

Figure 8.21.1 *Pelargonium heterophyllum*. 1, flowering plant x1; 2, petals x1,5; 3, androecium x4; 4, gynoecium x5; 5, tuber x1; 6, leaf x2.

*Geranium pilosum* Cav.: 273 (1788a); Poir.: 745 (1812); non Andr.: t. 259 (1802b). ICONOTYPE: Cavanilles, Monadelphiae classis dissertationes decem 6: t. 199 (1788b).

*Pelargonium pilosum* (Cav.) Steud.: 679 (1840); non F.G. Dietr.: 69 (1806), nec Pers.: 227 (1806).

*Pelargonium hirtum* Willd.: 644 (1800): substitute name for *Geranium pilosum* Cav.: 273 (1788a); Pers. 226 (1806); Steud.: 286 (1841); non (Burm. f.) Jacq.: t. 536 (1792).

*Pelargonium cavanillesii* Knuth: 332 (1912): substitute name for *Geranium pilosum* Cav.: 273 (1788a).

*Pelargonium ciliatum* L'Hérit.: t. 7 (1792); Willd.: 643 (1800); Ait. f.: 159 (1812); Link: 186 (1822); DC.: 650 (1824); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 284 (1841); non Jacq.: 195 (1791b). ICONOTYPE: L'Héritier, Geranologia: t. 7 (1792).

*Hoarea ciliata* (L'Hérit.) Sweet: 76 (1826c).

*Pelargonium longifolium* (Burm. f.) Jacq. var. *ciliatum* (L'Hérit.) Harv.: 262 (1860); Knuth: 324 (1912).

*Geranium oxalidifolium* Andr.: t. 300 (1803b); Poir.: 757 (1812). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 300 (1803b).

*Pelargonium oxalidifolium* (Andr.) Pers.: 227 (1806); Ait. f.: 162 (1812); DC.: 651 (1824); Spreng.: 52 (1826); Loudon: 568 (1829); G. Don: 729 (1831); Loudon: 271 (1832) Steud.: 679 (1840); Steud.: 288 (1841); Harv.: 266 (1860).

*Dimacria oxalidifolia* (Andr.) Sweet: 77 (1826c).

*Geranospermum oxalidifolium* (Andr.) Kuntze: 95 (1891).

A geophyte 70--170 mm tall when in flower. **Tuber:** a turnip-shaped root 10--25 mm long and 12--25 mm in diameter. **Leaves** simple, trilobate or trifoliolate, bright green, petiolate; lamina (or main pinna) ovate or trullate, base cuneate, apex obtuse, margin entire, 8--25 x 6--25 mm; small lateral pinnae ovate, 8--10 x 5--7 mm, adaxially glabrous or covered with short glandular hairs, abaxially glabrous or setose along the veins, margins with short appressed clavate bristle-like hairs; petiole 4--30 mm long and 1--3 mm in diameter, prostrate, covered with short glandular hairs interspersed with bristles or clavate hairs; stipules subulate or lanceolate, adnate to petioles for less than one third of their length, 4--10 mm long and 2--3 mm wide, ciliate. **Inflorescence:** scape 10--50 mm long and 1,5--2 mm in diameter, branched, bearing 2--6(-8) pseudo-umbellets with 4--9(-11) flowers each; peduncles 40--150 mm long, 1--1,5 mm in diameter, covered with short glandular hairs interspersed with patent bristles; bracts narrowly triangular, 2--5 mm long, 1--2 mm wide, adaxially hirsute, abaxially setose with distally appressed bristles. Pedicel *ca.* 0,5 mm long.



**Hypanthium** 9--15 mm long, pale reddish-brown, indumentum as on peduncle and sometimes with appressed curly hairs. **Sepals** 5, lanceolate, apices acute, 6--8 mm long, 1--2,5 mm wide, patent, green, abaxially covered with short glandular hairs interspersed with short patent bristles. **Petals** 5, white or cream-coloured with undulate margins, claws patent during anthesis forming a floral sheath; posterior two with a prominent black blotch in the centre, ligulate, laterally curved, bases cuneate, apices rounded or emarginate, laterally recurved, 17--22 x 2,5--4,5 mm; anterior three narrowly spatulate, bases attenuate, apices rounded, 15--20,5 x 2--3,5 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed in floral sheath, posterior one 1,5--3 mm long, lateral two 2,5--5,5 mm long, curved upwards, anterior two 4,5--7 mm long, curved upwards, white; staminodes 1,5--2,5 mm long; anthers pale pink, 1,5--2 mm long, pollen almost white. **Gynoecium:** ovary 2--4 mm long; style 0,5--1,5 mm long, pink; stigma branches 0,5--1,5 mm long, pink. **Fruit:** not seen (Figure 8.21.1).

#### Diagnostic features and affinities

*P. heterophyllum* is a small attractive species with white or cream-coloured flowers with large prominent black blotches in the centre of the posterior petals. The claws of the petals form a sheath in which the stamens are concealed, and the apices of the posterior petals are laterally recurved. The posterior stamen is usually much shorter than the lateral and anterior ones. This structure of the androecium is similar to that of *P. tenellum* and *P. trifoliolatum*. The small simple or trifoliolate prostrate leaves with appressed bristles along the margins, are similar to that of *P. tenellum* and *P. chelidonium*. However, the floral structure of *P. chelidonium* differs from that of *P. heterophyllum* and *P. tenellum*. The specific epithet *heterophyllum* refers to the variation that occurs in the leaf form.

#### Geographical distribution and ecology

*P. heterophyllum* is known from a small distribution area in the vicinity of Darling about 60 km north of Cape Town (Figure 8.21.2). This area receives an annual rainfall of 300--400 mm, which occurs mainly during the winter months. *P. heterophyllum* occurs in renosterveld in stony sand, on flats or lower hillsides or in marginal coastal fynbos in gravel. It flowers in October and November, after the leaves have died.

## Material studied

--3318 (Cape Town): Near Darling (-AD), *Johns s.n.* (NBG); Contreberg farm, near Darling (-AD), *Marais 33* (STEU); Oude Post, near Darling (-AD), *Van der Walt 1041* (STEU); Near Oude Post Hotel, Malmesbury (-BC), *Acocks 15234* (PRE); Groenekloof (-CB), *Pappe s.n.* (SAM); *Zeyher 171* (E, Gx2, K, MEL, Px2, PRE, S, SAM, W, WU, Z).

Without exact locality: *Sonder s.n.* (TCD); *Anon* (W, type); *Ryder 19992* (BOL, K).

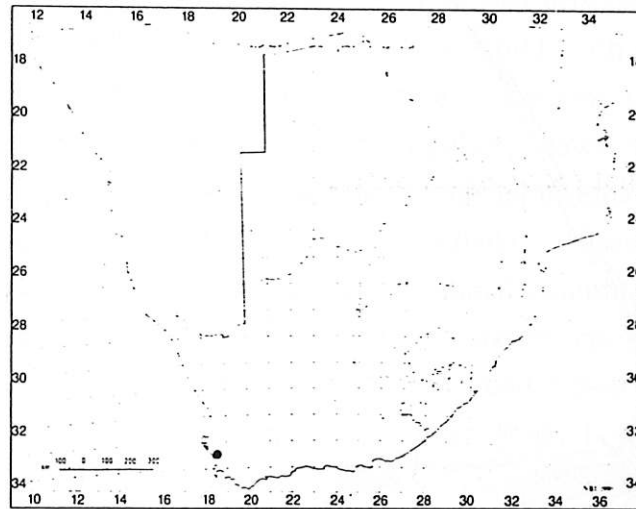


Figure 8.21.2 Geographical distribution of *P. heterophyllum*

**8.22** *Pelargonium tenellum* (Andr.) G. Don, A general system of gardening and botany 1: 729 (1831); Loudon: 272 (1832); Steud.: 679 (1840). ICONOTYPE: Andrews, Geraniums: C, ic (1820).

*Geranium tenellum* Andr.: C, ic (1820). ICONOTYPE: Andrews, Geraniums: C, ic (1820).

*Dimacria tenella* (Andr.) Sweet: 77 (1826c).

A geophyte 70--200 mm tall when in flower. **Tuber:** a turnip-shaped root 25--40 mm long and 15--35 mm in diameter. **Leaves** simple, trilobate or trifoliolate, bright green, petiolate; lamina (or main pinna) ovate, broadly ovate or trullate, base cuneate or truncate, apex acute to obtuse, margin entire, 15--35 x 8--25 mm; small lateral pinnae ovate, 8--10 x 5--7 mm, adaxially glabrous or covered with short glandular hairs, abaxially glabrous or sparsely setose mainly along the veins, margins with short appressed bristles; petiole 10--50 mm long and 1--3 mm in diameter, prostrate, sparsely to densely setose with appressed bristles interspersed with short glandular

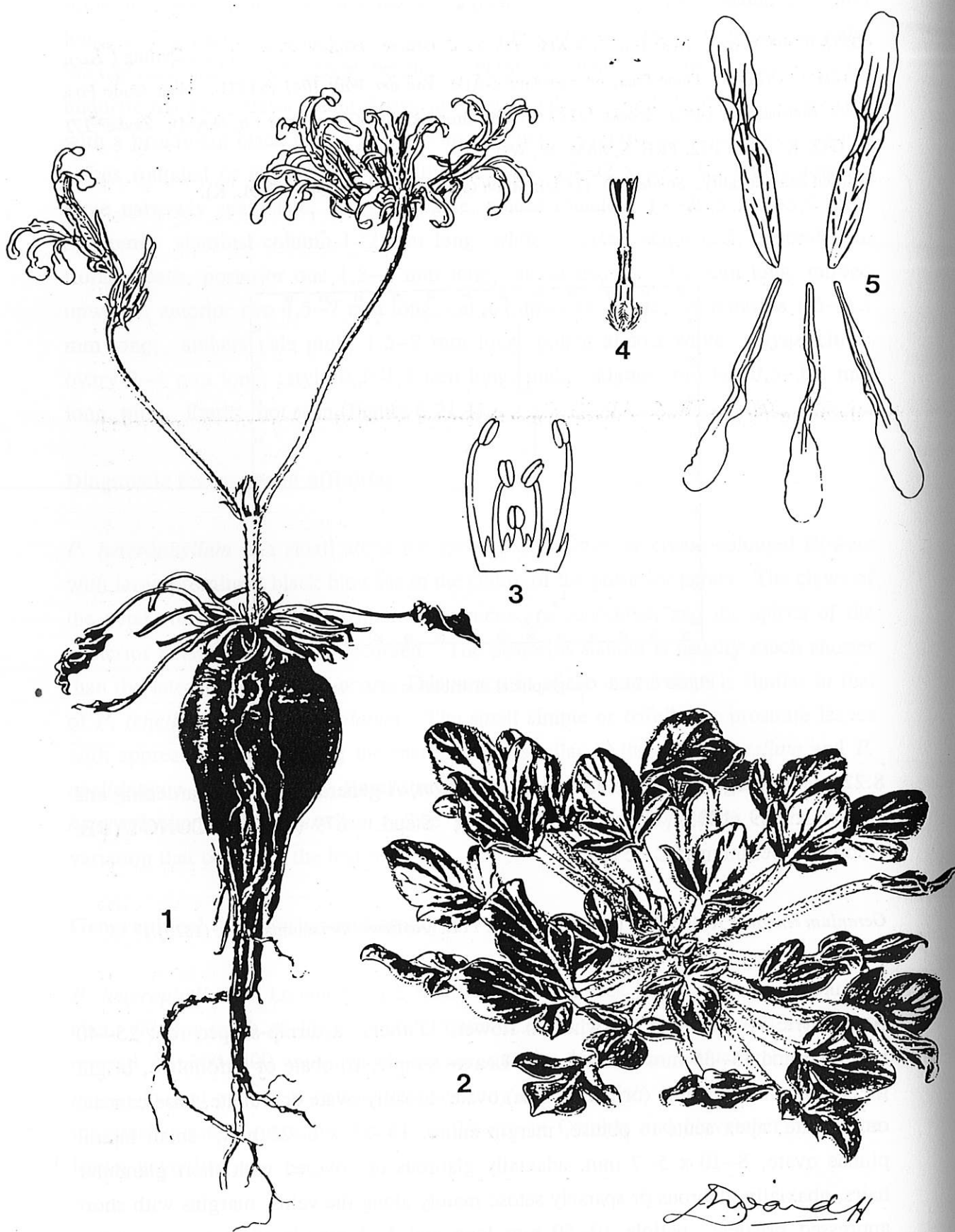


Figure 8.22.1 *Pelargonium tenellum*. 1, flowering plant x1; plant with leaves x1; 3, androecium x4; 4, gynoecium x6; petals x2;

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hairs; stipules subulate, adnate to petioles for less than one third of their length, 8--12 mm long and 2--3 mm wide, ciliate. **Inflorescence:** scape 15--50 mm long and 1--3 mm in diameter, branched, bearing 2--4 pseudo-umbellets with 3--10 flowers each; peduncles 20--200 mm long, 1--1,5 mm in diameter, hirsute with appressed curly hairs interspersed with glandular hairs and appressed bristles; bracts subulate, 4--8 mm long, 1--2 mm wide, abaxially hirsute with distally appressed hairs. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 10--19(-32) mm long, pale green, densely covered with glandular hairs interspersed with appressed curly hairs and appressed stiff hairs. **Sepals** 5, lanceolate, apex acute, 6--11,5 mm long, 1--2,5 mm wide, posterior one erect, others reflexed, green, abaxially setose with appressed bristles interspersed with glandular hairs. **Petals** 5, white, cream-coloured or pale pink with undulate margins, claws patent during anthesis forming a floral sheath; posterior two with red line markings giving it a flesh-coloured appearance, ligulate, claws *ca.* 13 mm long, usually wider than the apices, bases cuneate, apices rounded or emarginate, recurved, 19--25 x 2--3,5(-5) mm; anterior three narrowly spatulate, bases attenuate, apices rounded, 17--23 x 1,5--2,5(-4) mm. **Stamens:** staminal column 1--1,5 mm long, white; perfect stamens 5, concealed in floral sheath, posterior one 1,5--3,5 mm long, lateral two 4,5--6,5 mm long, curved upwards, anterior two 5,5--9 mm long, curved upwards, white; staminodes 1,3--2,5 mm long; anthers pink, 1--2 mm long, pollen white to yellow. **Gynoecium:** ovary 2,5--4,5 mm long; style 0,5--2,5 mm long, pale green; stigma branches 1--2,5 mm long, adaxially red. **Fruit:** not seen. (Figure 8.22.1)

#### Diagnostic features and affinities

*P. tenellum* is a geophyte with small simple or trifoliolate prostrate leaves with appressed bristles along the margins, characteristics which are shared with *P. heterophyllum* and *P. chelidonium*. The flowers of *P. tenellum* are also very similar to those of *P. heterophyllum*. Both species have long ligulate petals with undulate margins, and in both cases the claws of the petals form a floral sheath in which the stamens are concealed. In both species the posterior stamen is usually much shorter than the other four stamens, and the lateral and anterior ones are curved upwards. However, they differ in respect to the shape and the markings of the posterior petals. These petals in *P. heterophyllum* are laterally curved with large black blotches in the centre, whereas those of *P. tenellum* are straight with rather pale red lines along the veins. The specific epithet *tenellum* refers to the extremely delicate and tender habit of the plant (Andrews 1820).



## Geographical distribution and ecology

*P. tenellum* occurs on the south-western Cape coastal plain from Philadelphia in the west and the foot of the Du Toitskloof Mountains in the east, and as far south as Kuilsrivier and Stellenbosch. It was also collected on the eastern side of the south-western mountain range along the Doornrivier, a tributary of the Breërvier (Figure 8.22.2). This area receives an annual rainfall of 400--600 mm mainly in winter. *P. tenellum* grows on grassy slopes or in renosterveld on weathered granite or in sandy lime where it usually occurs in full sunlight. Its occurrence varies from occasional to locally frequent, and it flowers in summer, from November to January after the leaves have died.

*P. tenellum* and *P. heterophyllum* are very similar species and apparently they also give preference to the same habitat, but on closer investigation it seems that *P. tenellum* grows in areas with a higher annual rainfall than *P. heterophyllum*.

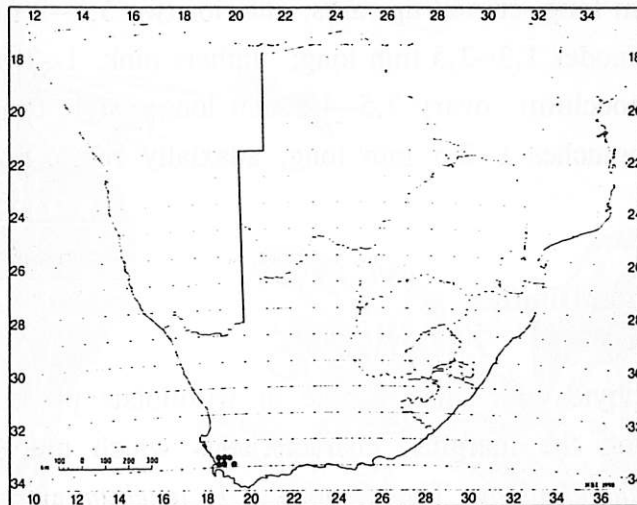


Figure 8.22.2 Geographical distribution of *P. tenellum*.

## Material studied

--3318 (Cape Town): Between Kalbaskraal and Darling (-DA), *Marais 15* (STEU); Swellengift, Philadelphia (-DA), *Marais 136, 137* (STEU); Klipheuwel (-DA), *Van der Walt 1027* (STEU); Klein Drakenstein & Dal Josefats (-DB), *Drège 7490a* (G, K, MO, Px2, W); Farm Bulelwa, Agter Paarl (-DB), *Van Zyl s.n.* (STEU); Langverwacht, above Kuilsrivier (-DC), *Oliver 4818* (STE); Bloem Erf, Koelenhof (-DD), *Baker s.n.* (BOL); Agter-Paarl, Protea F.U.C. road (-DD), *Boucher 158* (STE);



Voëltjiesdorp, Stellenbosch (-DD), *Boucher 3383* (STE); Simondium, Paarl (-DD), *Davis s.n.* (BOL); Between Muldersvlei & Klapmuts (-DD), *Salter 6494* (BOLx2).

--3319 (Worcester): Leliefontein farm, foot of Dutoitskloof (-CA), *Lawder s.n.* (NBG); Doornrivier, farm De Hoop (-CD), *Van Zyl s.n.* (STEU).

**8.23** *Pelargonium trifoliolatum* (Eckl. & Zeyh.) E.M. Marais in South African Journal of Botany 59: 131 (1993). TYPE: Cape Province, '... vallis "Tulbagh" prope "Waterfall" (Worcester).' *Ecklon & Zeyher 493* (S! lecto, designated here; S!; SAM!).

*Hoarea trifoliolata* Eckl. & Zeyh.: 64 (1835). TYPE: Cape Province, '... vallis "Tulbagh" prope "Waterfall" (Worcester).' *Ecklon & Zeyher 493* (S! lecto, designated here; S!; SAM!).

*Pelargonium astragalifolium* var *trifoliolatum* (Eckl. & Zeyh.) Harv.: 268 (1860); Knuth: 346 (1912).

*Geranium astragalifolium sensu* Andr.: t. 190 (1801); non Cav.: 257, t. 104, f. 2 (1787).

*Pelargonium astragalifolium* (*sensu* Andr.) Loudon: 570 (1829); Loudon: 272 (1832); non (Cav.) Jacq.: 8 (1795).

*Pelargonium trifoliatum* Steud.: 290 (1841); non Sweet: t. 294 (1826a); 82, 267 (1826c); nec Harv.: 271 (1860). Probably there is a spelling mistake in Steudel's publication and *P. trifoliatum* (Eckl. & Zeyh.) Steud. should have been *P. trifoliolatum*, because Ecklon & Zeyher did not describe a species *Hoarea trifoliata*.

#### Misidentifications

*Pelargonium pinnatum sensu* Harv.: 269 (1860) p.p.; *P. pinnatum sensu* Knuth: 346 (1912) p.p.; *P. pinnatum sensu* J.J.A. v.d. Walt: 34 fig. (1977) p.p.; *P. astragalifolium sensu* Harv.: 268, 269 (1860) p.p.; *P. astragalifolium sensu* Knuth: 345 (1912) p.p.

A geophyte 170--250 mm tall when in flower. **Tuber:** a turnip-shaped root, 12--35 mm long and 10--35 mm in diameter. **Leaves:** lamina pinnate, 50--170 mm long, pinnae ovate, acute, 6--15 x 3,5--6,5 mm, terminal pinna more or less the same size as the other pinnae, adaxially and abaxially hirsute with appressed hairs interspersed with short glandular hairs; petiole 50--150 mm long and 1--2 mm in diameter, indumentum as on pinnae; stipules 13--33 mm long and 1--2 mm wide, abaxially hirsute. **Inflorescence:** scape 20--150 mm long, 1--2 mm in diameter, branched, bearing 2--5 pseudo-umbellets with (3-)5--14(-20) flowers each; peduncles 50--160



Figure 8.23.1 *Pelargonium trifoliolatum*. A, flowering plant x1; B, petals x2; C, androecium x3; D, gynoecium x5; E, stipules x1; F, mericarp x1,5.

interspersed with long soft patent hairs and glandular hairs; bracts narrowly triangular, 3,5--6 mm long, 2 mm wide, abaxially densely hirsute with distally appressed hairs. Pedicel *ca.* 0,5 mm long. **Hypanthium** 10--15(-25) mm long, densely covered with appressed curly hairs and glandular hairs. **Sepals** 5, lanceolate, apices acute, 6--9,5 mm long, 1,2--3 mm wide, patent during anthesis, abaxially densely covered with appressed hairs and glandular hairs. **Petals** 5, cream-coloured, yellow or pink, claws orientated close together forming a floral sheath of 8--12 mm long; posterior two ligulate to narrowly obovate, curved laterally, with a prominent wine-red blotch on the curve, bases cuneate, apices rounded, margins undulate, laterally recurved during anthesis, 14--21 x 2,5--6,5 mm, claws 8--12 mm long; anterior three spatulate, bases attenuate, apices rounded, 13--20 x 2--6 mm. **Stamens**: staminal column 1--2,5 mm long, white; perfect stamens 5, concealed in floral sheath, posterior one 1,5--3 mm long, lateral two 2,2--5 mm long, curved upwards, anterior two 6--9,5 mm long, curved upwards, white; staminodes 2--3,5 mm long; anthers pale pink, 1--2 mm long, pollen yellow. **Gynoecium**: ovary 2,2--5,5 mm long; style 1--3 mm long, pink; stigma branches 0,5--1,5 mm long, pink. **Fruit**: bases of mericarps 3,5--4 mm long, without glandular hairs, tails 17--24 mm long (Figure 8.23.1).

