931; Keith, *l.c.* 466 (Fig. 10).

Geranium laciniatum Cav., *Monad. Class. Diss.* Dec. 4: 228. t. 113. fig. 3. 1787; *G. pulverulentum* Cav., *l.c.* 272 t. 125. f. 1. 788; *E. pulverulentum* (Cav.) Willd. *l.c.* 632; Schonbeck-Temesy, *l.c.* 53; Guittonneau in Boissiera 20: 81. 1972; *G. triangulare* Forsk., *Fl. Aegypt.-Arab.* 123. 1775 (-*nom. ambig.*); *E. triangulare* (Forsk.) *Musch., Man. Fl. Egypt* 558. 1912; Ozenda, *Fl. Sahara* 309. fig. 102. 1958; Quezel & Santa, *Nouv. Fl. Alger.* 2:

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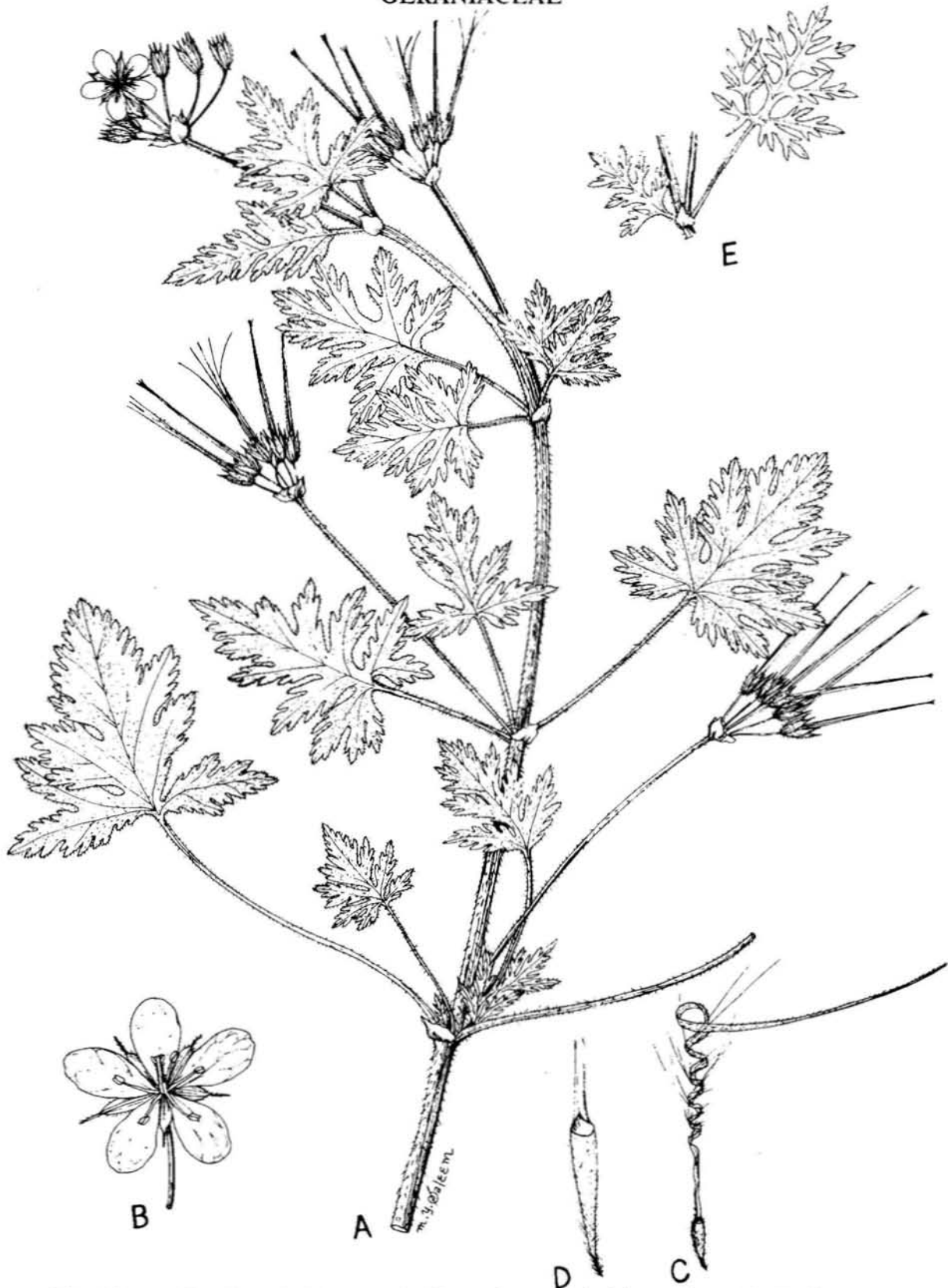


Fig. 10, ***Erodium laciniatum***: A, flowering and fruiting twig x 1.5; B, flower x 1.5; C, mericarp with beak x 1.5; D, enlarged mericarp x 5. E, leaf variation x 0.5

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580. 1962; Keith, l.c. 468; *E. bovei* Del., Ind. Hort. Monsp. 6. 1838 - *nom. nud.*; *E. involucratum* Kunze in Fl. 29: 740. 1846; *E. laciniatum* var. *involucratum* (Kunze) Willk. et Lange, Prodr. Fl. Hisp. 3: 539. 1878; *E. laciniatum* var. *pulverulentum* (Cav.) Boiss., l.c.; *E. subtrilobum* Jord. ssp. *pulverulentum* (Cav.) Vierh., Zool.-Ges. Wien 69: 133. 1919 - p.p.; *E. laciniatum* ssp. *pulverulentum* (Cav.) Burt & Lewis in Kew Bull. 1954. 405. 1954.

Annual or biennial, caulescent, prostrate-procumbent to suberect, up to 50 cm tall herb, with retrorsely or antrorsely hairy to tomentellous, occasionally glandular or glabrous, grooved shoots. Leaves simple, with up to 10 (-15) cm long petioles; lamina broadly cordate-ovate or triangular-ovate to ovate-elliptic or oblong-elliptic, (1-) 2-7 (-10) x (0.5) 1-4 (-5) cm, crisped-pubescent to glabrescent, undivided and irregularly serrate to variously dissected, lamina of basal ones pinnately 3-7-fid or partite into oblong-lanceolate, crenate-dentate or pinnatifid segments with narrow, acutish lobules; cauline leaves often almost bipinnatisect into linear-lanceolate, entire or trifid segments; rhachis lobed; stipules ovate, 5-8 (-12) x 3-5 (-7) mm, brownish, glabrous. Inflorescence (2-) 4-8 (-9)-flowered; peduncle longer than the leaves, eglandular, deflexed hairy to glabrous. Flowers small, purple, c. 10-15 mm across; pedicel 1-2 (-3) cm long, glabrescent to densely patulous hairy; bracts 2, united up to middle, broadly ovate-suborbiculate to reniform, glabrous, brown, obtuse. Sepals 3-4 x 1-1.5 mm, enlarging up to 7 x 2.5 mm in fruit, 3-5-nerved and appressed or patulous hairy outside, with 0.5-1.5 mm long mucro. Petals oblong to obovate-cuneate, 6-10 x 3-6 mm, ciliate at the base. Fertile and sterile filaments entire or 1-2-dentate, glabrous. Mericarps brown, 4-6 mm long, antrorsely whitish hairy, apical pits eglandular, without a furrow beneath; beak 3.5-8 (-9) cm long, barbate.

Type: Mauritania, *D. de Jussieu* (MA, Photo.-K).

A-2 Omerramel, Cabaw, soil sandy, prostrate, corolla reddish, 7.6.1974, *B. Faris* 465; c. 26 km from Nalut, 26.2.1975, *S.I. Ali* 2204; Gebel Nefousa, Rhnem-Jefren, 500 m, limestone hills, annual, flowers mauve, 15 March 1970, *P.H. Davis* 49546; Ras el-Jadir, Libyan-Tunisian border, prostrate herb, flowers purplish-pink, *A. Ghafoor* & *S.A. Alavi* 122; Gebel Nefousa, 23.3.1971, *L. Boulos* 3526; 2 km before Gharian, limestone hill, stony slope, fls. light violet, *S.I. Ali* 1630; Ginoun, near Jadoo, hilly area, c. 15 km from Shakshook on way to Jadoo prostrate herb, flowers pinkish-violet, 27.11.1976, *A. Ghafoor* & *S.A. Alavi* 205; **A-3** 6 km S.W. Tripoli, Sawani road, 1.1.1968 *L. Boulos* 1042; Wadi El-Maiet (Wadi El-Haya) project, prostrate, 28.5.1974, *B. Faris* 363; Tarhuna road, Waginin branch, 16 km to the

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South, 20.3.1973, *B. Faris* 151; Tripoli, Faculty of Science, Sidi El-Masri, 22.4.1967, *L. Boulos* 1761; El-Faateh University Campus, fls. purple, 25.4.1977, *Mohd. Ahmad* s.n.; Wadi El-Janin, c. 36 km from Tripoli on way to Tarhuna via Benghasher, fls. purple, 21.1.1977, *S.A. Alavi* 1064; 12 km west Tripoli, near the sea shore, 24.3.1967, *Boulos, Tawil & Bouni* 1605; Tripoli, Hadaba Sharqia-University lane, under shade, flowers pink, leaves much dissected, 25.3.1976, *S.M.H. Jafri* 6434; Barley fields facing Faculty of Science, Sidi El Masri, sandy soil, *L. Boulos* 1699; El-Faateh University campus, sandy soil, herb with spreading to erect branches, up to 20-35 cm tall, fls. purple-blue, *A. Ghafoor* 294, 304 and 308; *ibid*, leaves very much incised, fls. pink purple, 6.3.1977, *M.A. Siddiqi* 194; Misurata, 15.1.1967, *L. Boulos* 1060; **A-6** Tokra, 3.3.1973, *S.I. Ali & S.A. Faruqi* 1301; **B-2** Kaleba, c. 30 km from Garian, barley field, sandy soil, prostrate, 10.4.1974, *S.I. Ali* 1890; Al-Awenia, c. 7 km from Rumia, near barley field, prostrate, 11.4.1974, *S.I. Ali* 2048; c. 7-8 km before Zintan, (Between Reana & Zinten), near cult. field, sandy soil, 11.4.1974, *S.I. Ali* 2074.