#### Diagnostic features and affinities

*P. trifoliolatum* has flowers with prominent dark blotches on the posterior petals. These petals are ligulate to narrowly obovate and laterally recurved during anthesis and the margins are undulate. The stigma branches are usually shorter than the style. The anterior two stamens are more or less the same length as or slightly longer than the calyx. The scape is branched, bearing two to five pseudo-umbellets with about 5--14 cream-coloured, yellow or pink flowers each. The hypanthium is 1,5--3 times the length of the calyx. With respect to the structure of the petals and the androecium *P. trifoliolatum* shows affinities with *P. heterophyllum*. With respect to the morphology of the leaves *P. trifoliolatum* shows similarities with *P. pinnatum* and *P. viciifolium*, both species with different floral structures (Marais 1993).

The specific epithet *trifoliolatum*, although not very typical, refers to the incision of the leaves.

## Geographical distribution and ecology

*P. trifoliolatum* occurs on the lower slopes of the western escarpment of the southwestern Cape, from Piketberg and the Koue Bokkeveld Mountains in the north to the Groot Drakenstein in the south (Figure 8.23.2). During the previous century it was also collected by C.F. Ecklon and C. Zeyher, and R. Marloth in the Cape Peninsula. The distribution area receives an annual rainfall of 400--1000 mm occurring mainly in winter. The plants are locally common. It grows in clay soils in renosterveld as well as in sandy soil in fynbos. Flowering time is from October to January with the peak in November. Flowers appear after the leaves have died, but dried leaf remains are usually still present.

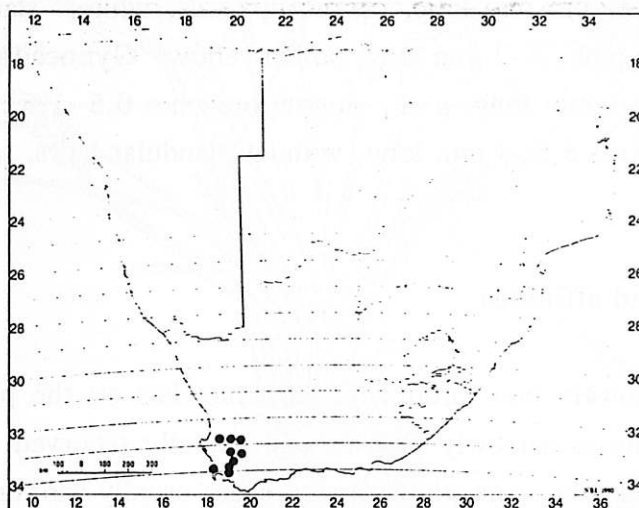


Figure 8.23.2 Geographical distribution of *P. trifoliolatum*.

## Material studied

--3218 (Clanwilliam): Blaauwberg (-DB), *Drège 7501a* (P); Levant Hill, Piketberg (-DC), *Nordenstam 3396* (S, STE).

--3219 (Wuppertal): Dasklip road, 2 km on Grootfontein turnoff (-CC), *Marais 178, 181* (STEU); Tweefontein, Koue Bokkeveld (-CD), *Marais 186* (STEU); Ceres Karoo (-DC), *Dymond s.n.* (BOL).

--3318 (Cape Town): Table Mountain (-CD), *Ecklon & Zeyher 498* (B, L, W); The Kloof, Cape Town (-CD), *Marloth 386* (PRE).

--3319 (Worcester): Roodesand (-AA), *Drège 1291* (P); Tulbaghsberg, near Winterhoek (-AA), *Ecklon & Zeyher 496* (Gx2, K, MEL, MO, P, Sx2, SAM, TCD, UPS, Wx2, Z); Rozendalfontein, Agter-Witzenberg (-AA), *Pillans 9576* (BOL, PRE); Between Rozendalfontein & Visgat (-AA), *Pillans 9570* (BOL); At turnoff to Agter-Witzenberg (-AB), *Marais 45* (STEU); Agter-Witzenberg (-AB), *Cillie*



*s.n.* (STEU); *Marais 49* (STEU); Agter-Witzenberg near Slagboom (-AB), *Marais 347* (STEU); Gydo Pass (-AB), *Marais 66, 394* (STEU); Rocklands, on Gydo-Citrusdal road (-AB), *Marais 370* (STEU); Op-die-Berg, Koue Bokkeveld (-AB), *Marais 189, 300* (STEU); Nieuwekloof, Tulbaghstal (-AC), *Drège s.n.* (G, Kx2, MEL, S, W); *Drège 7501* (MEL); Waterfall, near Tulbagh (-AC), *Ecklon & Zeyher 493* (Sx2, SAM); *Leighton 3041* (BOL); *Pappe 16* (K, MEL, PRE, TCD); *Theron s.n.* (STE); Romansrivier, Wolseley (-AC), *Leighton 2182* (BOL); *Van der Walt 572* (STEU); Witels Kloof, Michell's Pass (-AD), *Esterhuysen 14140* (BOL); S slopes of Castle Rocks (-AD), *Esterhuysen 20712* (BOL); Prince Alfred Hamlet (-AD), *Walgate 386* (NBG); Between Prince Alfred Hamlet & Gydo (-AD), *Marais 40* (STEU); Flats NW of Prince Alfred Hamlet (-AD), *Oliver 5132* (STE); Theronsberg Pass (-AD), *Marais 139* (STEU); W slopes of Roodeberg, Hex River Mountain (-BC), *Esterhuysen 20* (PRE); *Esterhuysen 20921* (BOL); Hexrivier (-BC), *Fischer 208* (STEU); Sanddrifkloof (-BC), *Marais 345* (STEU); Laakenvlei, Matroosberg (-BC), *Phillips 11755* (SAM); Theronsberg Pass (-BC), *Marais 55* (STEU); Kleinberg, Hex River Mountain (-BD), *Esterhuysen 9949* (BOL); Dutoitskloof (-CA), *Drège 7499* (G, P, S, W); Worcester Shooting Range (-CB), *Bayer 2627* (NBGx3); Between Rooihogte & Worcester (-CB), *Bolus s.n.* (BOL); Rainbow Chicken Farm (-CB), *Forrester 258* (NBG); *Walters 1545* (NBG); Near Rawsonville (-CB), *Forrester 208A* (NBG); Drakensteinberge (-CC), *Drège 7501b* (G, P, PRE); La Motte Forest Station, Zachariashoek (-CC), *Viviers 1125* (STE).  
 --3419 (Caledon): Grabouw (-AA), *Taylor 4406* (STE).

## ACICULATUM GROUP

Geophytes with elongated, branched roots and irregularly pinnate or bipinnatisect leaves with rigid erect petioles. Scape branched, bearing 2--8 pseudo-umbellets with 15--40 flowers each. Flowers with cream-coloured or pale yellow, ligulate or oblanceolate petals with V-shaped or feather-like markings on the posterior two. Stamens 2 or 5 fertile, posterior one and lateral two very short and concealed within the floral sheath, the anterior stamens long and protrude from the flower. Tectum of pollen striate.

**8.24** *Pelargonium aciculatum* E.M. Marais in South African Journal of Botany 57: 55 (1991). TYPE - Cape Province: Bothmas Kloof, near Riebeek Kasteel, *Marais 318* (STE, holo!, K!, PRE!).

A geophyte 100--300 mm tall when in flower. **Tuber:** elongated, branched roots, sometimes with more than one stem-growing point, 80--100 mm long and ca. 20 mm in diameter. **Leaves:** green, petiolate; lamina elliptic, 100--140 x 35--60(--80) mm, irregularly deeply pinnatilobed to bipinnatisect, densely hirsute with distally appressed



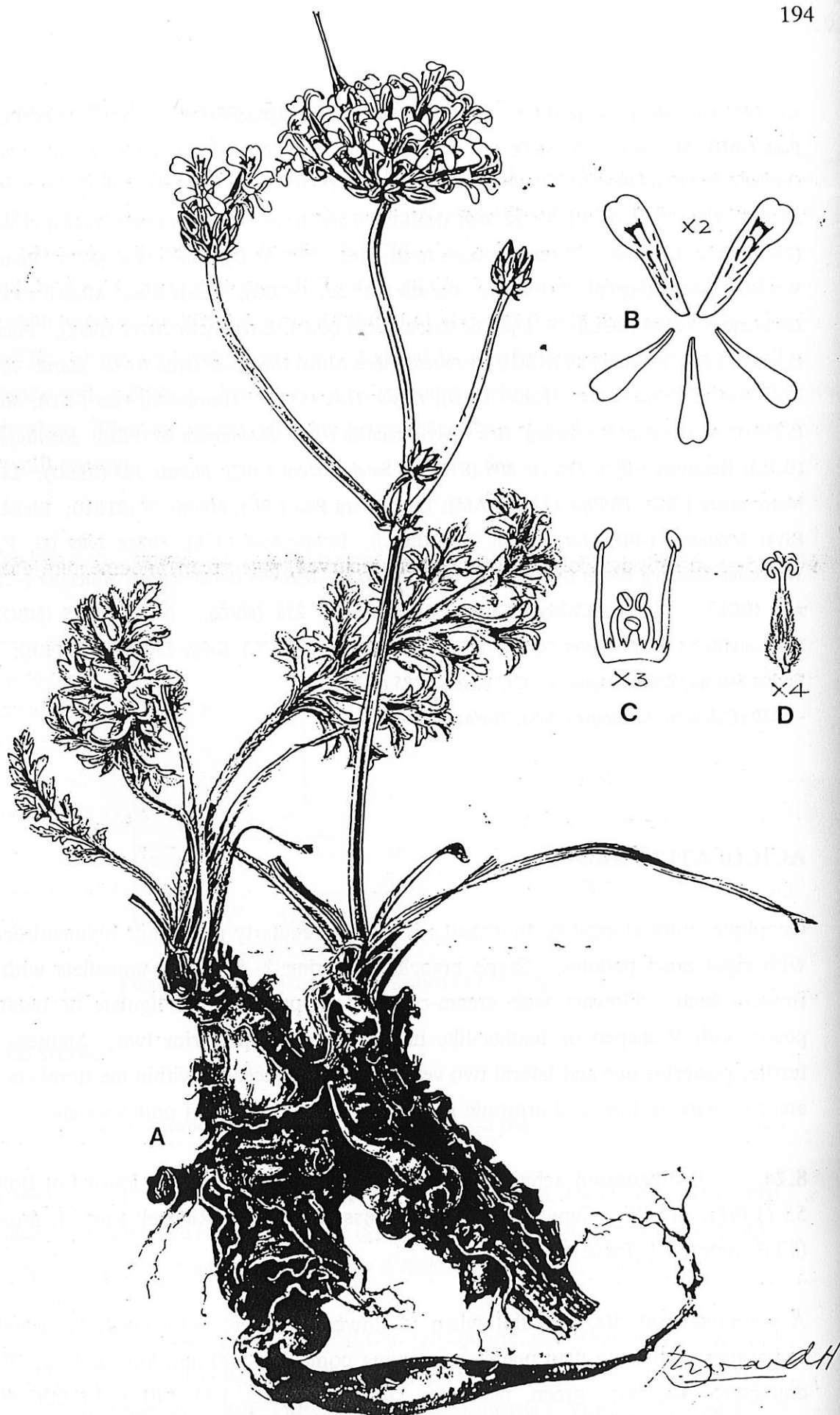


Figure 8.24.1 *Pelargonium aciculatum*. A, flowering plant x1; B, petals x2; C, androecium x3; D, gynoecium x4.

hairs and glandular hairs interspersed; segments linear, 6--12 mm wide, apices acute, margins serrate; petiole 50--130 mm long, rigid, erect, hirsute with coarse hairs and glandular hairs interspersed; stipules subulate, 18--25 mm long and 2 mm wide, ciliate, adnate to the petiole with apices free, free apices *ca.* 8 mm long. **Inflorescence:** scape 60--130 mm long and 2--3,5 mm in diameter, pale green, densely pilose with curly hairs interspersed with long glandular hairs, branched, bearing 2--4 pseudo-umbellets; peduncles 50--130 mm long and 1--1,5 mm in diameter, indumentum as on scape; bracts irregular in form and size, densely hirsute with appressed hairs; pseudo-umbellet 13--32(--40) flowered, subtended by a whorl of spatulate bracts; bracts 3--5 mm long, acuminate, adaxially hirsute with appressed hairs, abaxially hirsute with appressed hairs and interspersed with glandular hairs, initially erect, recurved during senescence. **Pedicel** *ca.* 1 mm long. **Hypanthium** 12--16 mm long (about twice as long as the calyx), pale green, indumentum as on scape. **Sepals** 5, lanceolate, apices acuminate, 7--9 x 1,5--3 mm, posterior one erect, others recurved, pale green, indumentum abaxially as on scape, only less dense. **Petals** 5, pale yellow or cream-coloured, claws orientated close together forming a sheath-like structure; posterior two with feather-like red markings, ligulate, curved laterally, bases cuneate, apices rounded to emarginate, laterally recurved during anthesis, 11--13,5 x 2--3,5 mm; anterior three dimly marked pink at the very base, spatulate, bases narrowly cuneate, apices rounded to emarginate, patent during anthesis, 9--10 x 2--2,5 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, posterior one *ca.* 1 mm long, lateral two 2 mm long, recurved so that anthers are borne on the same level as posterior one, anterior two 6,5--8 mm long, protruding from the flower, free filaments dark pink; staminodes *ca.* 2,5 mm long; anthers 1 mm long, dark pink, pollen orange. **Gynoecium:** ovary 4,5 mm long; style 3--4 mm long, dark pink; stigma branches 1 mm long, dark pink. **Fruit:** bases of mericarps *ca.* 4 mm long, with glandular hairs, tails *ca.* 23 mm long. (Figure 8.24.1).

#### Diagnostic features and affinities

*P. aciculatum* is a geophyte with erect leaves and rigid petioles. The laminae are irregularly deeply pinnatilobed to bipinnatisect and densely hirsute with appressed hairs. The hypanthia of the small yellow flowers are about twice the length of the calyx. There are five fertile stamens, of which the posterior one and the lateral two are very short and concealed within the floral sheath. The lateral two are recurved so that the anthers are borne on the same level as that of the posterior one. The anterior two stamens are about the same length as the calyx, and protrude from the flower. The petals are about 1,5 times the length of the calyx, with wine-red feather-like markings on the posterior two. The specific epithet refers to the irregular fine streaks on the petals.

*P. aciculatum* resembles *P. confertum*, *P. fasciculaceum* and *P. connivens* in respect to the morphology of the leaves as well as the floral structure. All four species have ligulate petals, very short lateral and posterior stamens and long anterior stamens. *P. aciculatum* shows a closer relation with *P. confertum* because both of them have rather short petals and short hypanthia. They differ in respect to the number of fertile stamens: *P. aciculatum* has five fertile stamens, whereas *P. confertum* has only two.

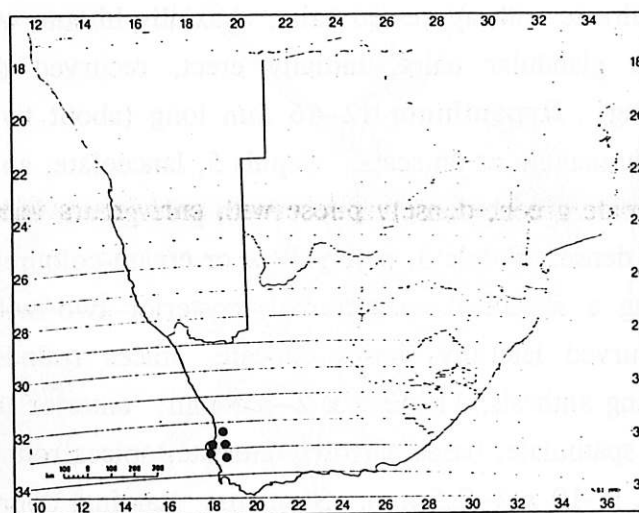


Figure 8.24.2 Geographical distribution of *P. aciculatum*.

### Geographical distribution and ecology

*P. aciculatum* occurs on foothills in renosterveld and is restricted to the west coast (Figure 8.24.2) from Paleisheuvel in the north to Riebeeck-Kasteel in the south, an area receiving an annual rainfall of 200–400 mm, mainly during winter. It flowers in summer, from November to December.

### Material studied

–3218 (Clanwilliam): Paleisheuvel (-BC), *Van der Walt 1024* (STEU); Nooitgedacht farm near Vredenburg (-CC), *Barker 10230* (NBG); De Hoek, on Die Kasteel road (-DC), *Marais 265* (STEU); De Hoek, Cement Factory (-DD), *Esterhuysen 20167* (BOL).

–3317 (Saldanha): Saldanha (-BB), *Van der Walt s.n.* (STEU).

–3318 (Cape Town): Langebaan (-AA), *Lewis s.n.* (BOL); *Ward-Hilhorst s.n.* (STEU); Bothmas Kloof, near Riebeeck Kasteel (-BD), *Marais 318* (K, PRE, STE); Voorspoed, Malmesbury (-BD), *Van der Walt 1039* (STEU).

8.25 *Pelargonium confertum* E.M. Marais in South African Journal of Botany 57: 57 (1991). TYPE - Cape Province: Darter's Grave, 13 km. S of Kamieskroon, Van Jaarsveld 4283 (STE, holo!, K!, PRE!).

A geophyte 140--300 mm tall when in flower. **Tuber:** elongated, branched roots, sometimes with more than one stem-growing point, 70 mm long and 15--30 mm in diameter. **Leaves:** green, petiolate; lamina elliptic to ovate, 90--180 x 40--80(-110) mm, irregularly bipinnate, densely hirsute with distally appressed hairs and with glandular hairs interspersed; segments linear, 5--12 mm wide, apices acute, margins serrate; petiole 35--60 mm long, rigid, erect, conspicuously curved, hirsute with appressed coarse hairs and short glandular hairs interspersed; stipules subulate, 13--20 mm long and 2 mm wide, hirsute to densely hirsute at the apex, adnate to the petiole with apices free, free apices *ca.* 5 mm long. **Inflorescence:** scape 40--200 mm long and 3--5 mm in diameter, pale green, densely pilose with curly hairs interspersed with long glandular hairs, branched, bearing 2--8 pseudo-umbellets; peduncles 70--150 mm long and 1--2 mm in diameter, indumentum as on scape; bracts irregular in form and size, densely hirsute; pseudo-umbellet 13--24(--40) flowered, subtended by a whorl of ovate bracts; bracts 4--5 mm long and *ca.* 1,5 mm wide, acute, abaxially hirsute with appressed hairs and interspersed with glandular hairs. **Pedicel** *ca.* 1 mm long. **Hypanthium** 11--17 mm long (twice as long as the calyx), curved, pale green, indumentum as on scape. **Sepals** 5, lanceolate, apices acuminate, 6--8 x 1--2 mm, posterior one erect, others recurved, pale green, indumentum abaxially as on scape, only less dense. **Petals** 5, pale yellow or cream-coloured, claws orientated close together forming a sheath-like structure; posterior two with feather-like red markings, ligulate, bases cuneate, apices rounded, laterally recurved during anthesis, 9--11 x 2--3 mm; anterior three with red markings at the very base, spatulate, bases attenuate, apices rounded, patent during anthesis, 7--9,5 x 1--2 mm. **Stamens:** staminal column *ca.* 1 mm long, white; perfect stamens 2, in anterior position, 8 mm long, protruding from the flower, free filaments white; staminodes 1--2 mm long, apices pink; anthers 1,5 mm long, pink, pollen orange. **Gynoecium:** ovary 5,5 mm long; style 2--4 mm long, pink; stigma branches 1 mm long, dark red. **Fruit:** bases of mericarps *ca.* 5 mm long, with glandular hairs, tails *ca.* 22 mm long. (Figure 8.25.1).