Distribution: N. Africa, S. Europe Eastwards to Pakistan.

A very variable species in almost all characters and divided by Vierhapper (Zool.-Bot. Ges. Wien 69: 122-140. 1919) into a number of infraspecific taxa each with a series of varieties and forms which are based on overlapping and poorly correlated characters. It is not possible to separate ssp. *pulverulentum* from type subspecies in our material as all integrating, but apparently distinct and extreme forms are met with.

Very common in maritime sands and other dry places in Gebel Nefousa etc.

Fl. January-April *Vern.* Ragma, Henet El-Gula

11. ***Erodium keithii*** Guitt. et Le Houreou in Bull. Soc. Bot. Fr. 115. 591. 1968; Keith, l.c. 466. (Fig. 11).

Annual, caulescent, procumbent or ascending, beset with capitate, 3-4-celled glands and few unicellular, non-capitate glands. Leaves simple, basal suborbicular, entire to 3-lobed, middle lobe 3-5-lobuled, lateral lobes 2-lobuled; stipules membranous, ovate, ciliate on margins, acute, brown. Inflorescence 4-7-flowered umbel; bracts 3-6, free, lanceolate to ovate, ciliate on margins. Sepals lanceolate, 3-7-nerved, hirsute, marginally ciliate, with 1-2 mm long mucro at the apex. Petals bright red, subequal, 3-nerved 1.5 times as long as sepals, claw glabrescent. Fertile filaments with violet anthers, antherless filaments lanceolate, glabrous. Mericarps

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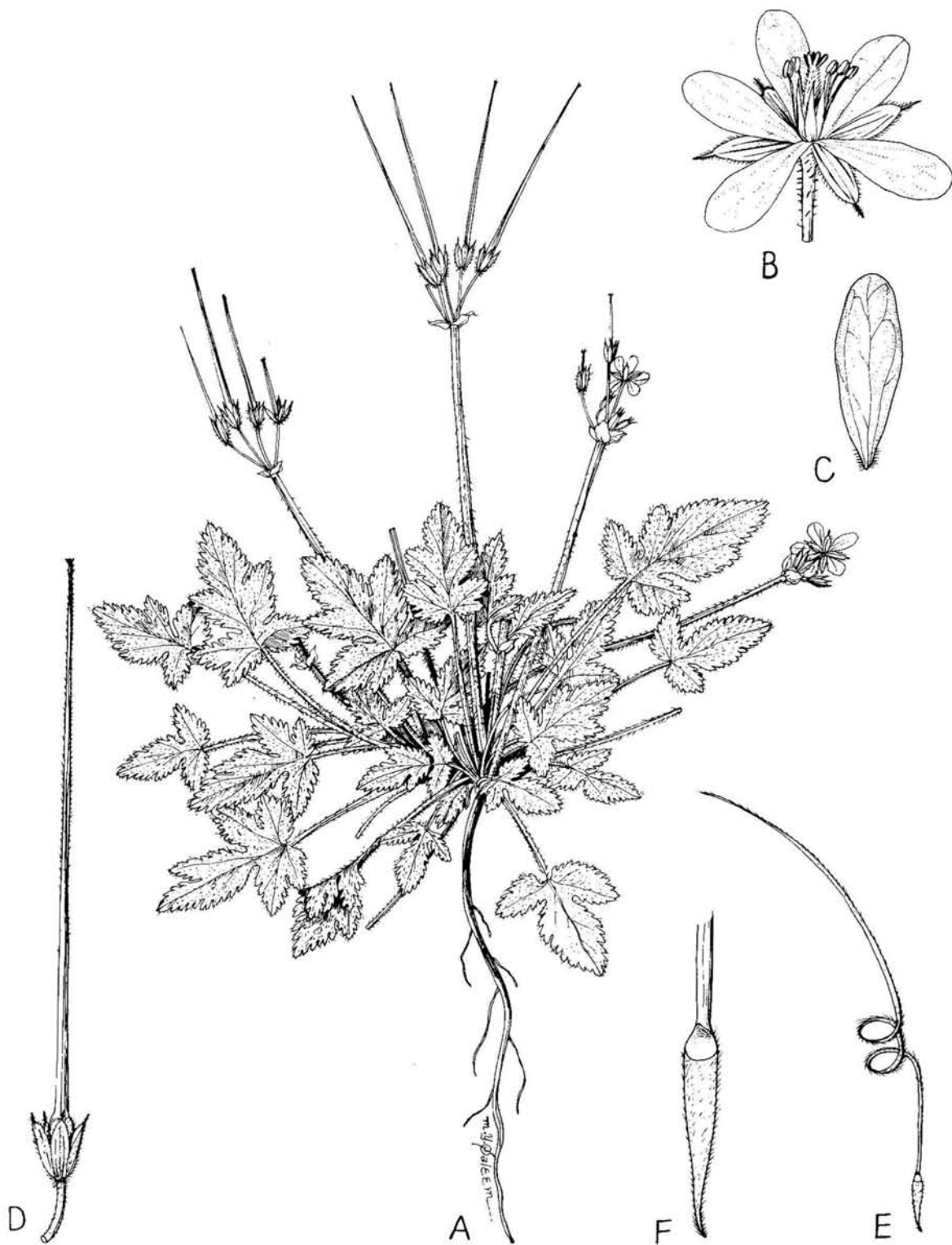


Fig. 11. *Erodium keithii*: A, habit x 1/2; B, flower x 3; C, petal x 4; D, fruit with calyx x 1.5; E, mericarp with beak x 1.5; F, enlarged mericarp with apical pit x 5.

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oblongish, 5-5.5 mm long, antrorsely hairy; apical pits without or with a very faint or inconspicuous furrow beneath, glabrous; beak 4-5 cm long, barbate.

Type: Libya: «rochers calcaires nummulitiques au-dessus d'Appolonia vers-Cyrene, *Le Houreou* 26046401, Herb. Afr. (P).

B-2 Jadoo, fls. deep pink, 24.1.1977, *M.A.Siddiqi* 188; **B-4** Sirte, 23.1.1977, *M.A.Siddiqi* 164.

Distribution: Endemic to Libya.

Differs from *E. chium* by its glabrous staminodes and base of the fertile stamen filaments, mericarps c. 5 (-5.5) mm long and beak 4-5 cm long. However, it needs further studies in our area to ascertain its absolute identity as a species from *E. chium*.

Fl. January-Feb.

12. ***Erodium chium*** (L.), Willd., *Phytogr.* 1: 10. 1974; Quezel & Santa, *Nouv. Fl. Alger.* 2: 580. 1962; Keith, *l.c.* 463.; Webb & Chatter, *Fl. Europ.* 2: 200. 1968; Tackholm, *Stud. Fl. Egypt.* ed. 2.297. 1974.

Geranium chium L., *Syst. Nat.* 2: 1143 May-June 1759; Burm. f., *Sp. Geran.* 32. August 1759.

Annual or biennial, usually caulescent, up to 50 cm tall herb, beset with deflexed hairs on ascending branches. Leaves up to 8 cm long, with deflexed hairy petiole; lamina ovate to broadly ovate-oblong, 2-5 (-6) x 1.5-4 (-5) cm, cordate at the base, lower shallowly pinnatifid, upper tripartite or tripinnatisect, lobes crenate-serrate, pressed whitish hairy, acute; stipules ovate-oblong, whitish-brown. Inflorescence 2-8-flowered; peduncle longer than the subtending leaves, deflexed hairy to glabrescent. Flowers purplish-pink, 1-1.8 cm across; pedicels up to 2 cm long, glabrescent; bracts 3 or more, ovate, 2-3 mm long, whitish-brown, acute. Sepals ovate-oblong, 4-5 mm long, enlarged up to 7 mm in fruit, hairy outside, with c. 1 mm long mucro at the apex. Petals obovate, 5-9 mm long, claw ciliate. Staminodes and fertile filaments ciliate at the base. Mericarps brown, 4-4.5 mm long, antrorsely hairy, apical pits eglandular, without furrow beneath; beak 3-3.5 (-4) cm long, barbate.

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Type: Described from S. Europe (?).

Reported from Cyrenaica (Bengazi, Tolmeta, Derna) and Tripolitania by Keith (l.c.) but its occurrence seems to be doubtful. The materials referred to this S. European species, from Libya and neighbouring countries may actually be that of the preceding species. However, the occurrence of this species in our area needs confirmation.

Distribution: S. Europe, Turkey and N. Africa (?).

13. **Erodium guttatum** (Desf.) Willd., Sp. Pl. 3: 636. 1800; Trotter, Fl. Econ. Lib. 224. 1915; Ozenda, Fl. Sahara 307. fig. 101. 1958; Quezel & Santa, Nouv. Fl. Alger. 2: 578. 1962; Keith, l.c. 1: 465. (Fig. 12).