#### Diagnostic features and affinities

*P. confertum* is a geophyte with erect leaves and rigid, curved petioles. The laminae are irregularly bipinnate and densely hirsute with appressed hairs. The hypanthia of the small yellow flowers are about twice the length of the calyx. The large number of



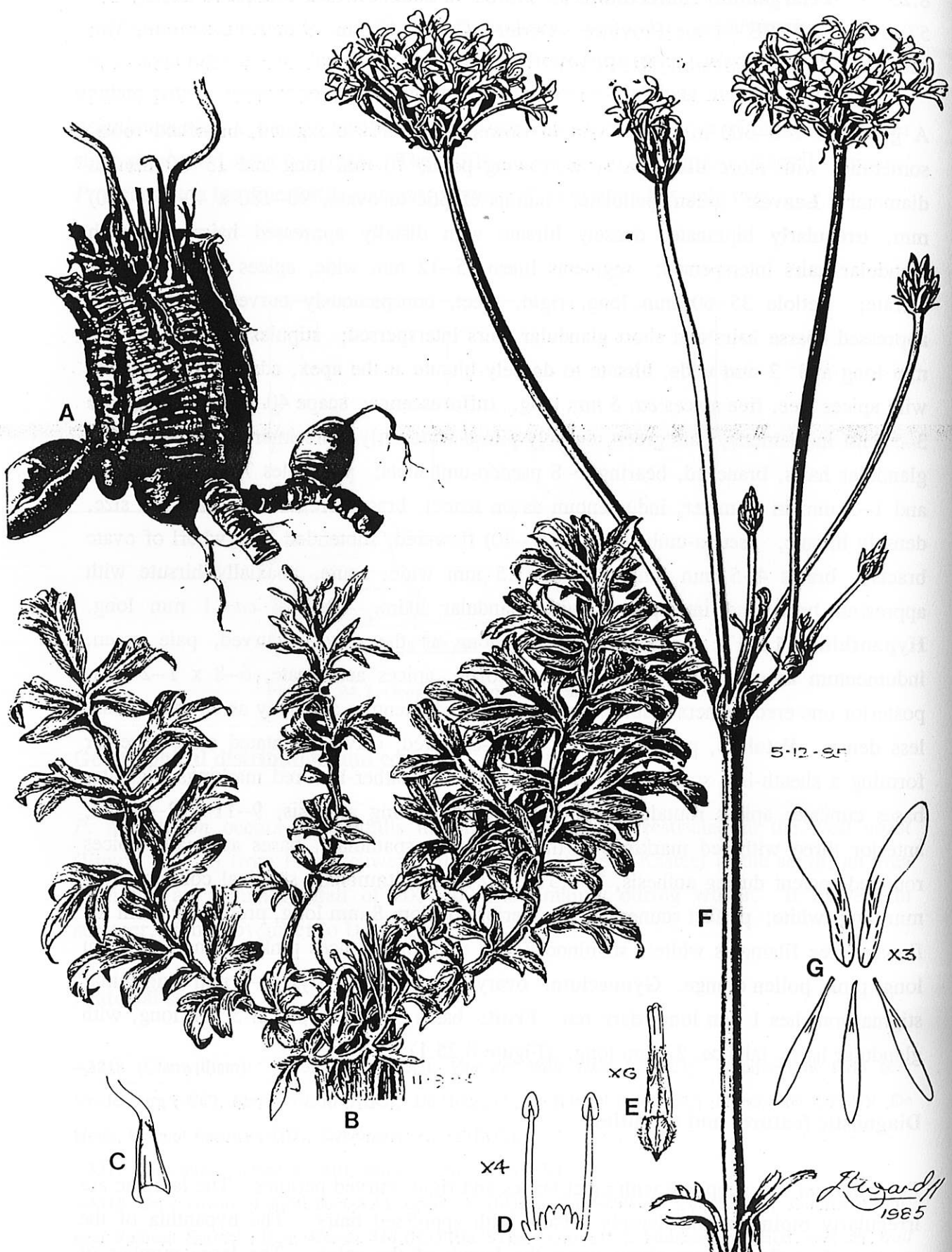


Figure 8.25.1 *Pelargonium confertum*. A, tuber x1; B, leaves x1; C, leaf base x1; D, androecium x4; E, gynoecium x6; F, inflorescence x1; G, petals x3.



flowers with short hypanthia gives the inflorescence a crowded appearance, hence the specific epithet. Only the anterior two stamens are fertile and they are the same length as the calyx and protrude from the flower. The petals are about 1,5 times the length of the calyx, with wine-red feather-like markings on the posterior two. The floral structure and especially the length of the hypanthia and the size, form and markings of the petals resemble those of *P. aciculatum*. The latter has five fertile stamens, whereas *P. confertum* has only two.

### Geographical distribution and ecology

*P. confertum* occurs in small populations in rock crevices or under bushes in Namaqualand, from Rietkloof Mountains near Steinkopf in the north to Nuwerus in the south (Figure 8.25.2), an area receiving an annual rainfall of 100–200 mm mainly during winter. It flowers from November to December.

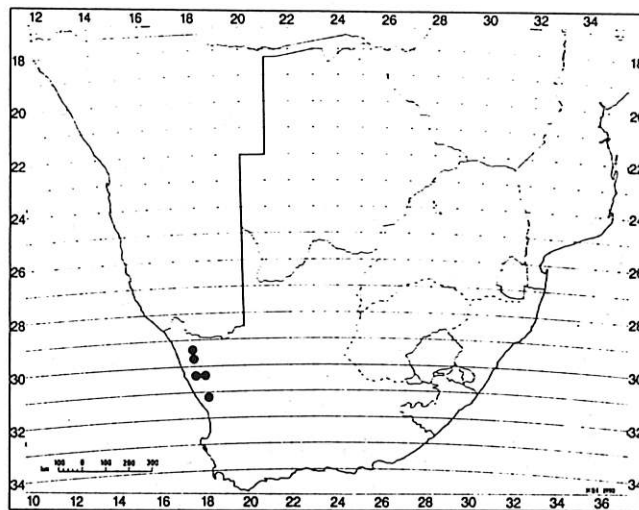


Figure 8.25.2 Geographical distribution of *P. confertum*.

### Material studied

- 2917 (Springbok): Northern slopes of Rietkloof Mountains (-BC), *Pearson 5703* (BOL, K); Spektakel Pass (-DA), *Van der Walt 956* (STEU); 2 km ESE of Nababeb (-DB), *Lavranos 28338* (STEU).
- 3017 (Hondeklipbaai): Darter's Grave, 13 km S of Kamieskroon (-BD). *Van Jaarsveld 4283* (K, PRE, STE).
- 3018 (Kamiesberg): 16 km from Garies to Leliefontein (-AC), *Marais 72* (STEU).
- 3118 (Vanhynsdorp): Between Nuwerus and Bitterfontein (-AB), *Pearson 5541* (BOL, K); Karee Mountains S of Nuwerus (-AB), *Van Zyl s.n.* (STEU).

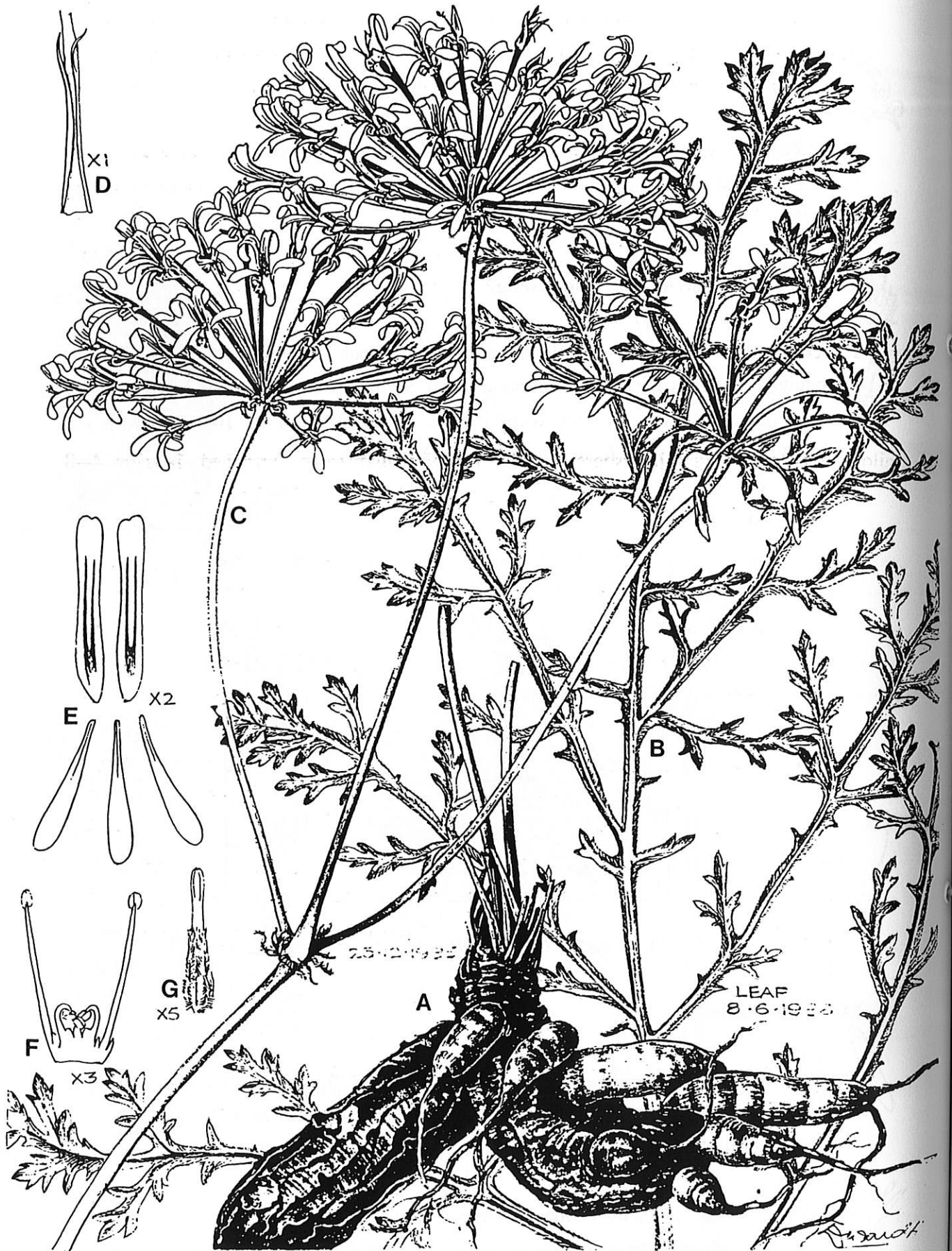


Figure 8.26.1 *Pelargonium fasciculaceum*. A, tuber x1; B, leaf x1; C, inflorescence x1; D, leaf base x1; E, petals x2; F, androecium x3; G, gynoecium x5.

8.26 *Pelargonium fasciculaceum* E.M. Marais in South African Journal of Botany 57: 59 (1991). TYPE - Cape Province: Arbeidsgenot, on gravelled road between Citrusdal and Clanwilliam, Marais 184 (STE, holo!, BOL!, K!, PRE!).

A geophyte 300--500 mm tall when in flower. **Tuber:** elongated, branched roots, sometimes with several stem-growing points, 70--110 mm long and 15--25 mm in diameter. **Leaves:** green, petiolate; lamina ovate, 140--270 x 60--120 mm, irregularly bipinnate, densely hirsute with distally appressed hairs and with glandular hairs interspersed; segments linear, 4--8 mm wide, apices acute, margins serrate; petiole 80--200 mm long, rigid, erect, hirsute with coarse hairs and interspersed with glandular hairs; stipules subulate, 15--25 mm long and 2 mm wide, hirsute to densely hirsute at the apex, adnate to the petiole with apices free; free apices *ca.* 5 mm long. **Inflorescence:** scape 70--170 mm long and 2--5 mm in diameter, pale green, densely pilose with curly hairs interspersed with long glandular hairs, branched, bearing 4--8 pseudo-umbellets; peduncles 90--240 mm long and 1,5--3 mm in diameter, indumentum as on scape; bracts irregular in form and size, densely hirsute; pseudo-umbellet 15--26(-40) flowered, subtended by a whorl of narrowly triangular bracts; bracts 4--5 mm long, acuminate, abaxially hirsute with appressed hairs and interspersed with glandular hairs, initially erect, recurved during senescence. **Pedicel** *ca.* 1 mm long. **Hypanthium** 40--60 mm long, (6--8 times the length of the calyx), pale green, indumentum as on scape. **Sepals** 5, posterior one triangular, remaining four lanceolate, apices acuminate, 7--9 x 1,5--3 mm, posterior one erect, others recurved, pale green, indumentum abaxially as on scape, only less dense. **Petals** 5, pale yellow or cream-coloured, oblanceolate or ligulate, bases cuneate, apices rounded to emarginate, claws orientated close together forming a sheath-like structure; posterior two with V-shaped red markings, apices laterally recurved during anthesis, 16--19 x 3--4 mm; anterior three dimly marked pink at the very base, apices patent during anthesis, 13--16 x 2--3 mm. **Stamens:** staminal column 1,5--2 mm long, white; perfect stamens 5, posterior one *ca.* 2 mm long, lateral two 4 mm long, recurved so that anthers are borne on the same level as posterior one, anterior two 9--11 mm long, protruding from the flower, free filaments dark pink; staminodes *ca.* 2,5 mm long; anthers 1 mm long, dark pink, pollen orange. **Gynoecium:** ovary 3 mm long; style 2 mm long, dark red; stigma branches 1 mm long, dark red. **Fruit:** bases of mericarps *ca.* 5 mm long and tails *ca.* 23 mm long. (Figure 8.26.1).



### Diagnostic features and affinities

*P. fasciculaceum* is a geophyte with very large erect leaves and rigid petioles. The laminae are irregularly bipinnate and densely hirsute with appressed hairs. With the long scapes and peduncles this species is up to 0,5 m high when in flower, and it is thus one of the tallest species in section *Hoarea*. The hypanthia of the pale yellow flowers are about six to eight times the length of the calyx. There are five fertile stamens, of which the posterior one and the lateral two are very short and concealed within the floral sheath. The lateral two are recurved so that the anthers are borne on the same level as that of the posterior one. The anterior two stamens are longer than the calyx and protrude from the flower. The petals are about twice the length of the calyx, with red V-shaped markings on the posterior two. The specific epithet refers to the large number of flowers with long hypanthia diverging from a common centre.

In respect to the leaf form and the structure of the androecium *P. fasciculaceum* resembles *P. aciculatum*, *P. confertum* and *P. connivens*. However, it reveals a closer relation with *P. connivens* because both species have long hypanthia and long ligulate petals with V-shaped markings on the posterior two. These two species differ in respect to the orientation and the colour of the petals (Marais 1991).

### Geographical distribution and ecology

*P. fasciculaceum* grows in sandy places along the banks of the Olifants River and its tributaries, and in mountain fynbos on the Nardous and Bokkeveld plateaux (Figure 8.26.2), an area receiving an annual rainfall of 200--400 mm, occurring mainly during winter. The fleshy roots are branched, forming an extensive root system on which several stem-growing points develop. Thus older plants often grow in colonies while younger and smaller plants usually grow singly, an indication that in nature plants easily develop from seeds. It flowers in summer, from December to January after the leaves have been shed. Each of the numerous scapes per plant bears four to eight pseudo-umbellets which mature in succession, thus lengthening the flowering season. Fruit setting in cultivation is rare. This, as well as the special structure of the androecium suggests a dependance on a special pollinator.

Plants from the Nardous and Bokkeveld plateaux, areas with a lower annual rainfall than along the Olifants River, flower only late in January and usually have fewer pseudo-umbellets per scape and fewer flowers per pseudo-umbellet than those from the Olifants River valley. Plants from the Olifants River valley flower from December to January.

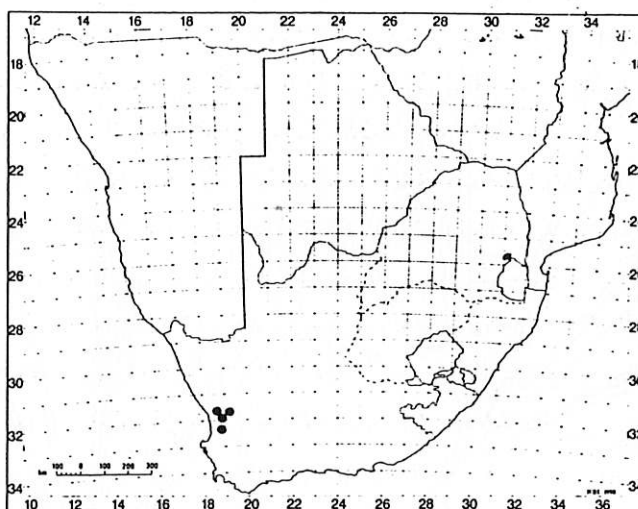


Figure 8.26.2 Geographical distribution of *P. fasciculaceum*.

### Material studied

--3118 (Vanrhynsdorp): Vleikraal, 8 km E of Klawer (-DA), *Walters 1* (STEU); Muggiedraai turnoff, on Nardous Pass road (-DD), *Marais 325* (STEU); On top of Giftberg (-DD), *Van Jaarsveld 4363* (STEU).

--3119 (Calvinia): Papkuilsfontein, S of Nieuwoudtville (-CA), *Von Willert s.n.* (STEU).

--3218 (Clanwilliam): Arbeidsgenot on gravelled road between Citrusdal and Clanwilliam (-BD), *Marais 184, 384* (BOL, K, PRE, STE); Haarwegskloof (-BD), *Marais 199* (STEU); Melkboomfontein on the banks of the Olifants River (-BD), *Marais 266* (STEU); 6 km from Paleisheuwel turnoff (-BD), *Van der Walt 1046* (STEU).

**8.27 *Pelargonium connivens* E.M. Marais** in *South African Journal of Botany* 57: 61 (1991). TYPE - Cape Province: Rondekop, Nieuwoudtville, *Lavranos & Pehlemann 19000* (STE, holo!, K!, PRE!).

A geophyte 180 mm tall when in flower. **Tuber:** elongated, branched roots, *ca.* 40 mm long and *ca.* 20 mm in diameter. **Leaves:** green, petiolate; lamina elliptic to ovate, 100--130 x 40--60 mm, irregularly pinnate to bipinnatisect, densely hirsute with distally appressed hairs and with glandular hairs interspersed; segments linear, 6--12 mm wide, apices acute, margins serrate; petiole 45--70 mm long, rigid, erect, hirsute with appressed coarse hairs and short glandular hairs interspersed; stipules subulate, 7--14 mm long and 1,5 mm wide, hirsute to densely hirsute at the apex, adnate to the petiole with apices free, free apices *ca.* 3 mm long. **Inflorescence:** scape 30--40 mm long and



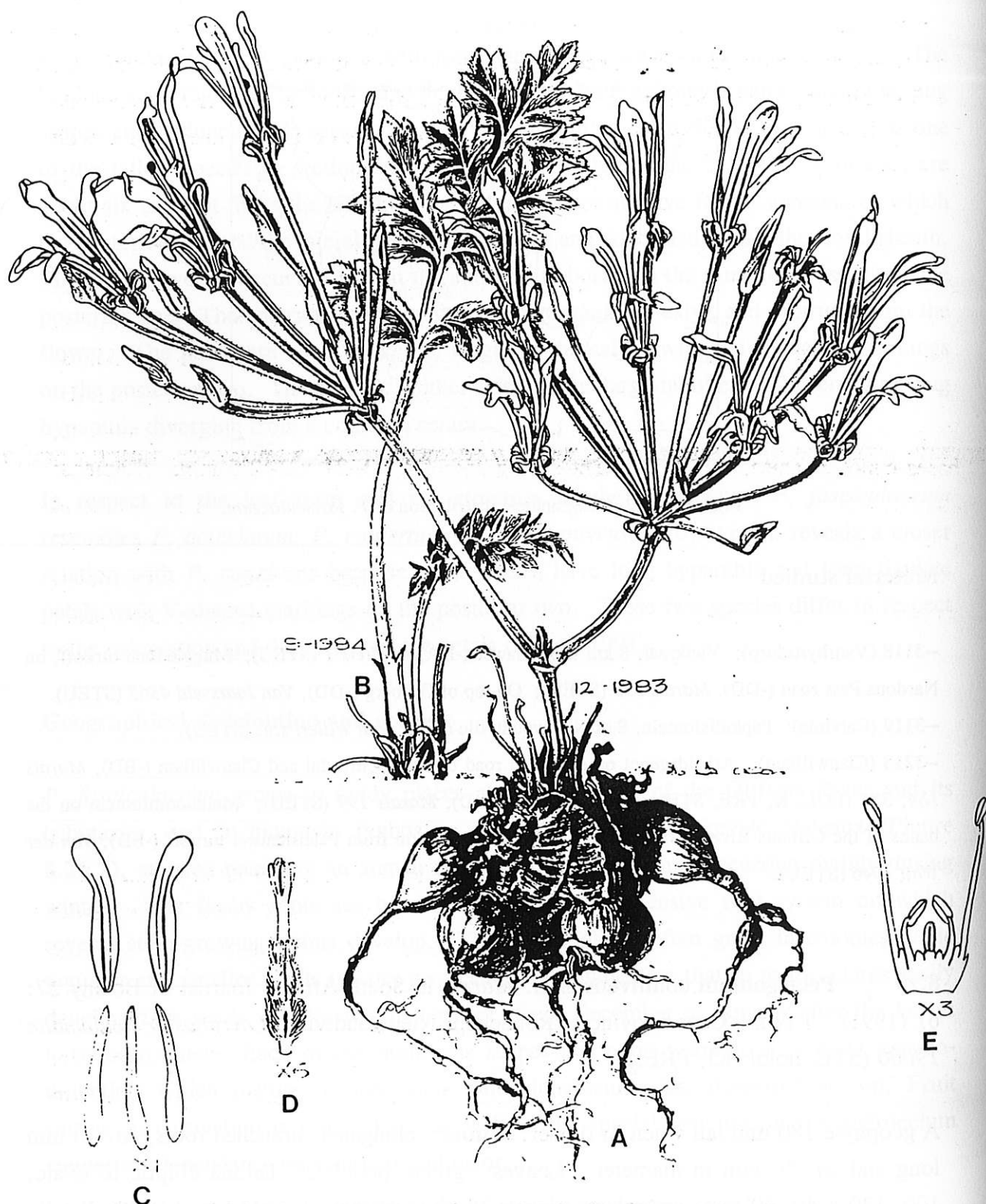


Figure 8.27.1 *Pelargonium connivens*. A, flowering plant x1; B, leaves x1; C, petals x1; D, gynoecium x6; E, androecium x3.

2--3 mm in diameter, pale green, densely pilose with curly hairs interspersed with long glandular hairs, branched, bearing 2--3 pseudo-umbellets; peduncles 35--70 mm long and 1,5--2 mm in diameter, indumentum as on scape; bracts irregular in form and size, densely hirsute; pseudo-umbellet 10--30 flowered, subtended by a whorl of subulate bracts; bracts 3--4 mm long, abaxially hirsute with appressed hairs and interspersed with glandular hairs, initially erect, recurved during senescence. **Pedicel** *ca.* 1 mm long. **Hypanthium** 40--55 mm long (4--5 times the length of the calyx), pale green, indumentum as on scape. **Sepals** 5, posterior one narrowly triangular, remaining four lanceolate, apices acuminate, 10 x 1,5--3 mm, recurved, pale green, indumentum abaxially as on scape, only less dense. **Petals** 5, cream-coloured to salmon-pink, connivent, forming a sheath-like structure; posterior two with V-shaped pink markings, ligulate, slightly curved, bases cuneate, apices rounded, slightly recurved during anthesis, 24--28 x 4 mm; anterior three dimly marked pink at the very base, ligulate to spatulate, bases cuneate, apices rounded, patent during anthesis, 20--24 x 2--2,5 mm. **Stamens:** staminal column 1,5--2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one *ca.* 2,5 mm long, lateral two 4 mm long, erect, anterior two 10 mm long, free filaments white; staminodes *ca.* 2,5 mm long; anthers *ca.* 1 mm long, dark pink, pollen orange. **Gynoecium:** ovary 3 mm long; style 4,5 mm long, pink; stigma branches 1 mm long, pink. **Fruit:** bases of mericarps *ca.* 5 mm long and tails *ca.* 23 mm long. (Figure 8.27.1).

### Diagnostic features and affinities

*P. connivens* is a geophyte with erect leaves and rigid petioles. The laminae are irregularly pinnate to bipinnatisect and densely hirsute with appressed hairs. The hypanthia of the cream-coloured to salmon-pink flowers are about four to five times the length of the calyx. There are five fertile stamens, of which the posterior one and the lateral two are very short and the lateral two are erect. The anterior two stamens are more or less the same length as the calyx. The petals are 2,5 to three times the length of the calyx, connivent, forming a sheath-like structure in which all the stamens are concealed, hence the specific epithet. The pink V-shaped markings on the posterior two petals give the flower a salmon-pink appearance.

In respect to the leaf form and the structure of the androecium *P. connivens* resembles *P. aciculatum*, *P. confertum* and *P. fasciculaceum*. However, it reveals a closer relation with *P. fasciculaceum* because both species have long hypanthia and long ligulate petals with V-shaped markings on the posterior two. These two species differ in respect to the orientation and the colour of the petals (Marais 1991).

### Geographical distribution and ecology

Only two collections of *P. connivens* are known, both from Rondekop near Nieuwoudtville (Figure 8.27.2). This area receives an annual rainfall of 200--300 mm, mainly during winter. It flowers from December to January.

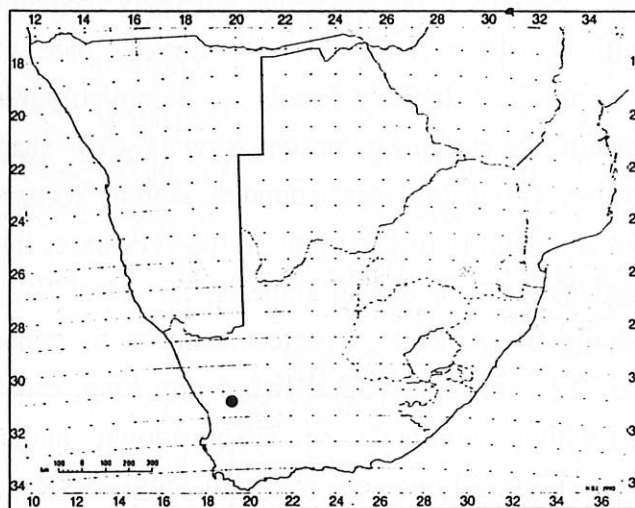


Figure 8.27.2 Geographical distribution of *P. connivens*.

### Material studied

--3119 (Calvinia): Rondekop near Nieuwoudtville (-AD), *Lavranos & Pehlemann 19000* (K, PRE, STE); *Lavranos & Pehlemann 19001* (STEU).

### LUTEUM GROUP

Geophytes with irregularly pinnate or bipinnatisect leaves. Scape branched, bearing 2--9(-12) pseudo-umbellets with 6--23 flowers each. Hypanthium 20--35 mm long. Flowers with yellow or pale yellow, ligulate to spatulate petals and V-shaped markings on the posterior petals. Stamens 2 or 5 fertile, twisted so that pollen surfaces are facing to the front. Tectum of pollen striate-reticulate.

**8.28** *Pelargonium luteum* (*Andr.*) *G. Don*, *A general system of gardening and botany* 1: 726 (1832); *Loudon*: 271 (1832); *Knuth*: 346 (1912). **ICONOTYPE**: *Andrews, The Botanist's Repository* 6: t. 423 (1805a).

*Geranium luteum* Andr.: t. 423 (1805a). ICONOTYPE: Andrews, The Botanist's Repository 6: t. 423 (1805a).

*Hoarea lutea* (Andr.) Sweet: 76 (1826c).

A geophyte 110--200 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root 20--60 mm long and 25--40 mm in diameter. **Leaves** green, petiolate; lamina elliptic, irregularly pinnate to bipinnatisect, 50--120 mm long; pinnae 10--40 mm long, incised, segments lacinate, adaxially and abaxially sparsely hirsute with appressed hairs and sparsely interspersed with glandular hairs; petiole 20--80 mm long and 1,5--2 mm in diameter, rigid, erecto-patent, covered with glandular hairs interspersed with appressed stiff hairs; stipules subulate or narrowly triangular, adnate to petioles for half to almost their total length, 5--10 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 10--25 mm long, 1,5--3 mm in diameter, branched, bearing 4--9(-12) pseudo-umbellets with 6--16(-20) flowers each; peduncles 50--150 mm long, 1--2 mm in diameter, hirsute with appressed curly hairs interspersed with long glandular hairs; bracts lanceolate, 2--5 mm long, 1--2 mm wide, abaxially hirsute with appressed hairs, interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 20--33 mm long, reddish green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6--8 mm long, 1--3 mm wide, posterior one erect, others recurved, reddish green with white margins, indumentum abaxially as on peduncle. **Petals** 5, yellow, patent during anthesis; posterior two with pale pink or red V-shaped markings, ligulate to spathulate, bases cuneate, apices rounded or emarginate, recurved, 11--15 x 2,5--4 mm; anterior three ligulate, bases attenuate, apices rounded or obtuse, 11--15,5 x 2--2,5 mm. **Stamens:** staminal column 1--3 mm long, white; perfect stamens 5, posterior one 3--4 mm long, lateral two 5,5--7,5 mm long, anterior two 7--9 mm long, white, free filaments of lateral and anterior ones twisted so that pollen surfaces of anthers are turned to the front; staminodes 2--3,5 mm long; anthers dark pink, 1--2 mm long, the posterior one smaller than the others, pollen orange. **Gynoecium:** ovary 1,5--5,5 mm long; style 1,5--5,5 mm long, white; stigma branches 1--2 mm long, adaxially wine-red. **Fruit:** bases of mericarps 4--6 mm long, with glandular hairs, tails 21--25 mm long. (Figure 8.28.1).

#### Diagnostic features and affinities

*P. luteum* is a geophyte with irregularly pinnate to bipinnatisect leaves and yellow flowers, hence the specific epithet. The androecium of *P. luteum* is typical for the genus *Pelargonium* and for the section *Hoarea* in having ten filaments and five fertile stamens. However, the way in which the fertile stamens are borne during anthesis, is unique. The





Figure 8.28.1 *Petargonium luteum*. A, flowering plant x1; B, plant with leaves x1; C, petals x2; D, gynoecium x4; E, androecium x4; F, leaf base x1.5.

posterior stamen is bent, pushing aside the pistil. At the same time the filaments of the lateral and anterior stamens are twisted so that the open anthers form a pollen-lined tunnel to the nectar tube (Figure 8.28.2). A remarkable elongation of the pistil occurs after the anthers are dropped. This is aimed at cross-pollination, and the special structure of the androecium is an indication of a special pollinator for this species, explaining the poor fruit formation in the Botanic Garden.

The delicate appearance of the pseudo-umbellets, the colour and the form of the petals and the way in which the fertile stamens are borne in *P. luteum*, indicate a relationship with *P. fumariifolium*.

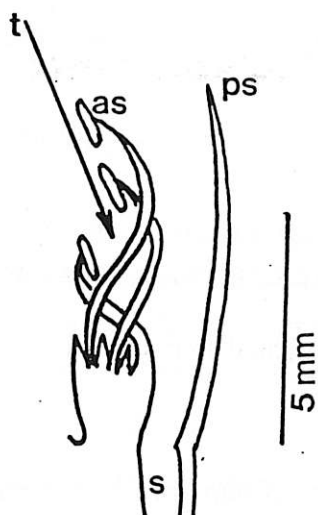


Figure 8.28.2 Androecium of *P. luteum*, as = anterior stamen, ps = posterior sepal, s = spur, t = tunnel

### Geographical distribution and ecology

The known distribution area of *P. luteum* is very small. It has only been recorded from the area around Nieuwoudtville and Calvinia (Figure 8.28.3) in rocky places in sand in karroid vegetation. This area has very hot summers and an annual rainfall of 200--300 mm, which occurs mainly in winter. *P. luteum* flowers from October to November. Each plant has a large number of pseudo-umbellets which flower in succession, thus lengthening the flowering period of the plant. In spite of the long flowering time and the large number of flowers per plant, fruit formation in the Botanic Garden is very poor. This may be ascribed to the absence of a special pollinator for this species in the garden. At the end of the flowering time all the leaves have died.

## Material studied

--3119 (Calvinia): 11 km from Nieuwoudtville to Brandkop (-AC), *Fischer 33* (STEU); Ambraalshoek, Calvinia (-BD), *Marais 120, 121* (STEU); Foot hills of Teefontein se punt (-BD), *Marais 270, 271* (STEU); 8 km N of Die Bos on Ceres - Calvinia road (-DC), *Perry 3243* (NBG, STEU).

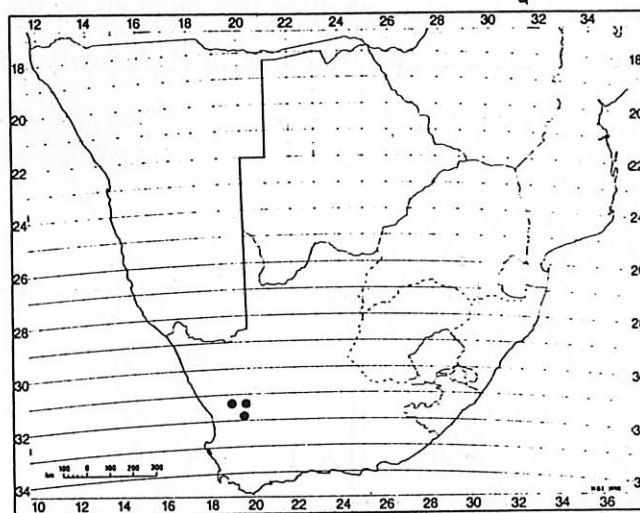


Figure 8.28.3 Geographical distribution of *P. luteum*.

**8.29** *Pelargonium fumariifolium* Knuth in *Planzenreich* 4, 129: 347 (1912); Compton: 294 (1931). TYPE - Cape Province: "Nama'land minor", *Scully 210* (BOL, holo!).

A geophyte 80--230 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 15--60 mm long and 15--30 mm in diameter. **Leaves** green, petiolate; lamina trullate in outline, pinnate to bipinnatisect with 3 or 5 pinnae, 70--130 x 70--140 mm; pinnae 40--90 mm long, lobed to lacinate, adaxially and abaxially hirsute with appressed hairs interspersed with very short glandular hairs; petiole 60--80 mm long and 1--2 mm in diameter, rigid, erecto-patent, densely hirsute with short appressed hairs; stipules subulate, adnate to petioles for half their length, 8--9 mm long and 1--2 mm wide, hirsute. **Inflorescence:** scape 20--150 mm long, 1--3 mm in diameter, branched, bearing 2--6 pseudo-umbellets with (8-)14--23 flowers each; peduncles 20--90 mm long, 1--2 mm in diameter, dark reddish brown, sparsely hirsute with appressed hairs interspersed with short glandular hairs; bracts lanceolate, 2--3 mm long, 1 mm wide, reclinate, abaxially densely hirsute with appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 24--35 mm long, pale green, indumentum as on peduncle. **Sepals** 5,

lanceolate, apices acute, 4--6 mm long, 1--2 mm wide, patent during anthesis, pale green with membranous margins, abaxially densely hirsute with appressed hairs, interspersed with glandular hairs. **Petals** 5, pale yellow, patent during anthesis; posterior two with pale pink V-shaped markings, ligulate to spatulate, bases cuneate, apices rounded or emarginate, recurved, 8--10 x 2--3 mm; anterior three with a single dark pink stripe on each, spatulate, bases attenuate, apices rounded, recurved, 9,5--13 x 2--3 mm. **Stamens:** staminal column 1--1,5 mm long, white; perfect stamens 2, in lateral position, 4--6 mm long, protruding from the flower, free filaments white, twisted so that pollen surfaces of the anthers are turned to the front; posterior staminodes 1,5--2 mm long, anterior five staminodes 4--6 mm long, protruding from the flower; anthers dark pink, 1--1,5 mm long, pollen yellow. **Gynoecium:** ovary 2--4 mm long; style 1--3 mm long, pink; stigma branches 1 mm long, adaxially dark pink. **Fruit:** bases of mericarps 4 mm long, with glandular hairs, tails *ca.* 24 mm long. (Figure 8.29.1).

### Diagnostic features and affinities

The androecium of *P. fumariifolium* is unique for the genus. The flower has only two fertile stamens which are in the lateral position. The filaments of these two stamens are twisted so that the pollen surfaces are facing to the front as in *P. luteum* and *P. carolihenrici*. The posterior staminodes are short (1,5--2 mm), but the five anterior ones are long (4--6 mm) and protrude from the flower. These long staminodes are unique for *Pelargonium*, because staminodes usually are short and concealed within the floral sheath.

*P. fumariifolium* is closely related to *P. luteum* because of the similarities in the form of the petals and the way the anthers are borne during anthesis. The pseudo-umbellets of both species have a very delicate appearance. The two species differ in leaf form, the indumentum of the scape, the hypanthium and the sepals as well as the number of fertile stamens. *P. fumariifolium* usually has more flowers per pseudo-umbellet than *P. luteum*.

The epithet *fumariifolium* refers to the leaves of *Fumaria* of the Fumariaceae, plants with much-divided leaves.

### Geographical distribution and ecology

Although *P. fumariifolium* has a wide distribution area, only a few collections are known. This may possibly be because plants usually occur in small populations and are difficult to find. It occurs from Kaus Mountains in Namaqualand in the north to Ceres-





Figure 8.29.1 *Pelargonium fumariifolium*. A, inflorescence x1; B, tuber x1; C, plant with leaves x1; D, androecium x3; E, gynoecium x6; F, petals x2.

*Pelargonium*  
1957

Karoo in the south and Whitehill in the east (Figure 8.29.2), an area with an annual rainfall of 100--300 mm, occurring mainly in winter. Plants grow in rocky areas in sandy soil or in compacted clayey sand, in renosterveld or 'karroid' vegetation. *P. fumariifolium* flowers from late October to November after the leaves have died.

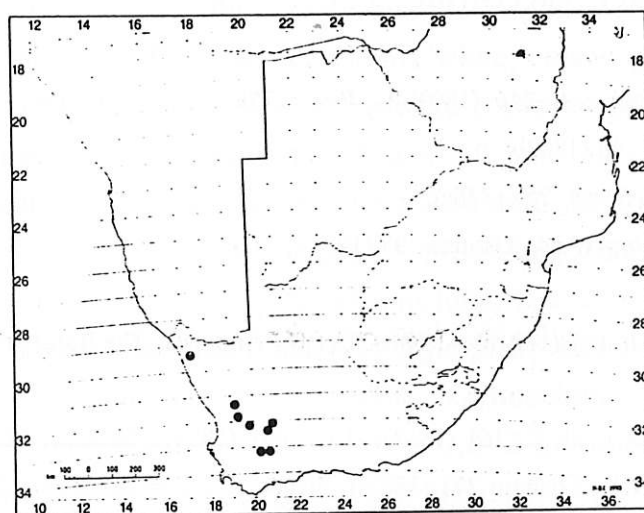


Figure 8.29.2 Geographical distribution of *P. fumariifolium*.

### Material studied

- 2917 (Springbok): Kaus Mountains (-AD), *Drège s.n.* (P).
- 3119 (Calvinia): 2 miles E of Nieuwoudtville (-AC), *Barker 9646* (NBG); Top of Botterkloof Pass (-CD), *Taylor 11998* (STE).
- 3220 (Sutherland): S of Sutherland, 3 km on the Ouberg turnoff (-BC), *Marais 240* (STEU).
- 3319 (Worcester): Spes Bona, Ceres-Karoo (-BB), *Marloth 13135* (PRE).
- 3320 (Montagu): 74 km on Karoo Poort - Matjiesfontein road (-AB), *Marais 391* (STEU); Whitehill, Karoo Garden (-BA), *Compton s.n.*, *3617* (BOL); *Compton 13930*, *16386* (NBG).

### INCRASSATUM GROUP

Geophytes with various leaf forms. Scape unbranched or branched, bearing 2--4(-7) pseudo-umbellets with 2--55 flowers each. Flowers white, cream-coloured, yellow, pink, bright pink or bright purple, with an obvious difference in form and size between the posterior two and the anterior three. Stamens 5 fertile, of different lengths, protrude from the flower, remain straight during anthesis.

**8.30** *Pelargonium incrassatum* (Andr.) Sims in Curtis's botanical magazine 20: t. 761 (1804); Pers.: 228 (1806); Ait. f.: 165 (1812); DC.: 654 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 678 (1840); Steud.: 287 (1841); Harv.: 271 (1860); Knuth: 344 (1912); Van Druten: t. 1134 (1952); Van der Walt & Vorster: 79, fig. (1981). **ICONOTYPE:** Andrews, The Botanist's Repository 4: t. 246 (1802b).

*Geranium incrassatum* Andr.: t. 246 (1802b); Poir.: 758 (1812). **ICONOTYPE:** Andrews, The Botanist's Repository 4: t. 246 (1802b).

*Hoarea incrassata* (Andr.) Sweet: 75 (1826c).

*Geranospermum incrassatum* (Andr.) Kuntze: 95 (1891).

*Geranium roseum* Andr.: t. 173 (1801b). **ICONOTYPE:** Andrews, The Botanist's Repository 3: t. 173 (1801b).

*Pelargonium roseum* (Andr.) Ait. f.: 161 (1812); DC.: 651 (1824); Spreng.: 52 (1826); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 289 (1841); Harv.: 268 (1860); non Ehrh. (1792).

*Hoarea rosea* (Andr.) Sweet: t. 262 (1825); Sweet: 76 (1826c).

*Geranospermum roseum* (Andr.) Kuntze: 95 (1891).

*Pelargonium condensatum* Pers.: 227 (1806): substitute name for *G. roseum* Andr.: t. 173 (1801b); Steud.: 679 (1840); Steud.: 285 (1841).

*Geranium condensatum* (Pers.) Poir.: 757 (1812).

*Pelargonium centauroides* DC.: 652 (1824); Spreng.: 53 (1826); G. Don: 727 (1831); Harv.: 271 (1860). **TYPE** - Africa: De Candolle herbarium 44 (G-DC, lecto!, designated here.)

*Geranospermum centauroides* (DC.) Kuntze: 94 (1891), (by mistake).

A geophyte 120--300(-370) mm tall when in flower. **Tuber:** a turnip-shaped or moniliform root, often with more than one stem-growing point, 12--40 mm long and 12--40(-55) mm in diameter. **Leaves** green, petiolate; lamina pinnatilobed to irregularly pinnate, ovate or narrowly ovate in outline, base cuneate or truncate, 20--110 x 20--70 mm; pinnae vary from obovate to obtriangular with apices obtuse to irregularly incised, 10--25(-45) mm long, adaxially and abaxially densely hirsute, interspersed with short glandular hairs; petiole 20--60(-130) mm long and 1--4 mm in diameter, prostrate to erecto-patent, hirsute with curly hairs, interspersed with glandular hairs and long soft patent non-glandular hairs; stipules subulate, adnate to the petioles for half their length, apices free, 8--18 mm long and 1--1.5 mm wide, ciliate. **Inflorescence:** 1--4 scapes per

plant, scape 80-270 mm long, 2--5 mm in diameter, hirsute with curly hairs, interspersed with glandular hairs and long soft patent non-glandular hairs, usually unbranched; pseudo-umbel with (15-)20--55 flowers; bracts subulate, 6--8 mm long, *ca.* 1 mm wide, reflexed, abaxially densely hirsute. **Pedice**l 1--4 mm long. **Hypanthium** 27--42 mm long, slightly curved, green, densely covered with glandular hairs. **Sepals** 5, lanceolate, apices acute, 8--12 mm long, 1--4,5 mm wide, posterior one erect, others reflexed, green with membranous margins, abaxially densely hirsute, interspersed with glandular hairs. **Petals** 5, bright purple or bright pink, with claws white; claws patent during anthesis, forming a floral sheath, apices recurved; posterior two unguiculate-obovate, claws curved, apices rounded or emarginate, 17--25 x 4--10 mm; anterior three spatulate, bases narrowly cuneate, apices rounded, 8--12,5 x 2--4 mm. **Stamens**: staminal column 2--6 mm long, white, smooth; perfect stamens 5, protruding from the flower, remaining straight during anthesis, posterior one 7,5--14 mm long, lateral two 8,5--15,5 mm long, anterior two 10--17,5 mm long, free filaments purple-pink; staminodes 3,5--7 mm long; anthers dark pink, 2--2,5 mm long, pollen yellow. **Gynoecium**: ovary 4--10 mm long; style 3--12 mm long, pale pink; stigma branches 0,8--2 mm long, adaxially wine-red. **Fruit**: bases of mericarps 5--6 mm long, without glandular hairs, tails 32--35 mm long. (Figure 8.30.1).

#### Diagnostic features and affinities

*P. incrassatum* is a very attractive species with a large number of brilliant pinkish purple flowers, borne in a pseudo-umbel on an unbranched scape. The tuber often develops more than one stem-growing point, each producing a scape with a many-flowered pseudo-umbel. The floral structure of this species is very similar to that of *P. grenvilleae*. In both species the hypanthia are slightly curved and the posterior two petals are larger than the anterior ones. Both species have five fertile stamens which remain straight during anthesis and at the same time an excessive lengthening of the style takes place. The two species differ in respect to the colour of the flower and the leaf form. *P. incrassatum* has bright purple flowers and irregularly pinnate leaves, whereas *P. grenvilleae* has cream-coloured flowers and simple leaves.

According to the original publication (Andrews 1802b), the specific epithet *incrassatum* refers to the thickened, succulent leaves of this species. This is, however erroneous, as the leaves are neither succulent nor thickened.