Geranium guttatum Desf., Fl. Atl. 2: 113. t. 169. 1798; *G. malapoides* Desf., l.c. 112; *Erodium nervosum* Pamp. in Arch. Bot. 12(1): 33. 1936 - **syn. nov.**

Perennial, caulescent, up to 30 cm tall, whitish-appressed hairy herb with ascending branches from the base. Leaves radical and cauline, with up to 12 cm long petiole, simple; lamina ovate or triangulate-ovate, 1-3 x 0.5-2 cm, cordate to truncate at the base, the lower undivided and crenate-dentate, the upper shallowly to deeply 3-lobed, lobes dentate; stipules triangular-ovate, 3-5 x 1.5-2.5 mm, light brown, acute-acuminate. Inflorescence 3-4 (-6)-flowered; peduncles always longer than the subtending leaves. Flowers deep violet or violet blue with black centre, c. 2-2.5 cm across; pedicels up to 3.5 (-4) cm long, whitish appressed tomentose; bracts triangular-lanceolate, acute, hairy. Sepals oblong-elliptical, 8-11 (-12) x 4-6 mm, membranous margined, densely canescent hairy outside, with c. 1-2 mm long awn at the apex. Petals obovate, 12-14 x 5-8 mm, hairy at the base, somewhat retuse or not at the apex. Fertile filaments basally dilated, $\pm$ squarish, 2-toothed, ciliate above, sterile filaments much reduced, dilated and ciliate at the base. Mericarps yellowish, 7-9 mm long, antrorsely whitish-brownish hairy, apical pits broad, glandular within, each with a shallow furrow beneath; beak 6-10 cm long, twisted coiled, barbate internally, barbes brown.

Type: « Habitat in arenis prope Belide (Algeria) » Herb Desf. (P.).

A-2 Gebel Nefousa. 23.3.1971, L. Boulos s.n.

Also reported by Keith (l.c.) from Kussabat, Ras Takout (Garian) and Azizia etc.

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Fig. 12, *Erodium guttatum*: A, habit x 1/2; B, flower x 1; C, mericarp with beak x 1; D, enlarged mericarp x 4.

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Distribution: S.W. Europe (Spain), N. Africa and Palestine.

A rare or undercollected Saharo-Arabian element in our area, growing in calcareous sandy soils. According to Trotter (l.c.) it is common in pre-desert and desert areas of Tripolitania.

Fl. March-April Vern. Dhemma, Zemma

14. **Erodium ciconium** (L.) L'Herit. in Aiton, Hort. Kew. 2: 415. 1789; Durand & Barratte, l.c. 54; Pamp., Prodr. Fl. Cir. 291. 1931; Keith, l.c. 463. (Fig. 13).

Geranium ciconium L., Cent. Pl. 1: 21. 1755.

Annual or biennial, procumbent to erect, caulescent, up to 60 cm tall, branched herb with deflexed and glandular hairs on furrowed stem and shoots. Leaves simple with up to 15 cm long, appressed hairy petioles; lamina triangular-ovate to ovate-elliptic in outline, 1.5-10 x 1-7 cm, deeply uni or bipinnatifid or sect into ovate-lanceolate or linear-oblong, c. 1 cm or more long, crenate or incised, appressed hairy segments, rachis winged, dentate or lobed between the main segments; stipules ovate to lanceolate-ovate, 5-10 x 3-6 mm, brownish, acute-acuminate, pubescent. Inflorescence (2-) 3-6 (-8)-flowered; peduncle up to 12 cm long, mostly longer than the subtending leaf, angular, deflexed hairy. Flowers purple or purplish-violet, 1.5-2 cm across; pedicel 1-2 cm long, glandular hairy; bracts several, free, akin to stipules, 2-5 mm long, free, hairy. Sepals oblong, 5-10 x 2-3 mm, enlarging up to 15 x 5.5 mm in fruit, externally 5-nerved and glandular hairy, membranous margined, acute with 2-4 mm long mucro. Petals obovate, 8-10 x 2-4 mm, claw short, hairy. Fertile filaments dilated, ciliate. Sterile filaments lanceolate-ovate, ciliate-glabrescent. Mericarps greyish-black, 8-12 (-15) mm long, subpatent whitish hairy, apical pits narrow, deep and glandular hairy, each without basal furrow; beak stout, thick, (5-) 6-10 (-12) cm long, barbate.

Type: Described from S. Europe (Valesiae Italiae, Monspellii), Herb. Linn. 858/53 (LINN).

A-8 Timimi to Omm Rezem, 5-50 m, sandy wadis (flooded last autumn), annual, 30 March 1970, *P.H. Davis* 50269; **B-2** 7 km before El-Zintan, reddish flowers, rocky soil, 11.4.1974, *M. Godeh* 252.

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Fig. 13, **Erodium ciconium**: A, habit x 1/2; B, mericarp with beak x 2; C, mericarp with apical pit x 3.

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Distribution: S. Europe, N. Africa, eastwards to W. Asia, Central Russia, Iran, Afghanistan and Pakistan.

Fl. March-May *Vern* Khlal el Guley

15. ***Erodium gruinum*** (L.) L'Her. ex. Aiton, Hort. Kew 2: 415. 1789; Durand & Barratte, l.c. 54; Pamp., l.c. 291; Quezel & Santa, Nouv. Fl. Alger. 2: 581. 1962; Keith, l.c. 1: 464. (Fig. 14).

Geranium gruinum L., Sp. Pl. 680. 1753; *E. gruinum* var. *subpinnatum* Brumhard in Feddes, Repert. 2: 118. 1906, *E. gruinum* var. *subglandulosum* Eig. in Beih. Bot. Centralbl. 50 (2): 233. 1932.

Annual or biennial, ascending to erect up to 30 (-50) cm tall, sparsely retrorse or patent hairy to glabrescent herb with thick, grooved shoots. Leaves radical and cauline, simple, rarely $\pm$ compound with up to 10 (-12) cm long, retrorse hairy, $\pm$ grooved petiole; lamina ovate to ovate-lanceolate or oblong-lanceolate, (1.5-) 3-10 (-12) x (0.5-) 1-5 (-6) cm, appressed hairy to glabrescent; radical leaves unlobed and crenate-dentate or pinnatipartite or pinnatisect into mostly 3(-5) crenate-dentate, triangular-ovate to ovate-oblong segments, the terminal segment largest, with 3-5 lobes; cauline leaves short petioled, often more deeply pinnatisect, acutely toothed, sometimes with a pair of almost free leaflets at base; stipules lanceolate-ovate to broadly ovate, 5-10 (-12) x 3-6 (-18) mm, whitish-brown, glabrous to ciliolate on margins, acute-acuminate. Inflorescence (1-) 3-6-flowered; peduncles mostly longer than the subtending leaves, hirsute to glabrous rarely subglandulose. Flowers large, violet or blue-violet, 2.5-3.5 cm across; pedicels c. 1 cm long, later elongated up to 10 times. Bracts several, akin to stipules, free, pubescent to marginally ciliolate. Sepals oblong to obovate-oblong or ovate-elliptic, 8-10 x 4-5 mm, enlarging in fruit up to 15-20 x 7-8 mm, white membranous between conspicuously thick, green, appressed hairy to glabrescent nerves, with c. 2-7 mm long mucro at the apex. Petals broadly obovate, 15-20 (-25) x 8-10 (-12) mm, glabrous at the base. Fertile and sterile filaments glabrous. Mericarps brownish, 10-15 mm long, antrorsely brownish-white haired, apical pits deep, eglandular and pitted within, each with a wide furrow beneath; beak 6 (-11) cm long, thick, reddish-barbate internally, with 2-4 coils near base.

Type: Described from Crete, Herb. Linn. 858/52 (LINN).

A-6 Zawia (Between Al-Marj & Taknes), 17.6.1972, *S.I.Ali* 526 and 533;

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Fig. 14, **Erodium gruinum**: A, habit x 1/2; B, mericarp with beak x 1; C, mericarp with apical pits x 2; D, apical pits (enlarged) x 8.

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Qaminis-Benghazi Road, 9.3.1968, *L. Boulos* 1973; Road between Al-Kuwayfiah and Daryanah, N.E.Benghazi, 10.3.1968, *L. Boulos* 2037; A-7 c. 20 km from Labrag (c. 35 km from Lamluda), stony roadside, 19.6.1972, *S.I.Ali* 707; c. 5 km from Beida towards Shahat, flowers violet, 20.6.1972, *S.I.Ali* 754; Beida, c. 55 km from Beida towards El-Marj (northern road), roadside, 23.6.1972, *S.I.Ali* 877 and 879; Shahat, 18.6.1972, *S.I.Ali* 652; 19-25 km S.E.Derna, 13.3.1968, *L. Boulos* 2324 and 2362; Above Derna, on road to Martouba, 300 m, limestone ravine on plateau, annual, flowers lavender blue, 30 March 1970 *P.H. Davis* 50316; Shahat, 28.2.1973, *S.I.Ali* & *S.A.Faruqi* 962; Al-Ghareeba, Gebel El-Akdhar, c. 100 m from sea level, soil clay-loam, suberect to spreading herb, 5.5.1978, *A. Ghafoor* 351.

Distribution: N. Africa, Sicily eastwards to Iran through Turkey, Palestine and Syria.