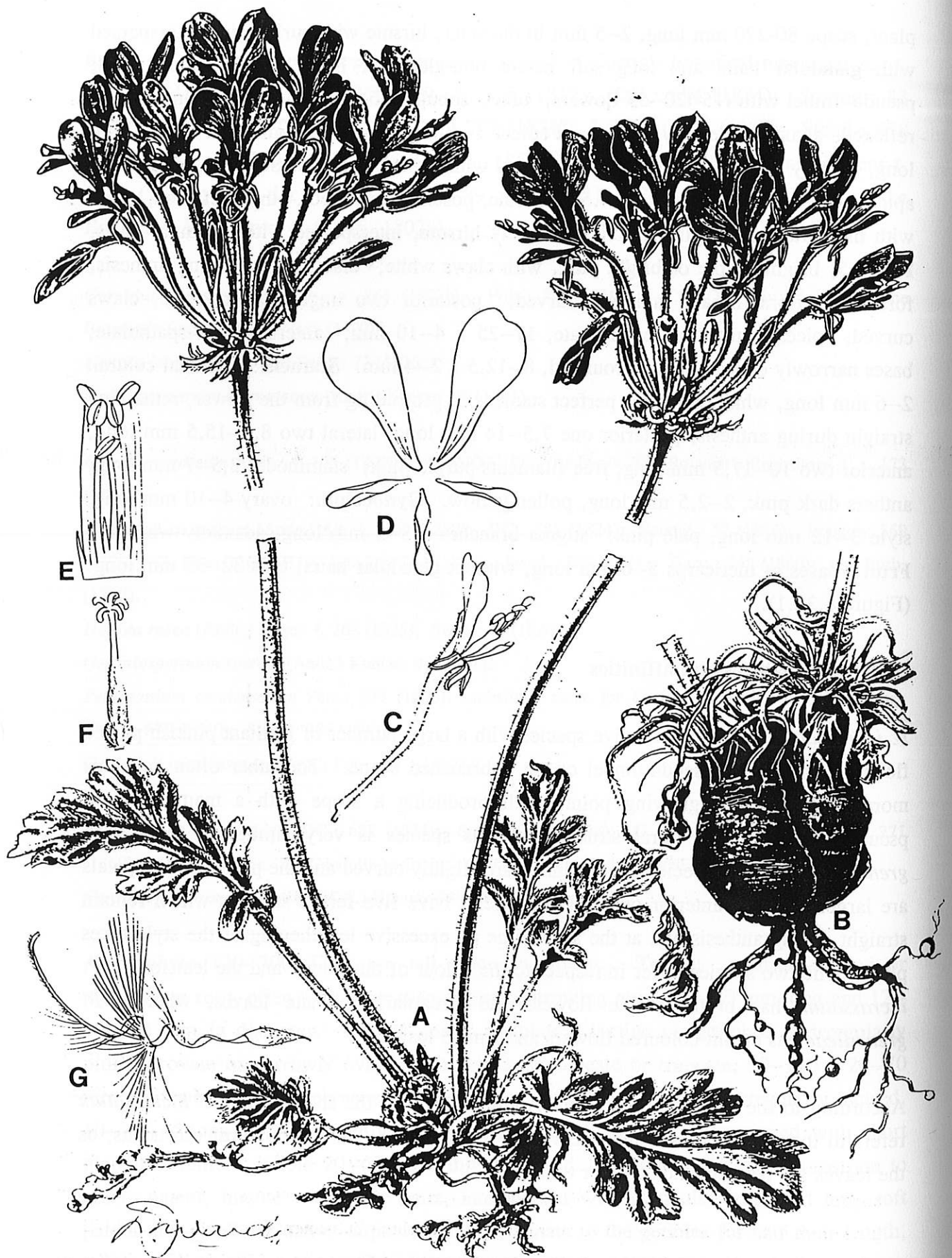


Figure 8.30.1 *Pelargonium incrassatum*. A, flowering plant x1; B, tuber x1; C, flower x1; D, petals x1.5; E, androecium x2; F, gynoecium x3; G, mericarp x2.

## Geographical distribution and ecology

*P. incrassatum* is restricted to Namaqualand and occurs from the Richtersveld in the north to the Heerenlogementsberg and Nardouw flats in the south (Figure 8.30.2). This is a very hot and arid area with a scant annual rainfall of 150--300 mm occurring mainly in winter. *P. incrassatum* grows in mountain karroid vegetation, short karroid or succulent shrub or broken Namaqualandveld. Sometimes single plants, but more often large populations occur in rocky outcrops, quartzite areas, weathered granite soils, deep or shallow sand or in shale, causing a splendid sight at springtime in Namaqualand. Plants grow in direct sunlight, but also occur under bushes. It is one of the early flowering species of section *Hoarea*, and one of the few species of this section of which the flowering time coincides with the peak of the flowering time in Namaqualand. It flowers from August to October when the leaves are withering.

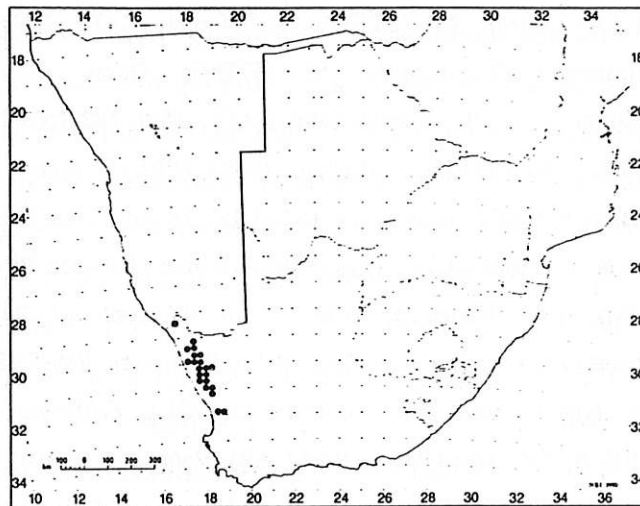


Figure 8.30.2 Geographical distribution of *P. incrassatum*.

## Material studied

--2816 (Oranjemund): Die Koej, Helskloof, Richtersveld (-BD), *Drijfhout 2942a* (STEU).

--2917 (Springbok): Karakuis (-AD), *Drège s.n.* (P); Klipfontein (-BA), *Bolus 1112* (BM, BOL, G, P, SAM, UPS); *Herre s.n.* (STE); *Van der Walt 1398* (STEU); 8 km W of Steinkopf (-BA), *Drijfhout 2971a* (STEU); Steinkopf (-BC), *Lewis 5497* (NBG); *Schlechter s.n.* (MO, P); Between Brakwater & Komaggas (-CD), *Hall 150* (NBG); Spektakel Pass (-DA), *Barker 1298* (NBG); *Boucher 73* (STEU); Spektakelberg (-DA), *Thompson 1038* (STE); Nigramoep (-DA), *Wikner s.n.* (SAM); Between Zilverfontein & Kooperenberge (-DB), *Drège s.n.* (G); Nababeeb Golf-course (-DB), *Marais 132* (STEU); Wildepaardehoek Pass (-DC), *Botha 2949* (PRE); Grootvlei (-DC), *Compton 17294* (NBG); *Middlemost*

1640 (NBG); *Swart s.n.* (STE); Sannagas (-DC), *Drijfhout 2783* (STEU); Mesklip (-DD), *Compton 5500* (BOL, P).

--3017 (Hondekclipbaai): 6,5 miles W of Kamieskroon (-BB), *Acocks 14872* (PRE); Grootvlei W of Kamieskroon (-BB), *Acocks 16450* (P, PRE); *Lewis 4363* (SAM); *Martin 1033* (NBG); *Van Jaarsveld 1408* (NBG); Grootvlei Pass W of Kamieskroon (-BB), *Van der Walt 789* (STEU); 4 km E of Grootvlei (-BB), *Van Jaarsveld 4276* (STEU); Kamieskroon (-BB), *Esterhuysen 5699* (BOL); *Hall s.n.* (NBG); *Henrici 2155, 2180* (PRE); *Marloth 13270* (PRE); *Thorne s.n.* (SAM); 2 km from Kamieskroon to Leliefontein (-BB), *Archer s.n.* (STE); 8,4 km from Kamieskroon to Bovlei (-BB), *Fischer 1* (STEU); 1 km S of Kamieskroon (-BB), *Hugo 2888* (STE); 1 mile N of Kamieskroon (-BB), *Theron 1337* (PRE); E of Kamiesberg Pass (-BB), *Marais 284* (STEU); Between Garies & Okiep (-BB), *Marloth 6726* (PRE); Bowesdorp (-BB), *Stokoe SAM57285* (SAM); 20 km from Garies to Kamieskroon (-BD), *Boucher 63* (STEU); Between Garies & Kamieskroon (-BD), *De Vos 1721* (STE); S of Darter's Grave (-BD), *Hall 126* (NBG); Near Garies (-DB), *Van der Walt 167* (STE); 5 miles N of Garies (-DB), *Lewis 1177* (SAM); 4 miles N of Garies (-DB), *Salter 1399* (BM).

--3018 (Kamiesberg): Pedroskloof, N of Leliefontein (-AA), *Archer s.n.* (STE); 9 km from Kamiesberg Pass to Leliefontein (-AA), *Marais 285* (STEU); Leliefontein (-AB), *Drège 7492* (P); 10 km from Kamieskroon to Kamiesberg (-AB), *Schonken 165* (STEU); Gorap (-AB), *Watermeyer s.n.* (PRE); Kasparskloof (-AC), *Drège s.n.* (P); Eselsfontein (-AC), *Hall 142* (NBG); *Markötter s.n.* (PRE); Kamiesberg (-AC), *Marais 60* (STEU); *Marloth 12494* (PRE); *Salter s.n.* (BOL); 3 km from Leliefontein to Kamieskroon (-AC), *Marais 74* (STEU); 28 km from Garies to Leliefontein (-AC), *Thompson 433* (STE); N of Garies (-CA), *Taylor 1061* (BOL); Between Bitterfontein & Stinkfontein (-CC), *Pearson 6523* (BM); Farm Kamagap, 10 km NE of Bitterfontein (-CD), *Nordenstam & Lundgren 1457* (STE); 6 miles from Bitterfontein to Pofadder (-CD), *Thompson 304* (PRE).

--3118 (Vanrhynsdorp): Nieuwe Rust (-AB), *Bolus 19345* (BOL); *Schlechter 11005* (BM, BOL, E, Gx2, GRA, Lx2, MO, P, PRE, S, Z); Near Nieuwe Rust (-AB), *Bolus s.n.* (BOL); Quaggaskop farm, 1 km W of Nuwerus (-AB), *Le Roux 2270* (STE); 5 km N of Nuwerus (-AB), *Nordenstam & Lundgren 1488* (STE); Spitsberg, SE of Nuwerus (-AB), *Oliver 5940* (STE); Heerenlogementsberg (-DC), *Boucher s.n.* (STE); Nardouwvlakte, Clanwilliam (-DD), *Stokoe 8456* (BOL).

**8.31 *Pelargonium grenvilleae* (Andr.) Harv. in Flora Capensis 1: 265 (1860); Knuth: 331 (1912). ICONOTYPE: Andrews, Geraniums: C, ic (1811).**

*Geranium grenvilleae* Andr.: C, ic (1811). ICONOTYPE: Andrews, Geraniums: C, ic (1811).

*Geranospermum grenvilleae* (Andr.) Kuntze: 95 (1891).

*Grenvillea conspicua* Sweet: t. 262, f. 2 (1825): substitute name for *G. grenvilleae* Andr.: C, ic (1811).

*Pelargonium conspicuum* (Sweet) G. Don: 731 (1831); Steud.: 678 (1840); Steud.: 285 (1841).



A small geophyte 70--150 mm tall when in flower. **Tuber:** a turnip-shaped root, sometimes with more than one stem-growing point, 17--35 mm long and 10--25 mm in diameter. **Leaves** greyish green, petiolate; lamina simple, ovate or widely ovate, base cuneate or truncate, apex obtuse or rounded, margin crenulate, 18--40(-60) x 15--35(-45) mm, adaxially and abaxially covered with long and short glandular hairs, sometimes interspersed with patent non-glandular hairs; petiole 13--50 mm long and 1--3 mm in diameter, prostrate, covered with glandular hairs; stipules subulate, almost completely adnate to the petioles with only the extreme apices free, 5--12 mm long and *ca.* 1 mm wide, covered with glandular hairs, margins ciliate. **Inflorescence:** scape 30--120 mm long, 2--3 mm in diameter, covered with glandular hairs, usually unbranched; pseudo-umbel with 10--28 flowers; bracts lanceolate, 4--10 mm long, 2--3 mm wide, sometimes reflexed, adaxially hirsute, abaxially covered with glandular hairs and near the margins with non-glandular hairs. **Pedice**l 1--4(-10) mm long (younger flowers with long pedicels); **Hypanthium** 25--40 mm long, slightly curved, green, densely covered with glandular hairs. **Sepals** 5, lanceolate, apices acute, 7,5--10 mm long, 1--3 mm wide, posterior one erect, others reflexed, green with membranous margins, abaxially covered with glandular hairs and with non-glandular hairs near the margins. **Petals** 5, cream-coloured, with dark pink markings on the claws; claws patent during anthesis, forming a floral sheath, apices recurved; posterior two unguiculate-obcordate, claws curved, apices emarginate, 14--19 x 5--9 mm; anterior three obovate, bases narrowly cuneate, apices rounded, 12--15 x 3,5--6 mm. **Stamens:** staminal column 2--5 mm long, white or pale pink, smooth; perfect stamens 5, protruding from the flower, remaining straight during anthesis, posterior one 6--9 mm long, lateral two 7--10 mm long, anterior two 7--12 mm long, free filaments dark pink; staminodes 3--6 mm long; anthers dark pink, 1,2--2,2 mm long, pollen orange. **Gynoecium:** ovary 3,5--7 mm long; style 2--6 mm long, pale pink; stigma branches 0,5--1 mm long, adaxially dark pink. **Fruit:** not seen. (Figure 8.31.1).

#### Diagnostic features and affinities

*P. grenvilleae* is a small geophyte with simple prostrate leaves and cream-coloured flowers. The scape is usually unbranched, but the tuber often develops more than one stem-growing point, each producing a scape with a pseudo-umbel. The floral structure of this species is very similar to that of *P. incrassatum*. In both species the hypanthia are slightly curved and the posterior two petals are larger than the anterior ones. Both species have five fertile stamens which remain straight during anthesis, and at the same time an excessive lengthening of the style takes place. The two species differ in respect to the colour of the flower and the leaf form. *P. incrassatum* has bright purple or bright





Figure 8.31.1 *Pelargonium grenvilleae*. 1, flowering plant x1; 2, tuber x1; 3, petals x2; 4, androecium x3; 5, flower without petals x1; 6, gynoecium x4.

pink flowers and irregularly pinnate leaves, whereas *P. grenvilleae* has cream-coloured flowers and simple leaves.

According to the original description, *P. grenvilleae* is a very large plant with pale flesh-coloured flowers and four fertile stamens, and according to the illustration the flowers have pale pink petals. All the specimens examined for this project, are small plants (70--150 mm tall) and none of them have pinkish or flesh-coloured flowers or only four fertile stamens. In spite of this, I have no doubt that the specimens examined, are those of *P. grenvilleae*, because no other plants known, match the original illustration better than these ones. *P. grenvilleae* is named in honour of Lord W.W. Grenville by whom it was introduced to England in the summer of 1810 (Andrews 1811).

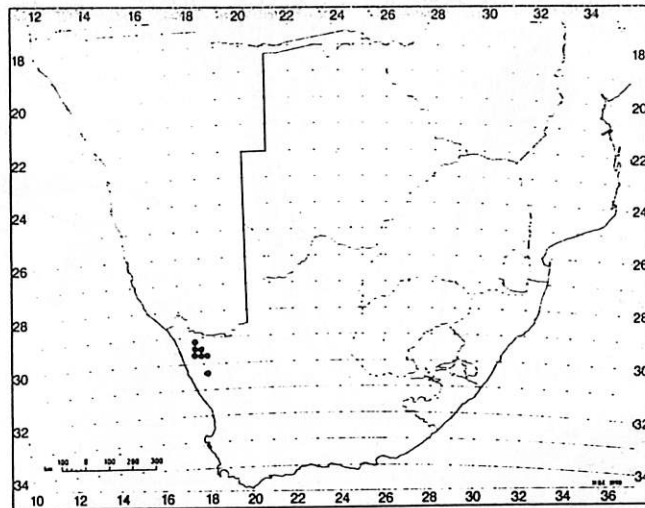


Figure 8.31.2 Geographical distribution of *P. grenvilleae*.

### Geographical distribution and ecology

*P. grenvilleae* is restricted to Namaqualand and occurs from Steinkopf in the north to Kamiesberg in the south (Figure 8.31.2). This is a very hot and arid area with a scant annual rainfall of 150--300 mm occurring mainly in winter. *P. grenvilleae* grows in sand or loam, and plants often occur under bushes. It flowers in spring, from September to October when the leaves are withering. The smaller geographical distribution of *P. grenvilleae* coincides with the much larger area occupied by *P. incrasatum*.



Figure 8.32.1 *Pelargonium moniliforme*. A, flowering plant x1; B, androecium x2; C, gynoecium x2; D, petals x1; E, tuber x1.

## Material studied

-2917 (Springbok): 3 km W of Steinkopf (-BA), *Williamson 3950* (STEU); 4,5 km W of Steinkopf (-BA), *Williamson 3951* (STEU); Steinkopf (-BC), *Meyer sub. Marloth 6560* (PRE); Anenous Mountains (-BC), *Taylor 1128* (BOL); Tierkloof near Steinkopf (-BD), *Van Breda 1362* (PRE); 23 km from Springbok to Kleinsee (-DA), *Marais 131* (STEU); 15 miles E of Springbok (-DB), *Hall NBG1088/50* (NBG); Springbok (-DB), *Le Roux s.n.* (STEU); Concordia (-DB), *Schlechter 11365* (BOL); Hester Malan Wild Flower Reserve (-DB), *Van der Walt 1406* (STEU).

-2918 (Gamoep): Hester Malan Wild Flower Reserve, plot 72 (-CA), *Rosch & Le Roux 1031* (PRE).

-3018 (Kamiesberg): E slope of Rooiberg (-AC), *Oliver s.n.* (STEU).

**8.32 *Pelargonium moniliforme* Harv.** in *Flora Capensis* 1: 264 (1860); Knuth: 333 (1912); Glover: 199 (1917); Marloth: 87 (1925); Compton: 295 (1931); Dyer: t. 9342 (1934). TYPE - Cape Province: Zilverfontein, *Drège s.n. sub. P. moniliforme* (TCD! lecto, here designated; CGE!, E!, Gx4!, K!, MEL!, MO!, OXF!, Px2!, PRE!, S!, SAM!, Wx2!); *Zeyher 2067* (S!).

*Geranospermum moniliforme* (Harv.) Kuntze: 95 (1891).

A deciduous geophyte 140--400 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root, 15--40 mm long and 7--25 mm in diameter, main root and lateral roots sometimes with a series of small tubers at short intervals. **Leaves** simple to tripartite, green, petiolate; lamina broadly ovate to trullate, apex rounded to obtuse, base widely cuneate, truncate or cordate, margin entire to crenate-lobulate, 15--65 x 15--60 mm, covered with long glandular hairs, abaxially also hirsute along main veins, margins ciliate with appressed or patent stiff hairs; petiole 20--80 mm long and 2--3 mm in diameter, prostrate, densely covered with long glandular hairs interspersed with soft patent hairs; stipules subulate, adnate to petioles with apices free, 6--10 mm long and *ca.* 1 mm wide, ciliate. **Inflorescence:** scape usually unbranched, 75--310 mm long, 2--5 mm in diameter, wine-red, covered with very long (3--4 mm) patent hairs interspersed with glandular hairs; pseudo-umbel with 12--40(-50) flowers; bracts narrowly triangular, 5--10 x 1--2 mm, recurved, adaxially hirsute with distally appressed hairs and abaxially hirsute, interspersed with glandular hairs. **Pedicel** 0,5--2 mm long. **Hypanthium** 20--77 mm long, wine-red, indumentum as on scape. **Sepals** 5, lanceolate, apices acute, 6--10 mm long, 1,5--3 mm wide, recurved, wine-red with green apex, indumentum abaxially as on scape. **Petals** 5, cream-coloured to yellow with a wine-red blotch in the centre, spatulate, bases narrowly cuneate, apices emarginate, patent during anthesis; posterior



two 13--22 x 3--8 mm; anterior three 10,5--17,5 x 3--6,5 mm, sometimes without blotches. **Stamens:** staminal column 2--4 mm long, white, smooth, perfect stamens 5, protruding from the flower, remaining straight, posterior one 5--10 mm long, lateral two 7--12 mm long, anterior two 11--16 mm long, white, apices dark red; staminodes 4--6 mm long; anthers 1,2--2 mm long, wine red, pollen orange. **Gynoecium:** ovary 3,5--6 mm long; style 2--9 mm long, dark pink; stigma branches 0,5--2 mm long, dark pink. **Fruit:** bases of mericarps 5 mm long, without glandular hairs, tails 24--28 mm long. (Figure 8.32.1).

### Diagnostic features and affinities

*P. moniliforme* is a geophyte with entire to tripartite prostrate leaves, the older ones larger with long petioles (*ca.* 60 mm) and the younger ones gradually reducing in size. The thick, usually unbranched scape is wine-red, bearing a pseudo-umbel with 12--40 flowers. The wine-red hypanthia are three to eight times the length of the sepals. The flowers are cream-coloured to yellow with dark red blotches. The blotches are sometimes restricted to the posterior petals. The two posterior petals are borne in such a way that the blotches appear as a single nectar guide. The five fertile stamens are long (5--16 mm) and protrude from the flower with the anterior ones 1,5--2 times the length of the sepals. The structure of the flowers and the morphology of the leaves reveal a close relation with *P. vinaceum*. The two species differ in that the plants of *P. vinaceum* are smaller than those of *P. moniliforme*, and that the flowers of the former have 2--4(-5) fertile stamens, whereas those of *P. moniliforme* always have five. During anthesis a noteworthy lengthening of the style and stigma branches takes place. This characteristic, together with the long straight stamens resemble that of several other species of section *Hoarea*, like *P. incrassatum* and *P. radicum*.

The specific epithet refers to the series of small tubers formed by the main or lateral roots. This, however, occurs in several other species in section *Hoarea* and is not unique to *P. moniliforme*.

### Geographical distribution and ecology

*P. moniliforme* occurs from Holgat River valley in the southwest of the Richtersveld to Karoo Poort in the south and Matjiesfontein in the east (Figure 8.32.2). This area receives an annual rainfall of 100--200 mm, mainly in winter. It grows in sand or in clay, on quartzite outcrops and stony areas, on foothills or on flats, in direct sunlight, or in partial shade in rock shelters or under bushes. Sometimes it occurs in large

populations, but more often plants occur singly. It occurs in short karroid vegetation, in marginal Namaqualand broken veld (Veldtype 33, Acocks 1988), and also in tall dense shrub vegetation as in the Kamiesberge. *P. moniliforme* is grazed by animals. This may be the reason why plants more often occur under bushes than in direct sunlight, they are the only ones to survive heavy grazing. Plants growing under bushes usually have very long scapes. Flowering time is during September, at a stage when the leaves are fading.

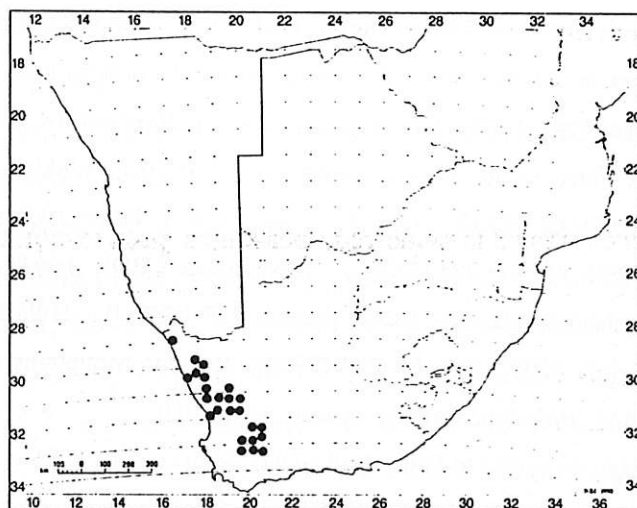


Figure 8.32.2 Geographical distribution of *P. moniliforme*.

### Material studied

- 2816 (Oranjemund): Holgat River valley (-DD), *Hardy 604* (K, PRE).
- 2917 (Springbok): Near Springbok (-DB), *Lewis 1174* (SAM).
- 2918 (Gamoep): Zilverfontein (-CC), *Drège s.n.* (CGE, E, Gx4, K, L, MEL, MO OXF, Px2, PRE, S, SAM, TCD, Wx2); *Drège 3236* (P); *Zeyher 2067* (S).
- 3017 (Hondeklipbaai): Hondeklipbaai (-AD), *Bruyns 1516* (STEU); Bowesdorp (-BB), *Thorne s.n.* (SAM); Wallekraal (-BC), *Boucher 77* (STEU); Between Garies and Kamieskroon (-BD), *Hutchinson 827* (BOL, K).
- 3018 (Kamiesberg): 8 km from Garies to Leliefontein (-AC), *Marais 73* (STEU); 3 km from Leliefontein to Kamieskroon (-AC) *Marais 75, 76* (STEU); Kamiesberg (-AC), *Marais 133* (STEU); Between Garies and Nuwerus (-CC) *Marloth 12489* (BOL, PRE, STEx3); Eenkoker, Kamiesberg (-CC), *Pearson 6751* (K); 10 km N of Bitterfontein (-CD), *Hugo 2900* (PRE, STE); 5 km on Kliprand road, N of Bitterfontein (-CD), *Marais 282* (STEU).
- 3019 (Loeriesfontein): Loeriesfontein, village ground (-CD), *Marais 123* (STEU).
- 3118 (Vanrhynsdorp): Mierhofkasteel (-AA), *Barker NBG856/50* (NBG); 6 km W of Bitterfontein (-AA) *Marais 70, 71* (STEU); 19 km NW of Bitterfontein (-AA), *Nordenstam & Lundgren 1788* (S);

Komkans (-AA), *Nordenstam & Lundgren 1719* (STE); Near Nuwerus (-AB), *Acocks 16435* (K); 13 m SW of Nuwerus (-AB), *Acocks 19592* (K, PRE); Nuwerus (-AB), *Barker 3730* (NBG); *Leighton 1124* (BOL); *Martin 842* (NBG); *Nordenstam 1355* (S, STE); Spitsberg, SE of Nuwerus (-AB), *Oliver 5939* (STE); Between Bitterfontein and Nuwerus (-AB), *Salter 1593* (BM, K); Bitterfontein (-AB), *Alice & Godman 745* (BM); *Schlechter 11030* (Z); Karee Mountains, S of Nuwerus (-AB), *Van Zyl s.n.* (STEU); Bokkeveldsberg (-BB), *Marloth 7798* (PRE); Strandfontein (-CC), *Acocks 15024* (PRE); Vanrhynsdorp (-DA), *Kolbe 14293* (BOL); Vleikraal, E of Klawer (-DA), *Walters 5* (STEU); *Walters 184* (PRE).

--3119 (Calvinia): Brandkop, N of Nieuwoudtville (-AA), *Stokoe s.n.* (SAM); Hantamrivierdrif (-AB), *Barker 9494* (NBG); Hantamrivier, 30 m NW of Calvinia (-AB), *Lewis 4068* (SAM); 30 m from Calvinia to Loeriesfontein (-AB), *Maguire 2001* (NBG); Perdeberg, between Loeriesfontein and Calvinia (-AB), *Marais 125* (STEU); Vanrhyns Pass, Loeriesfontein junction (-AC), *Hardy 80* (K, PRE); Near Brandkop (-AC), *Leipoldt 4394* (BOL); Nieuwoudtville (-AC), *Leipoldt s.n.* (BOL); Witkleigat (-BA), *Marais 275* (STEU); Grootrivier (-BB), *Marais 272* (STEU); Toren road (-BC), *Bayer 1905* (NBG); 20 km from Calvinia to Loeriesfontein (-BC), *Marais 273* (STEU); Akkerendam (-BD), *Acocks 17749* (PRE); *Taylor 2654, 2816* (NBG); Ambraalshoek, Calvinia (-BD), *Marais 119* (STEU); Hills N of Calvinia (-BD), *Marloth 12782* (PRE); Calvinia (-BD), *Schmidt 279* (PRE); Rebunie Mountains (CB), *Marloth 10303* (PRE); Blauwkranz Pass (-DA), *Hall 3866* (NBG); *Marais 68* (STEU).

--3219 (Wuppertal): 6 km from Bizansgat to Sutherland (-DD), *Marais 217* (STEU).

--3220 (Sutherland): Ouberg Pass (-AD), *Marais 252* (STEU); Tankwa, Klein Roggeveld (-BC), *Marloth 10388* (PRE); Between Hottentotskloof and Sutherland (-BC), *Leipoldt s.n.* (BOL); Thyshoogte (-CC), *Marais 218, 224* (STEU); Between Windheuwel and Bloemfontein (-CD), *Marais 335* (STEU); Verlatenkloof, Sutherland (-DA), *Leighton 3186* (BOL, K); *Marais 225* (STEU).

--3319 (Worcester): 4 km N of Karoo Poort (-BA), *Lavranos & Pehlemann 17478* (STEU).

--3320 (Montagu): Jagerskraal (-AB), *Bayer 3608* (NBG); Matjiesfontein (-BA), *Compton 3306* (BOL, K); *Marloth 9580* (PRE); *Van der Walt s.n.* (STEU); Whitehill, Karoo Garden (-BA), *Compton 11809, 15228* (NBG); Whitehill ridge (-BA), *Compton 13387* (NBG); Whitehill (-BA), *Pillans 14143* (BOL); 4 km from Matjiesfontein to Sutherland (-BA), *Marais 210* (STEU); Gnaapkop, Matjiesfontein (-BA), *Marais 355* (STEU); Bantams, Witteberge (-BC), *Compton 12167* (NBG).

### 8.33 *Pelargonium vinaceum* E.M. Marais, sp. nov. in sectione *Hoarea*, *P. moniliforme* affine.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napiforme, 22--35 mm longum, 15--22 mm in diam. Folia hysterantha, rosulata, simplicia raro trilobata vel tripartita, viridia, petiolata; lamina ovato vel trulliformis, margo integro, setis brevibus appressis marginalibus, 22--40 mm longa, 18--30 mm lata, adaxiale sparsim glandulosa, abaxiale sparsim glandulosa et hirsuta; petiolus 10--40 mm longus, prostratus, glandulosus et setosus; stipulae petiolo adnatae. Inflorescentia: scapus vinaceus,

pseudoumbellis utraque (7-)10--27 floribus. **Pedicellum** ca. 0,5 mm longum. **Hypanthium** 11--26 mm longum, vinaceum, glandulosum et hirsutum. **Sepala** 5, lanceolata, 4--8 mm longa, 1--3 mm lata, posterius erectum, cetera recurvata. **Petala** 5, crenea vel pallida flava, spathulata, dua postica 10--15,5 mm longa, 3,5--6 mm lata, maculis carmino-rubra, tria antica 7,5--12 mm longa, 3--4,5 mm lata. **Stamina fertilia** 2--4(-5).

**TYPE** - Namibia: 40 km north of Rosh Pinah, on road to Aus, *Marais 77* (STE, holotypus; BOL, K, MO, PRE).

A deciduous geophyte with a small regularly shaped subterranean tuber, 75--100(-180) mm tall when in flower. **Tuber**: a turnip-shaped or elongated root with a short flattened stem, covered with flaking dark brown periderms, 22--35 mm long and 15--22 mm in diameter. **Leaves** radical, hysteranthous, rosulate, simple, seldom trilobate or tripartite, green, petiolate: lamina broadly ovate to trullate, apex rounded to obtuse, base widely cuneate, margin entire, 22--40 x 18--30 mm, sparsely covered with short glandular hairs, abaxially also hirsute along main veins, margins with short appressed bristles; petiole 10--40 mm long and 2--3 mm in diameter, prostrate, covered with short glandular hairs interspersed with stiff patent hairs; stipules subulate, adnate to petioles with apices free, 5--7 mm long and ca. 1 mm wide, ciliate. **Inflorescence**: scape usually unbranched, 30--80(-140) mm long, 1--2 mm in diameter, wine-red, glandular interspersed with stiff patent hairs, pseudo-umbel with (7-)10--27 flowers; bracts narrowly triangular, recurved, 2,5--4 x 1 mm, hirsute; flower buds, flowers and fruits erect. **Pedicel** ca. 0,5 mm long. **Hypanthium** 11--26 mm long, wine-red, indumentum as on scape. **Sepals** 5, lanceolate, apices acute, 4--8 mm long, 1--3 mm wide, posterior one erect, others recurved, green, indumentum abaxially as on scape. **Petals** 5, cream-coloured to pale yellow, spathulate, bases narrowly cuneate, apices emarginate, patent during anthesis; posterior two with wine-red blotches in the centre, 10--15,5 x 3,5--6 mm; anterior three 7,5--12 x 3--4,5 mm. **Stamens** 10, basally connate, staminal column 1--2,5 mm long, white, smooth; perfect stamens 2--4(-5), protruding from the flower, remaining straight, apices red, lateral two 4--8,5 mm long, anterior two 5,5--11 mm long; staminodes 3--4 mm long; anthers 1--1,5 mm long, dark red, pollen orange. **Gynoecium**: ovary superior, oblong-conical, 5-lobed, 3--5 mm long, densely sericeous; style filiform, 2--7 mm long, pink; stigma with 5 branches, 0,5--1 mm long, pink. **Fruit**: a schizocarp consisting of 5 mericarps, bases of mericarps 4 mm long, without glandular hairs, tails ca. 18 mm long. (Figure 8.33.1).



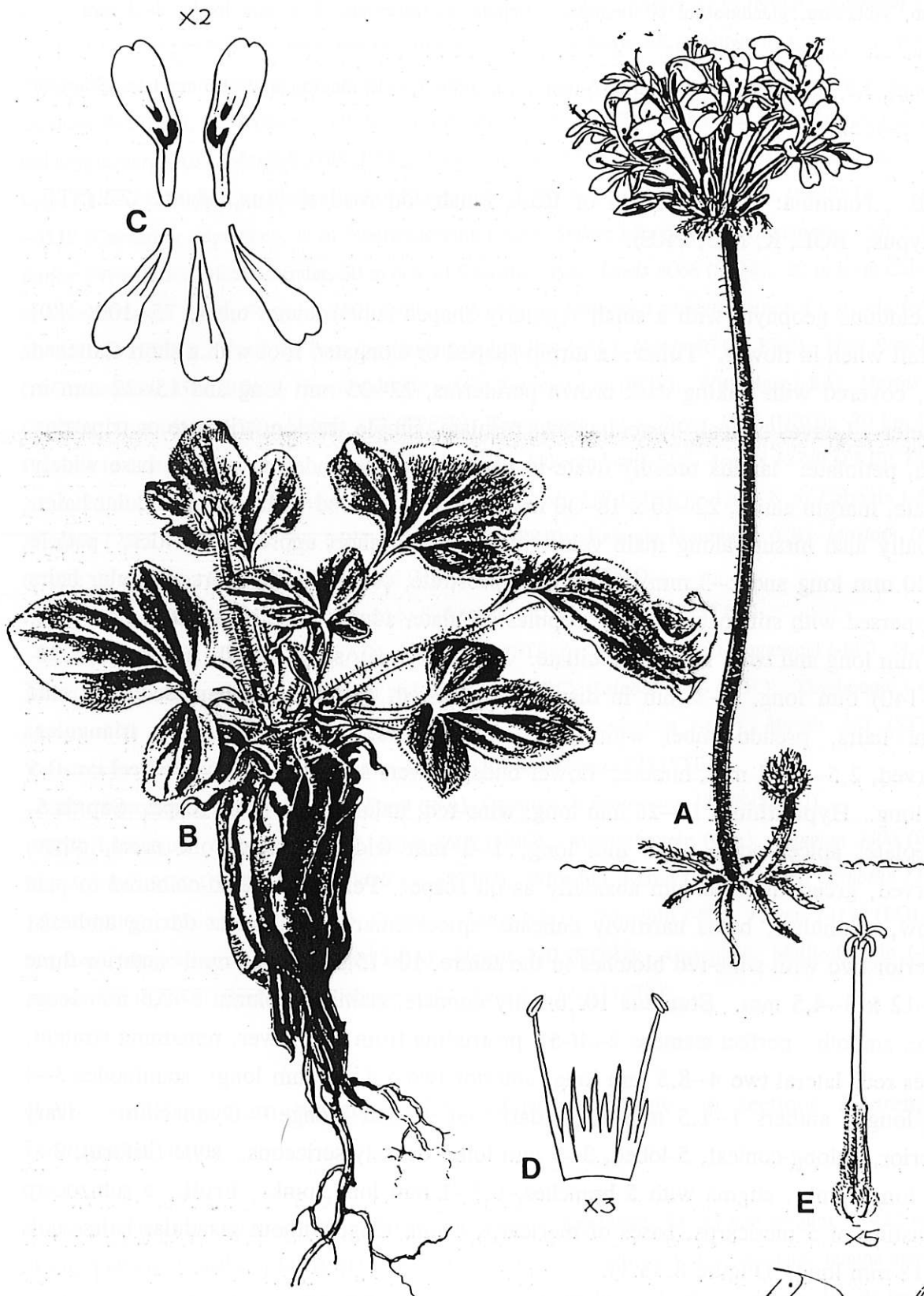


Figure 8.33.1 *Pelargonium vinaceum*. A, flowering plant x1; B, plant with leaves x1; C, petals x2; D, androecium x3; E, gynoecium x5.

Floward  
1911/52

### Diagnostic features and affinities

*P. vinaceum* is a geophyte with entire, seldom trifoliolate prostrate leaves; the older ones larger with long petioles (ca. 40 mm) and the younger ones gradually reducing in size. The wine-red, usually unbranched scape is bearing a pseudo-umbel with 10--27 flowers. The wine-red hypanthia are 2,5--3,5 times the length of the sepals. The specific epithet *vinaceum* refers to the wine-red scape and hypanthia of this species. The flowers are cream-coloured to pale yellow with wine-red blotches on the posterior two. The two posterior petals are borne in such a way that the blotches appear as a single nectar guide. The number of fertile stamens varies from two to four. They are long (5--11,5 mm) and protrude from the flower with the anterior ones 1,2--2 times the length of the sepals. During anthesis a noteworthy lengthening of the style and stigma branches takes place.

*P. vinaceum* resembles *P. moniliforme* with respect to the leaf structure as well as the floral structure. Both have simple to trifoliolate leaves, wine-red, unbranched scapes, long hypanthia and cream-coloured to yellow, spatulate petals. The markings on the posterior petals of the two species are identical. Their leaf anatomy and pollen morphology are also similar. *P. vinaceum* differs from *P. moniliforme* in respect to the size of the plants. The plants of *P. vinaceum* are up to 180 mm tall when in flower and those of *P. moniliforme* 400 mm. The latter usually has a larger number of flowers per pseudo-umbel than the former. *P. vinaceum* can also be distinguished from *P. moniliforme* by the short glandular hairs on the laminae, the appressed bristles on the margins of the laminae and the stiff hairs on the scape instead of the long glandular hairs on the laminae, the long appressed or patent stiff hairs on the margins of the laminae and the long soft patent hairs on the scape. The number of fertile stamens of *P. vinaceum* varies from two to four, whereas *P. moniliforme* always has five.

The wine-red scapes and hypanthia of *P. vinaceum* and *P. moniliforme* are similar to those of *P. caroli-henrici* and *P. rubiginosum*.

### Geographical distribution and ecology

*P. vinaceum* occurs from Rosh Pinah in southern Namibia, in the Richtersveld and as far south as the Nigramoep plateau south of Steinkopf (Figure 8.33.2), an area receiving an annual rainfall of about 100 mm, mainly during winter. It grows in karroid vegetation in rock crevices in granites, shale or sand and flowers from October to November after the leaves have died.

The distribution area of *P. vinaceum* is north of that of *P. moniliforme*, although in the Springbok area they are sympatric. Both species occur in the Richtersveld, but *P. moniliforme* occurs nearer to the coast, whereas *P. vinaceum* occurs inland. *P. moniliforme* is one of the early flowering species of section *Hoarea* and flowers in September, while leaves are still present. *P. vinaceum* flowers in October and November, after the leaves have died.

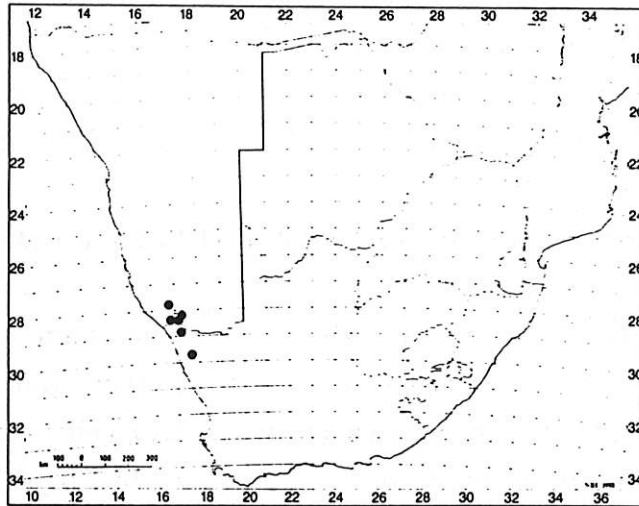


Figure 8.33.2 Geographical distribution of *P. vinaceum*.

### Material studied

–2716 (Witputz): Witputz Süd (-DA), *Lavranos 20785* (STEU); 40 km N of Rosh Pinah, on road to Aus (-DB), *Marais 77* (BOL, K, MO, PRE, STE); Spitskop 9 km N of Rosh Pinah (-DC), *Van der Walt & Vorster 1275* (STEU); Zebrafontein (-DD), *Beukes 10108* (BLFN); 35 km N of Rosh Pinah (-DD), *Leuenberger 3227* (WIND); *Venter 8630* (STEU).

–2816 (Oranjemund): Die Koei, Helskloof (-BD), *Drijfhout 2942* (STEU); Numees (-BD), *Visser s.n.* (STEU); *Von Willert s.n.* (STEU); W slope of Numees Mountain (-BD), *Williamson 4010* (STEU).

–2817 (Vioolsdrif): Verberg, Gamkap (-AB), *Van Jaarsveld 9695* (STEU); 15 km E of Helskloof, road to Grasdrif (-AC), *Graham 3527* (STEU); *Beukes 10102* (BLFN); 3 miles SW of Brakfontein (-CC), *Nordenstam 1799* (S); Tierpoortberge, Kliphoogete (-CD), *Drijfhout 1431* (STEU).

–2917 (Springbok): Nigramoep Plateau, 35 km S of Steinkopf (-DA), *Williamson 4341* (STEU).

**8.34** *Pelargonium radicum* Venten., Jardin de la Malmaison 2: t. 65 (1804): substitute name for *Geranium ciliatum* Andr.: t. 247 (1802b); Ait. f.: 160 (1812); Sims: t. 1718 (1815); DC.: 650 (1824); Spreng.: 50 (1826); Loudon: 568 (1829); G.

Don: 726 (1831); Loudon: 271 (1832); Harv.: 264 (1860); Knuth: 326 (1912); *P. radiatum* (by mistake) Steud.: 289 (1841). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 247 (1802b).

*Hoarea radicata* (Venten.) Sweet: t. 174 (1823); Sweet: 76 (1826c).

*Geranospermum radicum* (Venten.) Kuntze: 95 (1891).

*Geranium ciliatum* Andr.: t. 247 (1802b). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 247 (1802b).

*Pelargonium concavifolium* Pers.: 226 (1806): substitute name for *Geranium ciliatum* Andr.: t. 247 (1802b); Steud.: 677 (1840); Steud.: 284 (1841).

*Geranium concavifolium* (Pers.) Poir.: 752 (1812).

*Pelargonium squamulosum* Knuth: 327 (1912). TYPE: - Cape Province: "Namaland minor" Scully 216 (BOL, lecto!, designated here, BM); "Umgegend von Hopefield" Bachmann 1533 (Z!).