Common in Maritime sandy soils along the coast of Libya,

Fl. February-April

Doubtful occurrence

Erodium oxyrhynchum Bieb., (= *E. bryoniaefolium* Boiss.) is reported by Keith (l.c.) from Tripolitania without citing any specimens or specific locality. It is an E. Mediterranean and S. & C. Asian species and its occurrence in our area seems doubtful.

3. PELARGONIUM*

L'Her. ex Aiton, Hort. Kew. 2: 417. 1789.

Differs from *Geranium* by its zygomorphic flowers, with posterior sepals spurred and adnate to pedicels, beak of mericarps spirally twisting on dehiscence and only 5-7 fertile stamens present.

A genus of c. 300 species, distributed in tropical and subtropical areas, mainly centered in South Africa; represented by 4 cultivated species in Libya.

1. + Plants usually prostrate-procumbent with jointed, $\pm$ zig-zag stems. Leaves peltate, fleshy, glossy, brittle, glabrous or minutely pubescent
- Plants usually erect, with straight stems.

1. ***P. peltatum****

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- Leaves neither peltate nor glossy, softly or
stiffly hairy 2
2. + Leaves deeply palmately 5-7-lobed 3
 — Leaves shallowly 3 (or more) lobed or entire 4. **P. odoratissimum***
3. + Leaf lobes narrowly linear and pinnatifid,
 lobules revolute margined, stiff hispid on
 upperside and soft pubescent below 2. **P. radula***
 — Leaf lobes broad, not pinnatifid, coarsely to
 sharply serrate, glabrous 3. **P. grandiflorum***
1. ***Pelargonium peltatum** (L.) Soland. in Ait., Hort. Kew. ed. 1.2:427; Bailey,
 Stand. Encycl. Hort. 3: 2530. fig. 2839. 1963.

Geranium peltatum L., Sp. Pl. 678. 1753.

Usually prostrate-procumbent, much branched perennial, with slender, jointed $\pm$ zig-zag, angular stems. Leaves petiolate, peltate, fleshy, glossy and brittle, palmately 5-nerved, bluntly 5-angled or with short, wide, mostly obtuse lobes having entire margins, glabrous or minutely pubescent. Flowers shortly pedicellate, red to white or purplish, 4-8 together in long peduncled umbels. Calyx tube slender and stalk-like, 2-3 times longer than the acuminate and ciliate lobes, mostly longer than the pedicels. Petals obovate, unequal, usually twice as long as calyx lobes, the 2 upper ones erect and purple streaked or blotched, the 3 lower slightly shorter. Fertile stamens 7, the 2 uppermost very short.

Type: Described from South Africa, Herb. Linn. 858/12 (LINN).

A-3 Tripoli, Faculty of Agriculture Farms, fls. pink, 28.12.1975, *Randa M. Bughrara* 20.

Distribution: A native of S. Africa; introduced in gardens as an ornamental in many parts of the world.

Commonly grown in pots and baskets in Tripoli and elsewhere for its single and double flowers.

Fl. Almost throughout the year. *Vern:* Atr Itali

2. ***Pelargonium radula** (Cav.) L'Her. in Ait., Hort. Kew. ed. 1.2: 423. 1789;
 Durand & Barratte, Fl. Lib. Prodr. 56. 1910; Bailey, l.c. 2533. fig. 2248;

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Keith, Prelim. Check List Lib. Fl. 738. 1965.

Geranium radula Cav., Monad. Class. Diss. Dec. 262. 1787.

Erect, much branched, stiffly hispid and viscid pubescent greyish-green shrub. Leaves long petioled, deeply palmatipartite, lobes narrowly linear and pinnatifid, lobules revolute margined, all stiff hispid on the upper side and soft pubescent below; stipules ovate, free, acuminate. Flowers pedicellate, small, pale purple or rosy, 4-5 together in short peduncled umbels. Calyx tube shorter than pedicels, the lobes lanceolate setose and glandular. Petals with dark streaks. Stamens 7.

A-3 Tripoli, besides the Faculty of Science building, c. 45 cm tall, erect, fl. violet, 24.5.1973, *Assem et al* 30.

Distribution: A native of S. Africa; introduced as an ornamental in many countries.

Commonly cultivated as an ornamental for its beautiful pale-purple or rose-coloured floweres.

3. ***Pelargonium grandiflorum** (And.) Willd., Sp. Pl. 3: 674. 1800; Bailey, l.c. 3: 2530; Keith, l.c. 738.

Geranium grandiflorum Andrews, Bot. Reposit. t. 12. 1798.

Erect, up to 5 m tall, glabrous and glaucous shrub. Leaves long petioled, broadly orbicular, palmately 5-7-nerved from the top of the petiole, digitately deeply 5-7-lobed, lobes broad and coarsely to sharply serrate; stipules ovate, mucronate. Flowers pedicellate, c. 3 on each long peduncle, white. Calyx tube 3-4-times as long as the lanceolate lobes. Petals obovate, unequal, upper with 2 red streaks and broad, all thrice as long as calyx lobes.

Type: Described from S. Africa.

Distribution: A native of S. Africa; cultivated in many parts of the world, including Libya.

4. ***Pelargonium odoratissimum** (L.) Soland. in Ait., Hort. Kew. ed. 1.2: 419. 1789; Bailey, l.c. 2531.

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Geranium odoratissimum L., Sp. Pl. 679. 1753; *P. odorum* auct. non Andr.: Keith, l.c. 738.

Suberect to erect, up to c. 60 cm tall, with herbaceous, weak straggling, $\pm$ tortuose ascending softly pubescent branches from the short, thick, scaly, simple or branched, $\pm$ fleshy, woody rootstock. Leaves very long petioled, strongly and sweetly aromatic, rounded-cordate, 3-7-nerved, very soft and velvety, very obtuse, entire, dentate-crenate or obscurely 3 or more lobed; stipules deltoid-ovate, mostly connate. Flowers small, pedicellate, white or whitish, 5-10 together in leaf-opposed long peduncled umbel-like inflorescence. Calyx tube as long as the pedicels and longer than the lanceolate, membranous margined, acute lobes, more or less pubescent. Petals linear-spathulate, twice or less longer than calyx lobes, obtuse. Stamens 6 or 7.

Type: Described from South Africa, Herb. Linn. 858/25 (LINN).

Distribution: A native of S. Africa; introduced as an ornamental in many parts of the world.

Reported by Keith (l.c.) to be commonly cultivated in gardens in Libya for its sweet scented leaves used by the Arabs for flavouring tea and bread, although it produces very foul brew in tea.

Vern: Atr Arabi

4. GERANIUM

L., Sp. Pl. 676. 1753; Gen. Pl. ed. 5: 306. 1754.

Herbs, mostly hairy, occasionally woody or caespitose. Leaves petiolate, usually basal and cauline, opposite or alternate, $\pm$ orbicular, generally broader than long, palmately differently incised, rarely unlobed and dentate. Inflorescence terminal or axillary, (1-) 2-3-flowered, pedunculate, rarely sessile, simple umbellate cyme. Flowers pedicellate, actinomorphic, violet, purple or reddish pink to white; disc with 5 glands. Sepals 5, generally mucronate, imbricate. Petals 5, obovate to obcordate, entire, emarginate or 2-3-lobed, imbricate. Stamens 10 in 2 whorls, all fertile, rarely 3-5 sterile, free or $\pm$ connate at the base. Ovary 5-loculed, each locule 2-ovuled; style long, subterminal adhering to carpel beak; stigmas 5, filiform. Schizocarp beaked, splitting into 5, 1-seeded, dehiscent mericarps with persistent, internally glabrous beaks rolling from the base of calyx upwards and remaining

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attached to central part of style at tip. Seeds with little or no endosperm.

A genus of c. 400 species, distributed mostly in temperate and subtropical regions of both hemispheres; represented by 8 species in Libya.

In the descriptions in our flora the word *segment* is used to indicate a primary division of the leaf, *lobule* a division of the segment.

- | | | | |
|----|---|---|----------------------------|
| 1. | + Sepals connivent in flower and fruit. Petals long clawed. | 2 | |
| | — Sepals erect or subspreading in flower and fruit. Petals very shortly or not clawed | 3 | |
| 2. | + Leaf lamina divided to c. 2/3 or less. Sepals glabrous, keeled, with c. 0.5 mm long mucro | | 1. G. lucidum |
| | — Leaf lamina divided almost to the base. Sepals glandular, not keeled, with 1.5-2 mm long mucro | | 2. G. robertianum |
| 3. | + Perennial with ovoid-globular, brown, solitary or moniliformly arranged tuberous rhizome. Stem always leafless below first dichotomy | | 3. G. tuberosum |
| | — Annual with a slender root. Stem with rosetted leaves and not leafless below first dichotomy | 4 | |
| 4. | + Lamina of leaves divided to about half way but less than 2/3 into rhombic-cuneate segments | 6 | |
| | — Lamina of leaves divided almost to the base into oblong-cuneate segments | 5 | |
| 5. | + Pedicels 20-60 mm long, adpressedly eglandular hairy. Sepals with 1.5-3 mm long apical awn. Petals usually more than 6 mm long. Mericarps very sparsely appressed stiff hairy to glabrous | | 4. G. columbinum |
| | — Pedicels less than 20 mm long, glandular hairy. Sepals usually with c. 1 mm long apical awn. Petals 4-6 mm long. Mericarps densely patent eglandular hairy | | 5. G. dissectum |
| 6. | + Petals generally entire. Mericarps smooth, neither wrinkled nor ridged, patent hairy | | 6. G. rotundifolium |

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- Petals deeply to shallowly emarginate.
Mericarps mostly transversely ridged-rugose,
glabrous 7
- 7. + Peduncles mostly shorter than the subtending
leaves. Petals 7 mm or less long. All stamens
fertile 7. *G. molle*
- Peduncles mostly longer than the subtending
leaf. Petals more than 8 mm long. Usually 7
stamens fertile and 3 sterile 8. *G. brutium*
- 1. ***Geranium lucidum* L.**, Sp. Pl. 682. 1753; Quezel & Santa, Nouv. Fl. Alger. 2:
572. 1963; Keith, Prelim. Check List Lib. Fl. 517. 1965; Davis, Fl. Turk. 2:
456. 1867; Meikle, Fl. Cyp. 1: 335. 1977.

Annual, up to 40 cm tall, very sparsely stiff hairy or glabrous and glossy herb with erect, ascending or flexuose, often reddish, branches from the base. Leaves 1-4 (-6) cm in diameter, suborbicular-reniform, with up to 10 cm long petiole, palmatifid or partite to c. 2/3 or less into obovate-cuneate segments each with 3 broad, mucronulate, crenate or incised lobules; stipules narrowly triangular-lanceolate, 1.5-4 mm long, acute-acuminate, glabrous, membranous. Inflorescence 1-2-flowered, peduncle up to 5 cm long. Flowers bright pink rarely white, 1.5-2 cm across; pedicel 5-20 mm long, patent after flowering, upcurved near apex, sparsely pubescent; bracts linear, c. 1 mm long. Sepals ovate-lanceolate, 4-6 (-7) x 2.5-3 mm, glabrous, keeled, connivent in flower and fruit, 3-nerved, transversely ridged, papillate between nerves, with c. 0.5 mm long mucro. Petals spathulate, (5-) 8-10 x 1.5-2.5 mm, long clawed, entire. Stamens all fertile, filaments dilated and glabrous at the base. Mericarps c. 2.5 mm long, laterally compressed, longitudinally ridged, irregularly reticulate-rugose, sparsely uncinately hairy at the apex and base; beak up to 1 cm long, attenuate to 3-6 mm long style. Seeds $\pm$ ellipsoid-oblong, 1.5-2 mm long, smooth.

Type: Described from Europe, Herb. Linn. 858/72 (LINN).

Reported from Cyrenaica (between Marawa & Faidia in Macchia, 50 km from Faïda, 600 m, wadi Wardana, Wadi el Kuf) by Keith (l.c.)

Distribution: Europe, N. Africa, S.W. Asia and Russia.

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Fl. March-June

2. ***Geranium robertianum* L.**, Sp. Pl. 681. 1753; Viv., Fl. Lib. Spec. 39. 1824; Durand & Barratte, Fl. Lib. Prodr. 54. 1910; Pampanini, Prodr. Fl. Ciren. 290. 1931; Quezel & Santa, l.c. 572; Keith, l.c. 518. (Fig. 15).

Annual or biennial, often reddish, up to 40-50 cm tall, $\pm$ glandular hairy herb with erect or ascending shoots. Leaves triangular-ovate to pentagonal-orbiculate, 2-7 x 3-8 cm, with up to 15 cm long glandular-hispid petiole, basal rosetted, upper opposite, palmatisect (apparently compound looking) almost to the base into 3 (-5), narrowly ovate segments, each divided pinnatifidly into obtuse or acute 2-3-dentate, apiculate lobules; stipules triangular ovate to lanceolate, 2-4 mm long, obtuse to acute-acuminate, glandular hairy. Inflorescence 2-3-flowered, peduncle c. 6-7 cm long, glandular hairy. Flowers bright pink, 2-2.5 cm across; pedicel 4-10 mm long, erect to suberect, beset with spreading glandular and deflexed eglandular hairs; bracts akin to stipules, c. 1.5 mm long. Sepals narrowly to broadly lanceolate-ovate, 5-7 x 1.5-2.5 mm, 3-nerved, membranous margined, glandular-hairy, connivent, with 1.5-2 mm long mucro. Petals obovate-cuneate, 9-14 x 3.5-4.5 mm including 3-5 x c. 1.5 mm long narrow white claw, entire, glabrous at the base. Filaments very slightly dilated at the base, glabrous, anthers with orange pollen. Mericarps 2.5-3 mm long, separating without styles beak, with 2 distinct transverse ridges above and reticulately weakly ridged below, hairy on ridges to glabrescent; beak 12-19 mm long (including style), glabrous. Seed $\pm$ ellipsoid, c. 2 mm long, smooth, reddish-brown.

Type: Described from N. Europe, Herb. Cliff. (BM); Herb. Linn. 858/70 (LINN).

A-7 Wadi El-Kuf, Gebel Akhdar, 2.3.1973, *S.I.Ali & S.A.Faruqi* 1251; upper stream of wadi El-Kouf, Gebel Akhdar, 12.3.1968 *L. Boulos* 2217; Below ruins of Cyrene (Shahat), 500-600 m, rocky limestone gulley dominated by phrygana, in shade, flowers pink, 26 March 1970, *P.H. Davis* 50009; Gebel Akhdar, 26.2.1973, *Nuria El Migrabi* s.n.; Wadi El-Mahbool, 1.3.1973, *A. El Tiafe* 71 and 146; Gebel Akhdar, Gasr Libya, c. 150 m from sea level, clay loam soil, erect herb, *A. Ghafoor & M.A.El-Makahal* 398.

Distribution: Canary Islands eastwards to Japan, Central Asia and most of the Europe.

Fl. March-April

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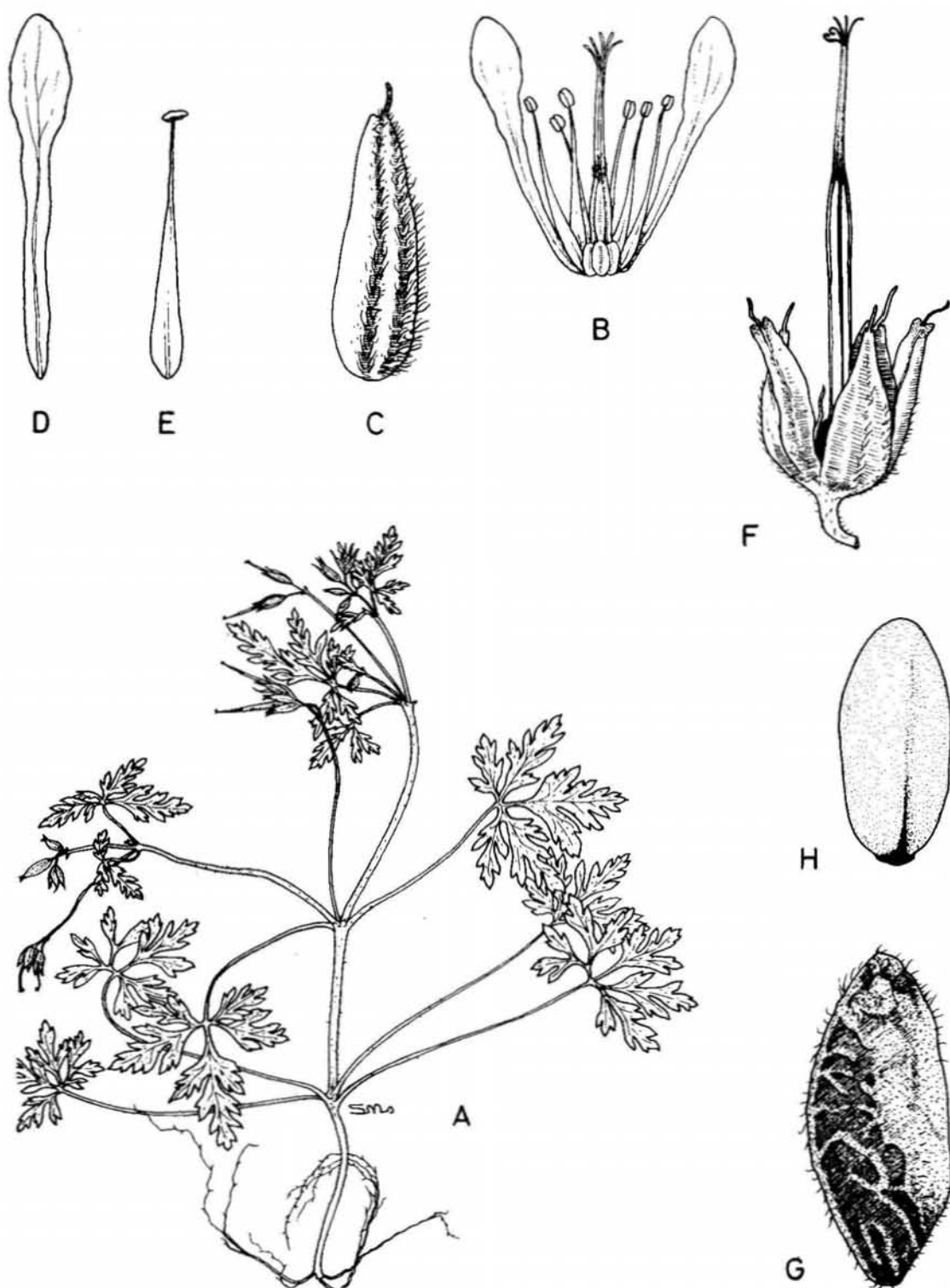


Fig. 15, ***Geranium robertianum***: A, habit x 1; B, flower (sepals and 3 petals removed) x 5; C, sepal x 6; D, petal x 6; E, stamen x 6; F, fruit with beak and sepals x 3; G, mericarp (without beak) x 15; H, seed x 15.