A geophyte 120--300 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 30--50 mm long and 12--30 mm in diameter. **Leaves** simple, green, petiolate; lamina lanceolate, base attenuate, apex acuminate, margin entire, 70--135 x 20--40 mm, young leaves adaxially pilose and abaxially pilose interspersed with stiff hairs or sometimes bristles, margins with appressed bristles; petiole 20--80 mm long and 2--3 mm in diameter, rigid, erect, pilose with short hairs interspersed with bristles; stipules subulate, adnate to petioles for one third to one half their length, 27--35 mm long and 1--3 mm wide, ciliate. **Inflorescence:** scape 30--110 mm long, 3--5 mm in diameter, branched, bearing (2-)3--7 pseudo-umbellets with 14--31(-35) flowers each; peduncles 30--100 mm long, 1,5--3 mm in diameter, densely hirsute interspersed with long glandular hairs and very long non-glandular hairs; bracts subulate, 7--14 mm long, 1--1,5 mm wide, adaxially velutinous, abaxially densely hirsute interspersed with long glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 40--60 mm long, green, densely hirsute interspersed with long glandular hairs. **Sepals** 5, narrowly triangular, apices acuminate, 7--11 mm long, 1--2,5 mm wide, patent, green with membranous margins, indumentum abaxially as on hypanthium. **Petals** 5, pale yellow, patent during anthesis; posterior two minutely dotted with wine-red spots in the central part, ligulate to narrowly spatulate, bases narrowly cuneate, apices truncate to emarginate, 13--20 x 3--3,5 mm; anterior three ligulate, bases attenuate, apices truncate to emarginate, 11--18 x 2--3 mm. **Stamens:** staminal column 1,5--3 mm long, white papillate; perfect stamens 5, initially straight, bending downwards during senescence, posterior one 5--7 mm long, lateral two 6--8 mm long, anterior two 7--9 mm long, white; staminodes 2--4 mm long; anthers pale pink, 1--1,5 mm long, pollen pale yellow. **Gynoecium:** ovary 3--5,5 mm



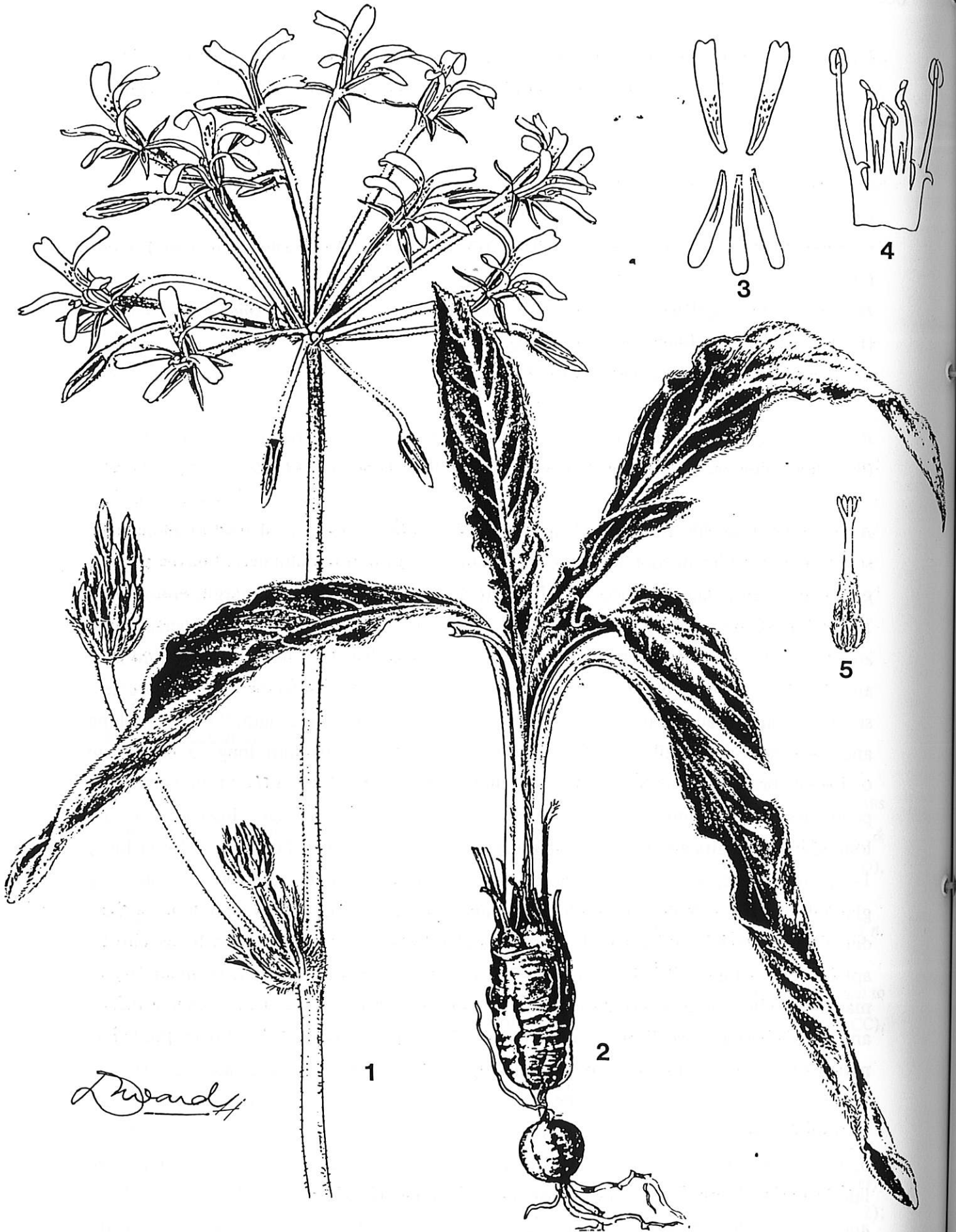


Figure 8.34.1 *Pelargonium radicum*. 1, inflorescence x1; 2, plant with leaves x1; 3, petals x1; 4, androecium x3; 5, gynoecium x4.

long; style 1,5--5 mm long, dark pink; stigma branches 1--2 mm long, pink. **Fruit:** bases of mericarps 6--7 mm long, with glandular hairs, tails 32--35 mm long. (Figure 8.34.1).

### Diagnostic features and affinities

*P. radicum* has simple lanceolate leaves, covered on both sides with short soft patent hairs and bristles along the margins. Sometimes bristle-like hairs also occur abaxially. The soft hairs are usually lost during senescence and at the time of flowering the shrivelled leaves are glabrous with white appressed bristles on the margins. Depending on the number of bristles abaxially, the shrivelled leaves can adaxially be glabrous and abaxially squamose.

The large number of pale yellow flowers per pseudo-umbellet and the ligulate or narrowly spatulate petals and long hypanthia of *P. radicum*, resemble those of *P. appendiculatum* and *P. fasciculaceum*. All three species have several pseudo-umbellets per scape which flowers in succession, thus lengthening the flowering period of the plant. The floral structures of *P. appendiculatum* and *P. radicum* are very similar with small differences in the lengths of the fertile stamens. In this respect they differ from *P. fasciculaceum* where the two anterior stamens are long and protrude from the flower, whereas the lateral and posterior ones are very short and concealed in the floral sheath.

The epithet *radicum*, meaning with roots, refers to the large root or tuber. This is not a distinctive character for this species only, but for the section as a whole.

### Geographical distribution and ecology

*P. radicum* occurs along the west coast of the Cape Province, from Springbok in the north to Hopefield in the south (Figure 8.34.2), an area receiving an annual rainfall of 100--300 mm mainly during the winter months. Although it seems to be a rather large distribution area, only a few collections are known, probably because plants usually occur in small populations or because the natural habit is destroyed. Plants grow in sandy soil and flower from late October to December.

### Material studied

--2917 (Springbok): Near Bloustasie, Springbok (-DB), *Van Berkel* 455 (NBG).

--3218 (Clanwilliam): Clanwilliam (-BB), *Bolus s.n.* (BOL); Onder-Bergvlei, Paleisheuwel (-BC), *Van der Walt 1417* (STEU); Olifantsrivier (-BD), *Niven 21, s.n.* (S).

--3318 (Cape Town): Near Hopefield (-AB), *Bachmann 1533* (Z).

Without exact locality: Namaland Minor, *Scully 216* (BM, BOL); Herb. de Ventenat, *Anon* (G); Bergrivier, *Zeyher 172* (K, P, SAMx2)

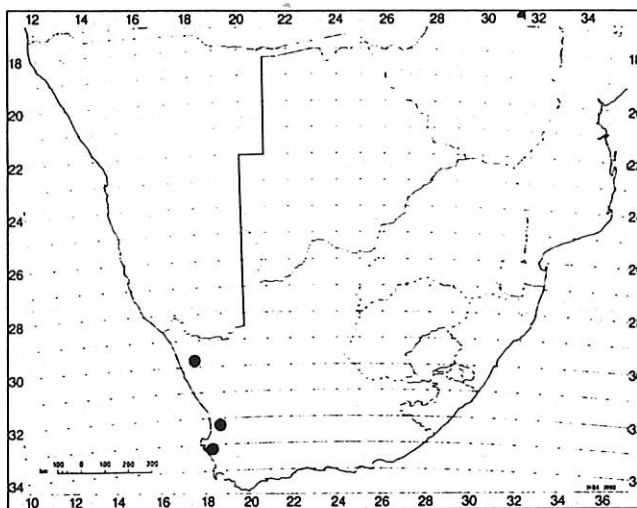


Figure 8.34.2 Geographical distribution of *P. radicum*.

**8.35** *Pelargonium appendiculatum* (L. f.) Willd., *Species Plantarum* 3: 651 (1800); Pers.: 228 (1806); DC.: 662 (1824); Spreng.: 53 (1826); G. Don: 736 (1831); Steud.: 677 (1840); Steud.: 283 (1841); Harv.: 270 (1860); Knuth: 349 (1912); Van der Walt & Vorster: 7, fig. (1988). TYPE - Cape Province: "Habitat in Africa" *sub* LINN 858.92 (LINN, lecto!, designated here).

*Geranium appendiculatum* L. f.: 304 (1781); Murray: 618 (1784); Cav.: 262, t. 121, f. 2 (1787); Thunb.: 116 (1800); Thunb.: 529 (1823). TYPE - Cape Province: "Habitat in Africa" *sub* LINN 858.92 (LINN, lecto!, designated here).

*Hoarea appendiculata* (L. f.) Eckl. & Zeyh.: 65 (1835).

*Geranospermum appendiculatum* (L. f.) Kuntze: 94 (1891).

An aromatic geophyte 150--300 mm tall when in flower. **Tuber:** a turnip-shaped root, branched, forming numerous stem-growing points in older plants; branches covered with flaking periderms, 10--25 mm in diameter; tuberous system forming clumps up to 500 mm in diameter. **Leaves** greyish green, petiolate; lamina elliptic to ovate in outline, irregularly bipinnatisect or tripinnatisect, 30--110 mm long; pinnae 12--35 mm long,

deeply incised, segments 0,5--1 mm wide, apices rounded, densely villous interspersed with glandular hairs; petiole 10--130 mm long and 2--5 mm in diameter, rigid, erectopatent, villous with glandular hairs interspersed; stipules very conspicuous, obtrullate or ear-shaped, rigid, patent, adnate to petioles for two thirds of their length, 15--30 mm long and 8--12 mm wide, densely hirsute with appressed hairs. **Inflorescence:** scape 10--30 mm long, 2--7 mm in diameter, branched, bearing 2-3 pseudo-umbellets with (4-)6--15 flowers each; peduncles 40--140 mm long, 2--5 mm in diameter, green, densely covered with short glandular hairs interspersed with long soft patent non-glandular hairs; bracts lanceolate to ligulate, 7--9 mm long, 1--1,5 mm wide, adaxially hirsute with appressed hairs and abaxially hirsute with long patent hairs interspersed with short glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 60--100 mm long, green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 9--13 mm long, 1--3 mm wide, posterior one erect, others recurved, green with margins white, indumentum abaxially as on peduncle. **Petals** 5, pale yellow, patent during anthesis; posterior two spatulate with small pale pink or dark red blotches in the centre, bases cuneate, apices emarginate, 17--23 x 4--7 mm; anterior three ligulate, bases attenuate, apices emarginate, 15--20 x 2--4 mm. **Stamens:** staminal column 1--3 mm long, white; perfect stamens 5, initially straight, bending downwards during senescence, posterior one 8--10 mm long, lateral two 9--11,5 mm long, anterior two 11--13 mm long, white; staminodes 4--5 mm long; anthers yellow, ca. 2 mm long, pollen orange. **Gynoecium:** ovary 4,5--6 mm long; style 3,5--4 mm long, pale green; stigma branches 2,5--3 mm long, pale green. **Fruit:** bases of mericarps ca. 7 mm long, without glandular hairs, tails 50--55 mm long. (Figure 8.35.1).

#### Diagnostic features and affinities

*P. appendiculatum* is characterized by the exceptionally large, ear-shaped stipules, hence the specific epithet. This form of stipules is unique for section *Hoarea*. Secondly the branching tuber, forming numerous stem-growing points, is also a distinctive character within section *Hoarea*. This extensive branching is probably stimulated by the grazing of sheep and antelope, forming clumps up to half a meter in diameter. The annual increments, terminated by leaves, are clearly distinguishable on these branches. The colour and the form of the petals, as well as the structure of the androecium are very similar to those of *P. radicum*. Both species have pale yellow, spatulate to ligulate petals and stamens with more or less the same length as the sepals. Initially the stamens are straight, but during senescence they bend downwards, probably a mechanism to avoid self-pollination. The hypanthia of *P. appendiculatum* (60--100 mm) are usually longer than those of *P. radicum* (40--60 mm) and the petals of the former are also slightly



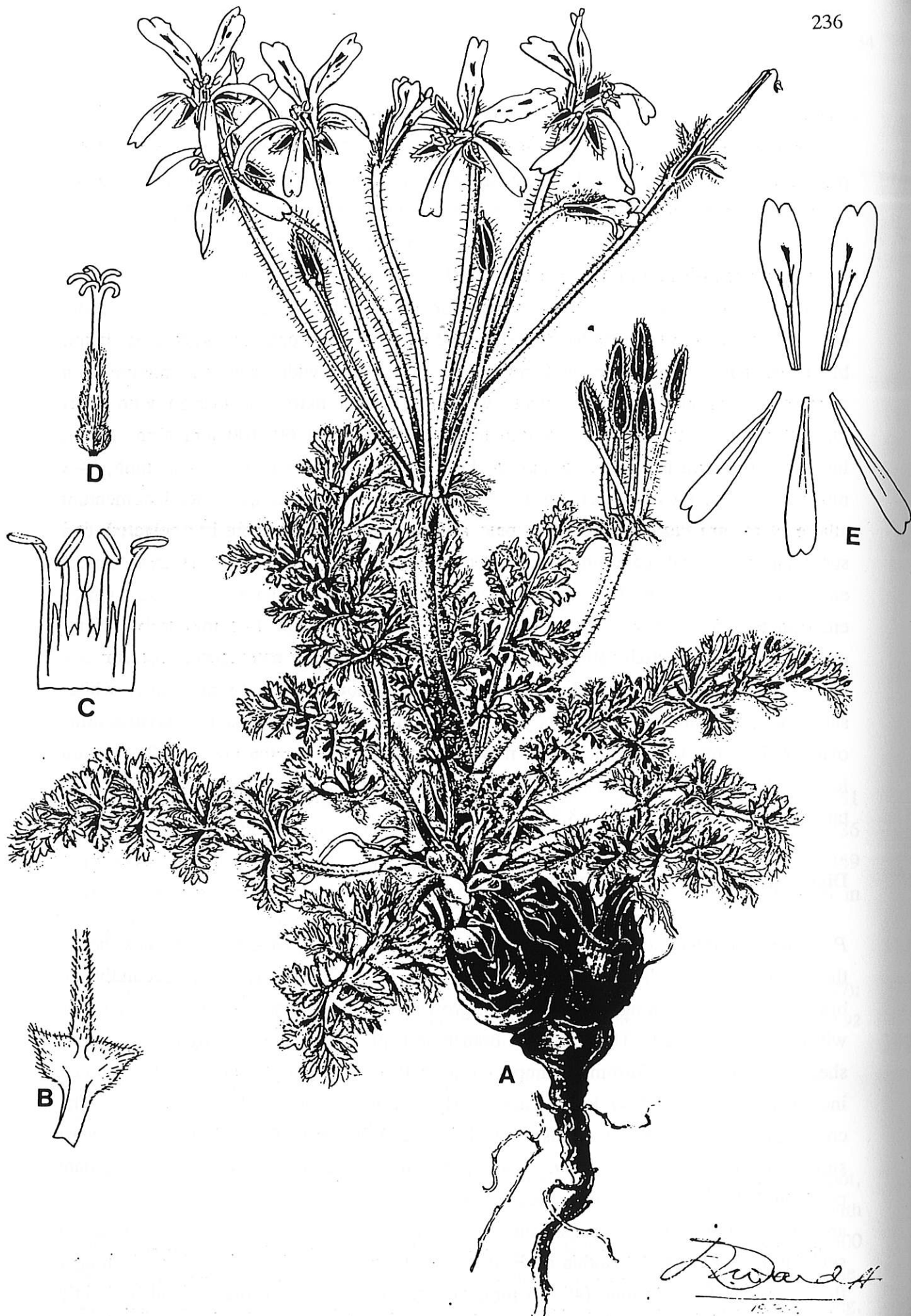


Figure 8.35.1 *Pelargonium appendiculatum*. A, flowering plant x1; B, leaf base x1; C, androecium x3; D, gynoecium x3; E, petals x1,5.

*Richard H.*  
1972

larger than those of *P. radicum*. On the other hand, *P. appendiculatum* has a smaller number of pseudo-umbellets per scape (2--3) and less flowers per pseudo-umbellet (6--15) than *P. radicum*. The latter has 3--7 pseudo-umbellets per scape and 14--31 flowers per pseudo-umbellet.

### Geographical distribution and ecology

*P. appendiculatum* is known from a small distribution area along the Langvlei river near Leipoldtville (Figure 8.35.2). During the previous century J.F. Drège collected it at Brakfontein along the Olifantsrivier and during the first half of this century a few collections were made near Clanwilliam. However, since the start of this research project, no collection of this species was made in this area. It is one of the most robust species of section *Hoarea* and should be obvious in the veld, but it is also known that these plants are heavily grazed by sheep and as this area is extensively cultivated, it is possible that its distribution has shrunk and is now confined to the Langvlei area.

*P. appendiculatum* grows in deep coastal calcareous sands in west coast strandveld in an area with an annual rainfall of 200--300 mm. It flowers from September to October.

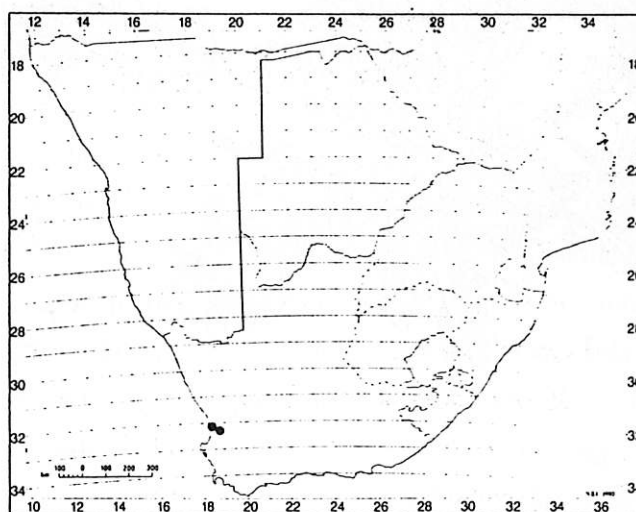
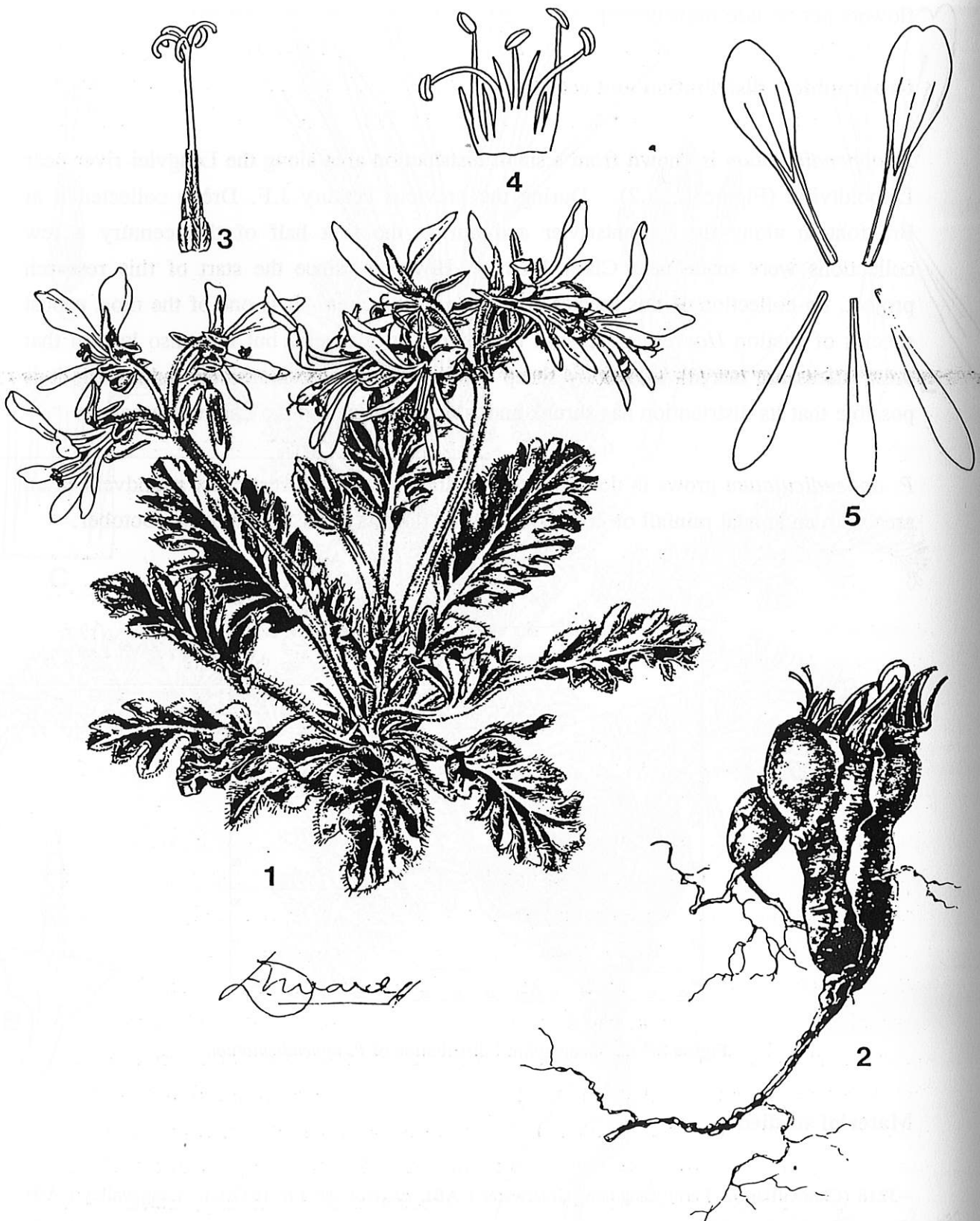


Figure 8.35.2 Geographical distribution of *P. appendiculatum*.