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3. **Geranium tuberosum** L., Sp. Pl. 680. 1753; Viv., Fl. Lib. Spec. l.c.; Durand & Barratte, Fl. Lib. Prodr. 53. 1910; Pamp., Prodr. Fl. Ciren. 289. 1931; Quezel & Santa, l.c. 572; Keith, l.c. 519. (Fig. 16).

Perennial, up to 60 cm tall, dichotomously branched, appressed pubescent to hirsute herb with ovoid-globular, brown, solitary or moniliformly arranged rhizomatous intercalary tubers. Leaves 4-12 cm in diameter, appressed hairy to glabrescent, pentagonous-orbiculate, with up to 15 (-20) cm long, hairy petioles, palmatisect nearly to the base into 5-9, linear-oblong or divided pinnatifidly or pinnatisectly into lanceolate-linear, acute or obtuse lobules; upper leaves shortly petioled to sessile with $\pm$ linear, hardly incised or lobulate segments; stipules ovate-lanceolate, 1.5-3.5 mm long, hairy. Inflorescence usually 2-many flowered, peduncle up to 3.5 cm long or much reduced. Flowers purple or pinkish-purple, 1.5-2.5 (-3) cm across; pedicel 5-30 mm long, densely hairy, erect in fruit; bracts ligulate to lanceolate-ovate, ciliate. Sepals broadly ovate or lanceolate-ovate to obovate, (4-) 6-8 (-10) mm long, hairy, with c. 1-1.5 mm long awn. Petals obcordate, 8-13 (-18) x 5-12 mm, hairy at the base, deeply emarginate. Filaments purple or pinkish-purple, not or slightly dilated at the base, the outer whorl glabrous, the inner long haired. Mericarps 3-4 mm long, pubescent, not wrinkled; beak 1-2 cm long (including c. 0.5 mm long style), hirsute. Seeds ellipsoid-subglobose 2-2.5 mm long, brown, punctate or smooth.

Type: Herb. Cliff. and Herb. Linn. 858.54 (LINN).

A-2 Garian, 23.3.1967, Issa M. Farage 39; Dridja, 31 March 1968, L. Boulos 2634.

Distribution: N. Africa. S. Europe, C. and S.W. Asia.

Common in Gebel Nefousa and Gebel Akhdar in cultivated and fallow lands but undercollected. The root tubers of this species are edible and also used as styptic, diuretic and antidiabetic.

Fl. Feb.-May

4. **Geranium columbinum** L., Sp. Pl. 682. 1753; Durand & Barratte, l.c. 53; Pamp., l.c. 290; Quezel & Santa, l.c. 574; Keith, l.c. 517. (Fig. 17).

Annual or biennial, erect or sprawling, up to 40 cm tall, sparsely appressed-strigose, or glabrescent, eglandular herb. Leaves 2-4 (-5) cm in diameter;

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Fig. 16, **Geranium tuberosum**: A, habit x 1; B, petal x 3; C, fruit (dehiscent) x 2.

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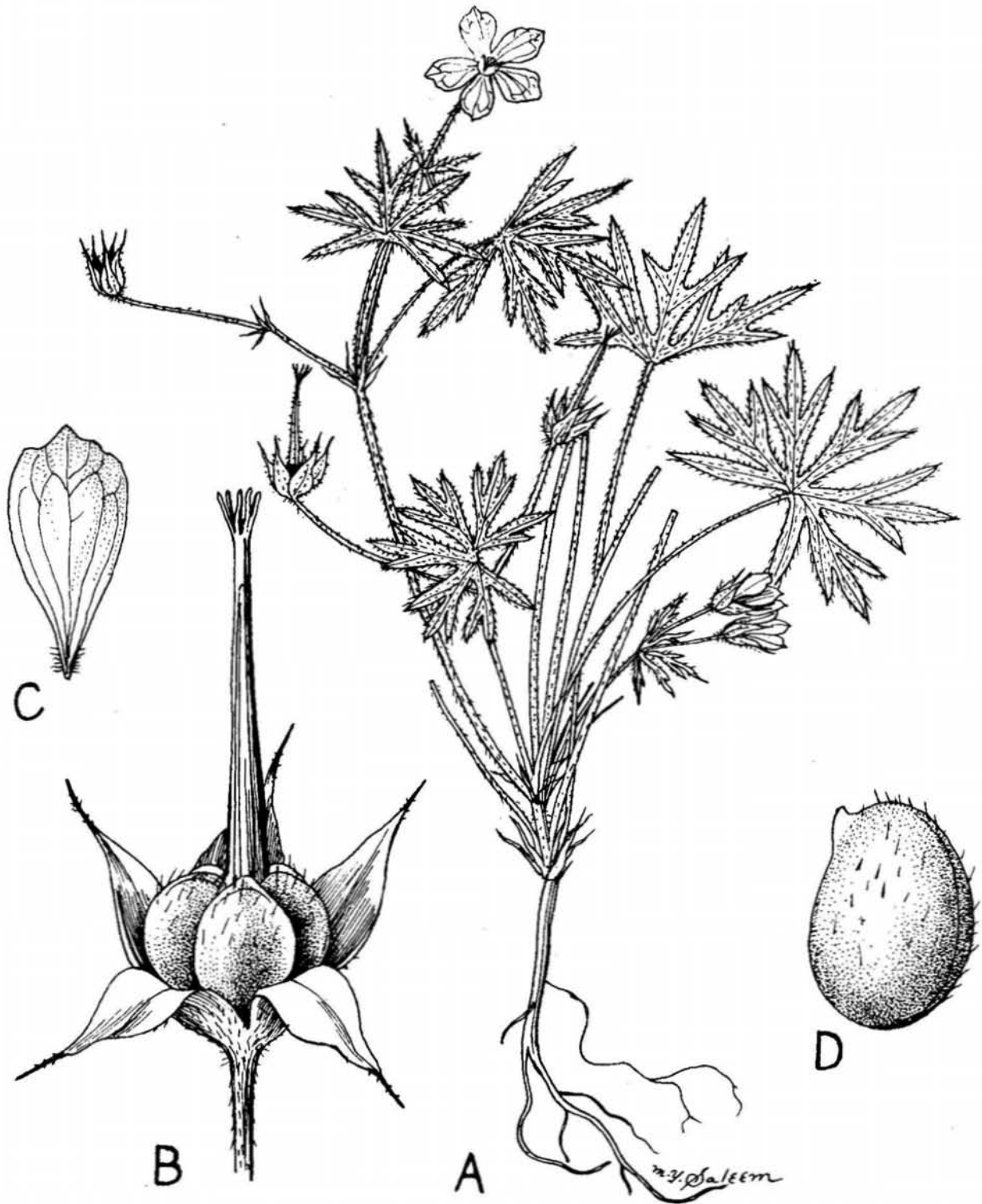


Fig. 17. *Geranium columbinum*: A, habit x 1/2; B, fruit x 2; C, petal x 2; D, mericarp x 8.

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basal with up to 10 (-20) cm long petiole, orbicular-pentagonal, palmatisect nearly to the base into 5-7 rhombic, $\pm$ cuneate segments which are divided pinnatifidly into 2-3 linear-oblong, obtuse or acutle, entire or dissected lobules; upper leaves opposite, more deeply dissected into linear segments; stipules narrowly triangular-subulate, (2-) 4-6 (-9) mm long, acuminate-aristate, reddish. Inflorescence scapose and cauline, 2-flowered, peduncle $\pm$ spreading, up to 10 cm long, patent or deflexed, enlarged in fruit; bracts akin to stipules, c. 4-5 mm long, acuminate-aristate. Sepals lanceolate-ovate, (1-) 5-9 x 2-6 mm, appressed-strigose outside, membranous margined, enlarged in fruit, apical awn c. 1.5-3 mm long. Petals obovate-cuneate, (6-) 7-10 x 2-3.5 mm, hairy at the base, rounded, truncate-retuse, or crenulate at the apex. Stamens all fertile, filaments narrowly triangular at base, c. 4 mm long, glabrous. Mericarps dorsally $\pm$ keeled, c. 3.5-4 mm long, very sparsely appressed stiff hairy to glabrous, not wrinkled; beak 1-2 cm long, appressed stiff hairy. Seeds subglobose, c. 2 mm in diameter, reticulately pitted.

Type: Described from France, Switzerland and Germany, Herb. Linn. 858/79 (LINN).

A-7 Wadi al-Kuf, 2.3.1973, *S.I.Ali & S.A.Faruqi* 1250; halfway between Cyrene (Shahat) & Apollonia (Marsa Susa), wadi Roseyt, 350 m, rocky limestone gorge, in macchie, annual, flowers mauve pink, erect, 27 March 1970, *P.H. Davis* 50114.

Distribution: S.W. to C. and E. Europe; Africa, S.W. Asia, Russia and introduced in N. America.

It seems to be confined to the N.E. parts of Libya.

Fl. March-April

5. ***Geranium dissectum* L.**, Cent. Plant. 1: 21. 1755; Viv., Fl. Lib. Spec. 39. 1824; Pamp., l.c.; Quezel & Santa, l.c. 574; Keith, l.c. 517. (Fig. 18).

Annual or biennial, retrorsely adpressed hairy, up to 60 cm tall, diffusely branched herb with erect or ascending shoots. Leaves (1-) 2-5 (-7) cm in diameter, reniform-orbiculate with up to 15 (-20) cm long petiole, palmatipartite or palmatisect to near the base into (3-) 5-7, rhombic-cuneate segments, each divided deeply or pinnatifidly into 3, oblong-linear, obtuse, mucronate entire to dissected lobules; stipules ovate-oblong to triangular-subulate, 3-8 (-10) mm long, acuminate. Inflorescence usually 2-flowered and cauline, peduncle up to 5 cm long, usually

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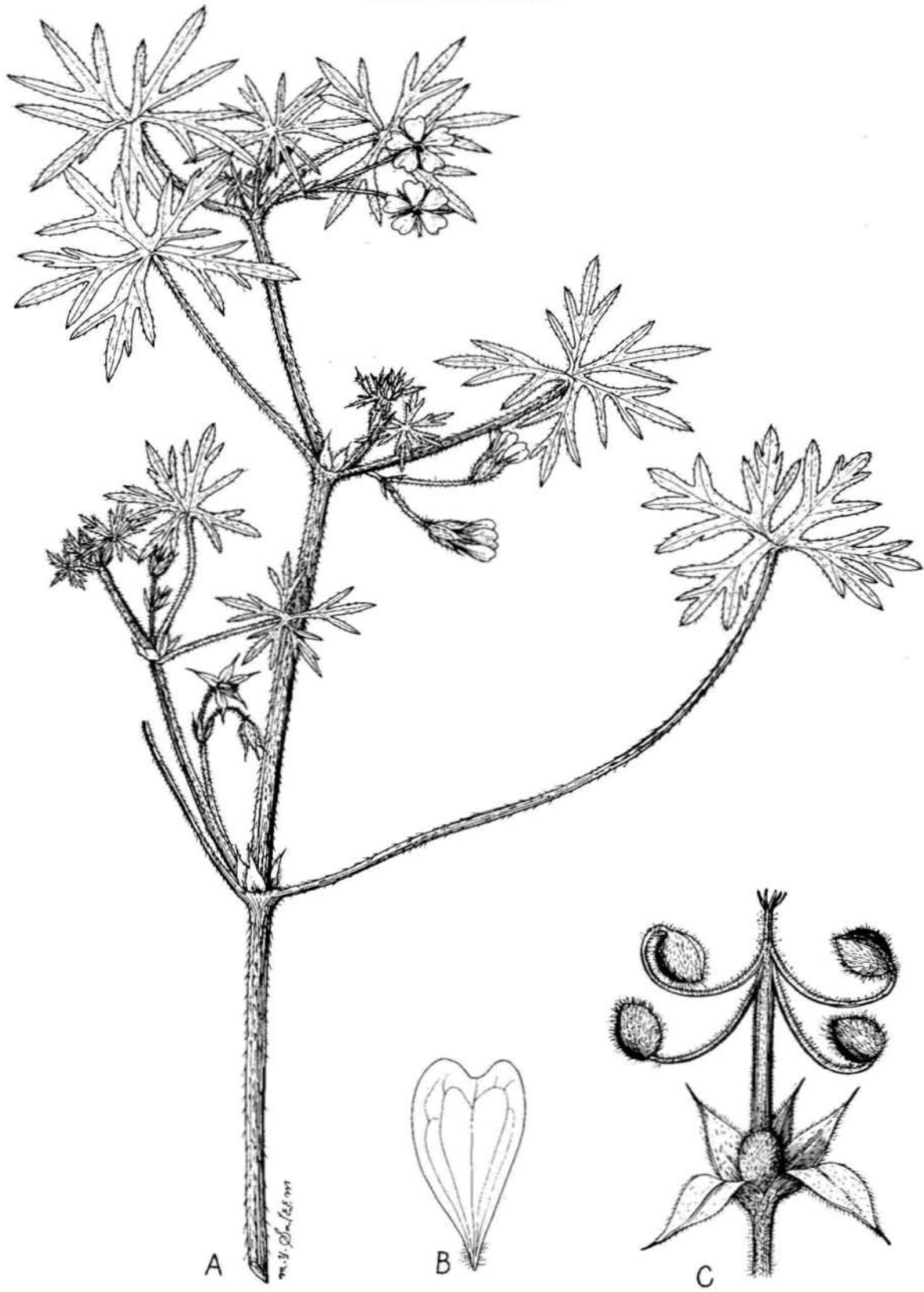


Fig. 18. *Geranium dissectum*: A, flowering twig x 1; B, petal x 6; C, fruit (dehiscent) x 3.

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shorter than the petiole of subtending leaf, glandular-hairy. Flowers pinkish-purple to white, 8-12 mm across; pedicels 5-20 mm long, patent or deflexed; bracts subulate, 1-4 mm long, acuminate. Sepals narrowly ovate-lanceolate, 3-6 x 1.5-2.5 mm, membranous margined, glandular hairy outside, slightly enlarged in fruit, apical awn 1 (-2) mm long. Petals obovate-cuneate, (3) 4-6 - 2-2.5 mm, hairy at the base, $\pm$ retuse or emarginate at the apex. Stamens all fertile, filaments c. 2.5 mm long, ciliate, abruptly broadened at base. Mericarps 2-3 mm long, neither transversely ridged nor wrinkled, densely patent hairy, hairs eglandular; beak 8-12 mm long, patently glandular and eglandular hairy. Seeds subglobose, c. 1.5 mm in diameter, pitted-reticulate.

Type: Described from S. Europe, Herb. Linn. 858/82 (LINN).

A-7 Roman aquaduct near Labrag, E. of Shahat (Cyrene), 700 m, Marshy places, annual, flowers purplish pink, 29.3.1970, *P.H. Davis* 50253.

Distribution: Europe, N. Africa, S.W. and C. Asia.

Malva aegyptiaca Linn. (Malvaceae) is often confused with this species in herbarium due to similar leaf shape and divisions but differs in stellate hairs on vegetative parts, in addition to floral construction and fruits.

Fl. Feb.-April

6. ***Geranium rotundifolium*** L., Sp. Pl. 683. 1753; Durand & Barratte, l.c. 53; Pampanini, Prodr. Fl. Ciren. 290. 1931; Quezel & Santa, l.c. 573; Keith, l.c. 519 (Fig. 19).

Annual, up to 50 cm tall, basally branched herb with erect or ascending shoots, beset with spreading, eglandular and glandular hairs. Leaves 1-5 (-6) cm in diameter, orbicular-reniform, basal mostly with up to 15 cm long petioles, palmatifid or -partite to c. 1/2-2/3 or less into 5-7 obovate-cuneate or $\pm$ rhomboid-cuneate, 3-dentate segments or each divided into 3-5, triangular, shortly apiculate $\pm$ obtuse lobules; upper leaves opposite, shortly petiolate; stipules reddish, narrowly triangular-lanceolate, 2-4 mm long, pilose. Inflorescence 2 (-3)-flowered, peduncle up to 5 cm long, usually shorter than subtending leaves. Flowers pink, 1-1.6 (-2) cm across; pedicels 1.5-2 cm long, beset with dark capitate glandular hairs, patent or deflexed in fruits, bracts lanceolate to $\pm$ subulate, 1.5-2 mm long, pilose. Sepals elliptic-ovate, 3-6 x 2-3 mm, mostly 3-nerved, hairy outside,

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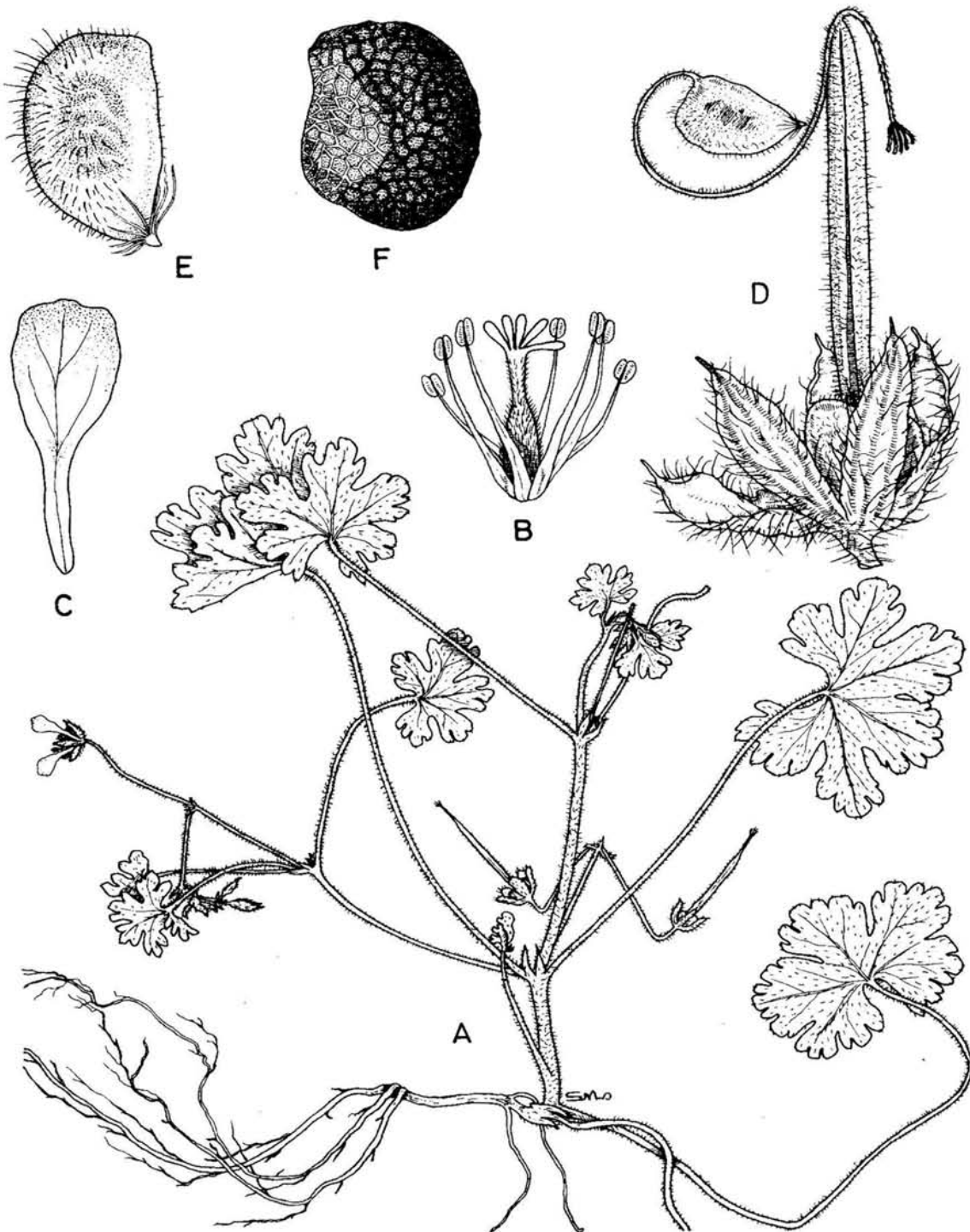


Fig. 19, *Geranium rotundifolium*: A, habit x 1; B, flower (sepals and petals removed) x 5; C, petal x 5; D, fruit (dehiscing) x 5; E, mericarp x 10; F, seed x 15.

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with c. 0.5 mm long mucro. Petals oblong-obovate, 5-10 x 1.5-3 mm, cuneate, generally entire at the apex, glabrous. Stamens all fertile, filaments narrowly lanceolate-ovate, c. 5 mm long, glabrous or sparsely pilose at the base. Mericarps 2.5-3 mm long, neither wrinkled nor ridged, smooth and hairy; beak 12-18 (-20) mm long (including style), patent hairy, hairs glandular and eglandular. Seeds ovoid-subglobose, dark brown, c. 2 mm long and broad, reticulately-pitted.

Type: Described from Europe, Herb. Linn. 858/83 (LINN).

A-7 Wadi El-Kuf, Gebel Akhdar, fls. pink, *S.I.Ali & S.A.Faruqi* 1442; Wadi Derna, 14.3.1968, *L. Boulos* 2430; 12 km E. El-Marj, Gebel Akhdar, 10.3.1968, *L. Boulos* 2058; Below ruins of Cyrene (Shahat), 500-600 m, rocky limestone gulley dominated by phrygana, annual, petals pink, serpentine, 26.3.1970; *P.H.Davis* 50010; Gebel Akhdar, Gasr Libya, c. 150 m from sea level, clay loam soil, erect herb, fruits beaked, *A. Ghafoor & M.A.El-Makahal* 397.

Distribution: C. Asia, Pakistan westwards to N. Africa and Europe.

Fl. February-April

7. ***Geranium molle*** L., Sp. Pl. 682. 1753; Viv., Fl. Lib. Spec. 39. 1824; Durand & Barratte, Fl. Lib. Prodr. 53. 1910; Pamp., l.c. 289; Quezel & Santa, l.c. 573; Keith, l.c. 517. (Fig. 20).

Annual or biennial, up to 40 cm tall, densely soft hairy, hairs glandular and eglandular, greyish-green herb with erect or ascending branches from the base. Leaves up to 4 cm in diameter, basal rosetted with up to 12 cm long petiole; uppermost alternate and subsessile to sessile, all reniform to $\pm$ orbiculate, palmatifid or palmatipartite to less than 2/3 into 5-9, oblong, cuneate, obtuse or $\pm$ incised segments, each often divided into lanceolate, obtuse to subacute lobules; stipules oblong-lanceolate to broadly ovate 4-8 mm long, acute, softly hairy. Inflorescence 2-flowered, peduncle 1-4 cm long, shorter than the subtending leaf, hairy. Flowers pinkish-purple, 1-1.5 cm across; pedicel 10-20 mm long, ascending, often deflexed at the base and upcurved after flowering, beset with short glandular and long eglandular hairs; bracts oblong-lanceolate, 2-4 mm long. Sepals ovate-lanceolate to elliptic, 3-5 x 1.5-2.5 mm, 3 nerved, villose and glandular hairy outside, shortly mucronate, membranous margined. Petals obcordate-cuneate, (3-) 4-7 x 2-3.5 mm, hairy near base, deeply to shallowly emarginate at the apex. Stamens all fertile, filaments lanceolate-ovate, c. 3.5 mm long, glabrous. Mericarps

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Fig. 20, ***Geranium molle***: A, habit x 1/2; B, flower x 6; C, petal x 6; D, fruit x 4; E, mericarp x 12.

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1.5-2 mm long, glabrous, mostly transversely ridged and rugose; beak 7-10 (-12) mm long, glandular-hirtellous. Seeds dull brown, ellipsoid-globose, c. 1.5 mm in diameter, almost smooth.

Type: Described from Europe, based on Vaillant's illustration in Bot. Paris, t. 15. f. 3. 1726.

A-3 Tripoli, University Campus, common, erect herb with bluish-purple flowers, 25.4.1977, *A. Ghafoor* 307; *id.* fls. pinkish, 16.3.1977, *A. Ghafoor* 283; Hadaba Sharqia-University lane, under shade, fls. pink, 25.3.1976, *S.M.H.Jafri* 6438; c. 8 km from Tripoli, *Fathi, B.R.* 154; Sharshara, 25.3.1976, *Fathi, B.R.* 31; **A-7** Shahat (Cyrene) to Faida, S. of Baida crossroads, 700 m, fallow field, annual, flowers mauve, small, 1 April 1970, *P.H.Davis* 50517; 19-25 km S.E. of Derna, 13.3.1968, *L. Boulos* 2307; Wadi Derna, 20.1.1967, *L. Boulos* 1272; Derna, *L. Boulos* 1156; **B-2** Ain El-Rumia, 9.4.1974, *G. Faris* 355.

Distribution: C. Asia and Indo-Pakistan subcontinent westwards to N. Africa, and Europe.

Fl. March-May

8. ***Geranium brutium*** Gasp. in Rend. Acad. Sc. Nap. 1: 491. 1842; Webb. & Ferguson in Tutin et al, Fl. Europ. 2: 198. 1968. (fig. 22).

G. molle Linn. ssp. *brutium* (Gasp.) Davis in Notes R.B.G. Edinb. 28: 35. 1967; in Fl. Turk. 2: 460. 1967.

Annual, up to 40 (-70) cm tall, softly pubescent herb, with ascending-erect branches from the base. Leaves up to 4 cm in diameter, basal rosetted with up to 12 cm long petiole, upper most alternate and with petiole shorter than lamina, reniform to $\pm$ orbiculate, palmatifid to palmatipartite to less than 2/3 into 5-9, $\pm$ cuneate, 3-fid segments with obtuse to acute lobules; stipules oblong-lanceolate, 4-8 mm long, acute, brownish. Inflorescence 2-flowered, peduncle mostly longer than the subtending leaf, hairy. Flowers reddish-purple or violet, c. (1.6-) 2 - 2.5 cm across; pedicel 10-25 mm long, beset with eglandular hairs; bracts oblong-lanceolate, 2-4 mm long, brownish, hairy. Sepals lanceolate-ovate to elliptic, 3.5-5 x 1.5-2.5 mm, externally eglandular hairy with c. 0.2 mm long mucro. Petals obcordate, cuneate, 8-12 x 5-7 mm, hairy at the base, deeply emarginate. Filaments purplish, 7 (-10) fertile, glabrous at the base. Mericarps 1.5-2 mm long, glabrous, transversely ridged

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Fig. 21. *Geranium brutium*: A, habit x 1/2; B, petal x 4; C, fruit x 3.

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and rugose; beak 8-12 mm long, minutely hirtellous. Seeds ellipsoid-globose, c. 1.5 mm in diameter, smooth.

Type: Described from Calabria.

A-6 Tokra, 3.3.1973, *S.I.Ali & S.A.Faruqi* 1300; **A-7** Wadi Kuf, 2.3.1973, *S.I.Ali & S.A.Faruqi* 1249; Shahat, 28.2.1973, *S.I.Ali & S.A.Faruqi* 979; 1000; Below Cyrene (Shahat) ruins, 500-600 m, rocky limestone gulley dominated by garigue, annual, flowers pink, large, stems ascending, 26 March 1970, *P.H. Davis* 50076; Shahat (Cyrene) to Faidia, S. Baida crossroads, 700 m, fallow fields and calcareous slopes, annual, ascending, flowers lilac pink, large, abundant carpels; 1 April 1970; *P.H. Davis* 50512; Gebel Akhdar, 26.2.1973, *Nuria El-migriby* s.n.; Shahat, erect herb, c. 20 cm, violet flowers, 28.2.1973, *A.El Tiaffe* s.n.; Sosa, 28.2.1973; *A.S. Sharif* 67.

Distribution: S. Europe, N. Africa and W. Asia.

This species has been recorded for the first time from Libya and is common in Gebel Akhdar area. It is often confused with *G. pyrenaicum* Burm. f. from which it differs in its glabrous, rugose mericarps. Sometimes referred to a subspecies of the preceding species, from which it differs on key characters.

Fl. Feb.-April

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