### Material studied

--3218 (Clanwilliam): Farm Langdam, Graafwater (-AB), Engelbrecht s.n. (STEU); Langevalley (-AB), Thunberg s.n. (Sx2, UPS); Ecklon & Zeyher 503 (G, K, L, MEL, MO, P, S, SAM, TCD, Wx2, WU, Z); Along Langvlei near Leipoldtville (-AB), Van der Walt 1429, 1430 (STEU); De Brug, Clanwilliam (-BB),



*L. Nylandt*

Figure 8.36.1 *Pelargonium campestre*. 1, flowering plant x1; 2, tuber x1; 3, gynoecium x2,5; 4, androecium x2; 5, petals x2.

*Adamson s.n.* (BOL); Bergvalley (-BC), *Zeyher 80.10* (PRE); Olifantsrivier, near Brakfontein (-BD), *Drège s.n.* (MELx2).

**8.36** *Pelargonium campestre* (Eckl. & Zeyh.) Steud., *Nomenclator botanicus*, 2nd edn, 2: 284 (1841); Harv.: 267 (1860); Knuth: 341 (1912). TYPE - Cape Province: ' . In *campestriis graminosis ad flumen "Zwartkopsrivier" (Uitenhage)* . .' *Ecklon & Zeyher 480* (S, lecto!, designated here; K!; LX3!; MELX3!; MO!; OXF!; P!; SAM!; W!).

*Hoarea campestris* Eckl. & Zeyh.: 63 (1835). TYPE - Cape Province: ' . In *campestriis graminosis ad flumen "Zwartkopsrivier" (Uitenhage)* . .' *Ecklon & Zeyher 480* (S, lecto!, designated here; K!; LX3!; MELX3!; MO!; OXF!; P!; SAM!; W!).

*Geranospermum campestre* (Eckl. & Zeyh.) Kuntze: 94 (1891).

A geophyte 60--90(-140) mm tall when in flower. **Tuber**: a turnip-shaped or elongated root 25--50 mm long and 10--35 mm in diameter. **Leaves** green, petiolate; lamina simple or irregularly pinnatisect, ovate, base cuneate, apex acute to obtuse, margin entire, irregularly serrate to deeply incised, 15--50 x 7--35 mm; pinnae ovate, 15--20 x 5--10 mm, adaxially glabrous or sparsely hirsute, abaxially sparsely hirsute and with long glandular hairs along the veins, margins ciliate with long appressed stiff hairs; petiole 10--52 mm long and 1--2,5 mm in diameter, prostrate to erecto-patent, sparsely hirsute with patent hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles for half their length, (4-)8--15 mm long and *ca.* 2 mm wide, hirsute. **Inflorescence**: scape 10--50 mm long, 2--2,5 mm in diameter, branched, bearing 2--4 pseudo-umbellets with 5--9 flowers each; peduncles 25--70 mm long, 1--2 mm in diameter, densely covered with long glandular hairs and sparsely interspersed with long soft patent hairs; bracts subulate, 4--8 mm long, 1--2 mm wide, adaxially and abaxially hirsute. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 12--22 mm long, densely covered with long glandular hairs. **Sepals** 5, lanceolate, apices acute, 7--12 mm long, 1,5--3,5 mm wide, posterior one erect, others recurved, green, indumentum abaxially as on hypanthium. **Petals** 5, white, claws connivent, forming a trumpet-shaped floral sheath, apices patent; posterior two spatulate, claws linear, apices rounded or emarginate, 14--23 x 4--5,5 mm; anterior three spatulate, bases attenuate, apices rounded or obtuse, 11--18 x 2,5--3 mm. **Stamens**: staminal column 2--3 mm long, white, smooth; perfect stamens 5, protruding from the flower, posterior one 6--10 mm long, lateral two 8--11,5 mm long, anterior two 9--13 mm long, white; staminodes 5--8 mm long; anthers wine-red, 2--2,5 mm long, pollen orange. **Gynoeceium**: ovary 4,5--8 mm long; style 2--5



mm long, wine-red; stigma branches 2--3 mm long, wine-red. **Fruit:** bases of mericarps ca. 6 mm long, with glandular hairs, tails 26--28 mm long. (Figure 8.36.1).

### Diagnostic features and affinities

*P. campestre* is a small geophyte with simple to irregularly pinnatisect leaves and medium-size white flowers. The petals are without any markings or nectar guides. Probably, to compensate for the lack of these guides, the long protruding stamens have prominent wine-red anthers, forming the centre of attraction of the flower. At a later stage during anthesis the anthers are dropped and the centre of attraction is replaced by the long recurved wine-red stigma branches. The stamens remain straight during anthesis, a characteristic which *P. campestre* has in common with species like *P. moniliforme*, *P. carneum* Jacq. and *P. nephrophyllum*.

Although I do not regard this species as closely related to *P. auritum* var. *carneum*, they often cause confusion. Both species occur in the eastern Cape, and both have white flowers with long protruding stamens. *P. auritum* var. *carneum* has narrow ligulate petals (posterior two 1,5--3 mm wide) and a papillate staminal column, whereas *P. campestre* has wider spatulate petals (posterior two 4--5,5 mm wide) and a smooth staminal column.

The specific epithet *campestre*, meaning pertaining to plains or flat areas, thus referring to the habitat of the species.

### Geographical distribution and ecology

So far only four collections of *P. campestre* are known, two from the vicinity of Grahamstown, and two from Redhouse and Zwartkopsrivier near Port Elizabeth (Figure 8.36.2). *P. campestre* occurs in grassveld or karroid vegetation on shale, in an area with an annual rainfall of 400--600 mm. Although the rainy season for this area is unpredictable to some extent, rain can occur throughout the year. Flowering time for this species is from October to December. This apparent long flowering season is probably due to the unpredictability of the rainy season, a phenomenon which is also observed in *P. aestivalis*. The latter is one of the few species of section *Hoarea* occurring exclusively in the summer rainfall area and according to the dates on herbarium specimens, this species also has a very long flowering season.

## Material studied

--3325 (Port Elizabeth): Zwartkopsrivier (-DC), *Ecklon & Zeyher 480* (K, LX3, MELX2, MO, OXF, P, S, SAM, W); Redhouse (-DC), *Paterson 292* (GRA, SAM).

--3326 (Grahamstown): 6--7 miles from Grahamstown on Cradock road (-AD), *Dyer 1673* (PRE); 9 km from Grahamstown on Cradock road (-AD), *Jacot-Guillarmod 8300* (STEU).

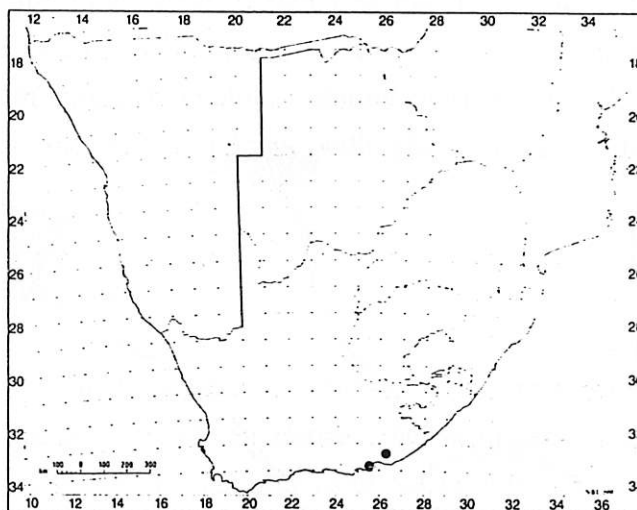


Figure 8.36.2 Geographical distribution of *P. campestre*.

**8.37** *Pelargonium nephrophyllum* *E.M. Marais* in South African Journal of Botany 58: 220 (1992). TYPE - Cape Province: Vanrhynsdorp, farm Sandkraal, *Snijman 593* (STE, holol!, BOL!, K!, MO!, NBG!, PRE!).

A geophyte 50--120 mm tall when in flower. **Tuber:** a turnip-shaped root 25--30 mm long and 18--25 mm in diameter. **Leaves** simple, petiolate; lamina reniform, palmately veined, apex rounded, margin deeply crenate, (10-)15--25 x (13-)18--27 mm, adaxially green, sparsely hirsute, abaxially reddish purple, with a few very short glandular hairs, margins with short appressed bristles; petiole 40--80 mm long and 1 mm in diameter, rigid, spreading horizontally from the growing point and bending vertically in the middle, covered with short glandular hairs interspersed with bristles; stipules narrowly triangular, adnate to petioles for one third of their length, 2--3 mm long and *ca.* 1 mm wide, ciliate. **Inflorescence:** scape 10--40 mm long, branched, bearing 2 pseudo-umbellets with 3--7 flowers each; peduncles 25--75 mm long, 1 mm in diameter, hirsute with distally appressed curly hairs interspersed with short glandular hairs; bracts lanceolate, 5--8 mm long, 2--3 mm wide, adaxially and abaxially densely hirsute with

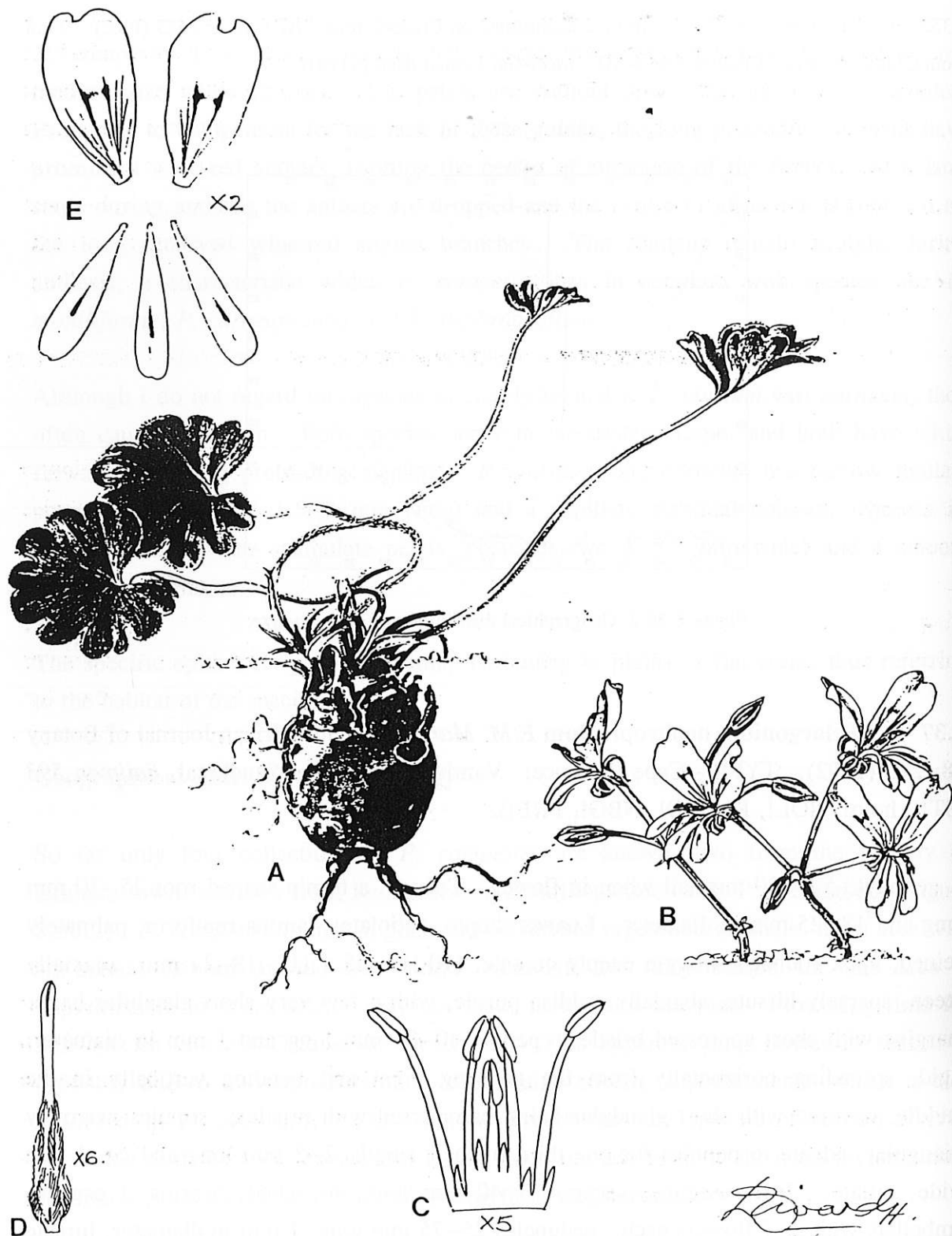


Figure 8.37.1 *Pelargonium nephrophyllum*. A, plant with leaves x1; B, inflorescences x1; C, androecium x5; D, gynoecium x6; E, petals x2.

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distally appressed hairs. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 20--30 mm long, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6--9 mm long, 1--3 mm wide, recurved, pale reddish brown with margins white to pink, indumentum abaxially as on peduncle. **Petals** 5, pink to salmon-pink with an orange blotch in the centre, patent during anthesis; posterior two obcordate, bases cuneate, apices emarginate, 12--14 x 6,5--8 mm; anterior three spatulate, bases narrowly cuneate, apices rounded, 11--14 x 2,5--3,5 mm. **Stamens**: staminal column 1,5--2 mm long, pale pink; perfect stamens 5, protruding from the flower, remaining straight during anthesis, posterior one 3--4 mm long, lateral two 5 mm long, anterior two 7--8 mm long, pink; staminodes 2--3,5 mm long; anthers dark pink, *ca.* 2 mm long, pollen orange. **Gynoecium**: ovary 2,5--3 mm long; style 1--2 mm long, dark pink; stigma branches 1--1,5 mm long, dark pink. **Fruit**: bases of mericarps 4 mm long, with glandular hairs, tails 13--17 mm long. (Figure 8.37.1).

#### Diagnostic features and affinities

*P. nephrophyllum* has palmately veined, kidney-shaped leaves with scalloped margins, a leaf shape which is unique for section *Hoarea*, hence the specific epithet. The petioles are long and thin, and spread horizontally from the growing point and bend vertically in the middle. This orientation of the petioles resembles that of *P. ternifolium*, *P. fergusoniae* and *P. reflexum*. *P. ternifolium* has tripartite leaves and the latter two species palmatipartite. The long thin petioles together with the pinkish scape, peduncles and hypanthia give the plant a delicate appearance. The orange blotches on the pink petals are accentuated by the orange coloured pollen. The long straight stamens resemble that of several other species of *Hoarea*, like *P. moniliforme* and *P. incrassatum*, but can easily be distinguished because of the pink, obcordate petals.

#### Geographical distribution and ecology

So far *P. nephrophyllum* is known from a small distribution area. It occurs in succulent karoo on the stony lower slopes or sandy flats west of the Matsikamma Mountains (Figure 8.37.2), an area with an annual rainfall of 100--200 mm occurring mainly in winter. The plants are locally common. The poor herbarium record may be due to the flowering time of the species from late February to April, a time when few botanists visit the area. This is much later than most of the species in section *Hoarea*. The species flowers before new leaves appear.



## Material studied

--3118 (Vanrhynsdorp): Vleikraal, E of Klawer (-DA), *Schonken 35* (STEU); *Walters 123* (PRE, STE); Sandkraal, S of Vanrhynsdorp (-DA), *Perry 1550* (NBG); *Snijman 593* (BOL, K, MO, NBG, PRE, STE); Sandkraal, SW slopes of Matsikamma Mountains (-DB), *Acocks 14178* (PRE).

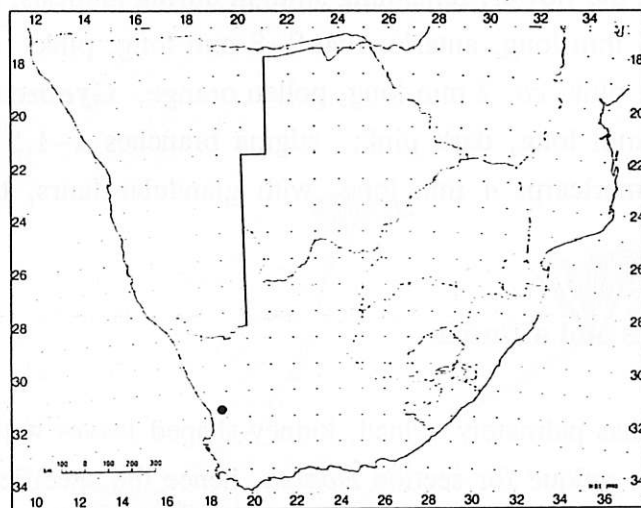


Figure 8.37.2 Geographical distribution of *P. nephrophyllum*.

**8.38** *Pelargonium carneum* Jacq., *Collectanea* 4: 189 (1791b); Jacq.: 8, t. 512 (1792); Willd.: 649 (1800), (Excl. Burm. f.); Pers.: 228 (1806), (Excl. Cav.); DC.: 654 (1824), (Excl. Cav.); Spreng.: 53 (1826), (Excl. Cav.); Loudon: 570 (1829); G. Don: 728 (1831); Loudon: 272 (1832); Steud.: 284 (1841); Harv.: 269 (1860); Knuth: 340 (1912). TYPE - "Ex Promontorio bonae Spei" (W, holo!).

*Dimacria carnea* (Jacq.) Sweet: 77 (1826c).

*Pelargonium maximiliani* Schltr.: 151 (1899). TYPE - Cape Province: "In collibus lapidosis montium prope Houw-Hoek, in ditone Caledon" *Schlechter 9421* (K, lecto!, designated here, BM!, BOL!, E!, Gx3!, L!, MO!, P!, PREx3!, S!, W!, Z!).

A geophyte 120--380 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root 20--60 mm long and 10--30 mm in diameter. **Leaves** green, petiolate; lamina simple, trifoliolate, pinnate to irregularly bipinnatisect; simple leaves ovate with apices acute and margins entire to serrate, 30--50 x 15--20 mm; compound leaves elliptic in outline, 50--70 mm long, pinnae 15--30 mm long, deeply incised, segments lacinate, 1--3 mm wide,

wide, adaxially glabrous, ciliate, abaxially hirsute with long appressed stiff hairs; petiole 25--30 mm long and 1,5--2 mm in diameter, rigid, erecto-patent, hirsute with appressed hairs interspersed with very short glandular hairs; stipules subulate, adnate to the petioles for half their length, 16--30 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 20--120 mm long, 2--4 mm in diameter, branched, bearing 2--3 pseudo-umbellets with 4--13 flowers each; peduncles 30--170 mm long, 1,5--3 mm in diameter, covered with short glandular hairs interspersed with long and short patent hairs; bracts narrowly triangular, 5--10 mm long, 2--3 mm wide, abaxially hirsute with appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** (29-)35--75 mm long, green, covered with short glandular hairs interspersed with sometimes clavate bristle-like hairs. **Sepals** 5, narrowly triangular, apices attenuate, 9--20 mm long, 1,5--4 mm wide, recurved, green to reddish brown with margins white, sparsely setose interspersed with short glandular hairs. **Petals** 5, white, pink, yellow, cream-coloured or flesh-coloured, patent during anthesis; posterior two with wine-red feather-like markings, obovate to widely obovate or obcordate, bases cuneate, apices rounded, truncate or emarginate, 17--34 x 8--15,5 mm; anterior three widely spatulate, bases narrowly cuneate, apices rounded, truncate or emarginate, 15--25 x 4--7,5 mm. **Stamens:** staminal column 1,5--4 mm long, white; perfect stamens 5, remain straight during anthesis, posterior one 6--11 mm long, lateral two 8--14,5 mm long, anterior two 11--17 mm long, white; staminodes 2--6 mm long; anthers dark red, 2--3 mm long, pollen orange. **Gynoecium:** ovary 3,5--7,5 mm long; style 2--8,5 mm long, pale green; stigma branches 1,5--3(-4) mm long, adaxially dark red. **Fruit:** bases of mericarps 6 mm long, with glandular hairs, tails 25--31 mm long. (Figure 8.38.1).

#### Diagnostic features and affinities

*P. carneum* is a geophyte normally with irregularly bipinnatisect leaves, although specimens with simple or trifoliolate leaves are also known. The rather large bell-shaped flowers have very long hypanthia ((29-)35--75 mm) and wide patent petals (posterior ones 8--15,5 mm wide). The colour of the petals varies from white, pink, yellow to cream-coloured or flesh-coloured, hence the specific epithet *carneum*. The stamens, of which the anterior ones are of the same length or slightly longer than the sepals, remain straight inside the bell-shaped flower. This flower structure is similar to that of *P. radiatum* and *P. nummifolium*. However, the three taxa differ in respect to the leaf form and the indumentum of the peduncle, hypanthia and the sepals.

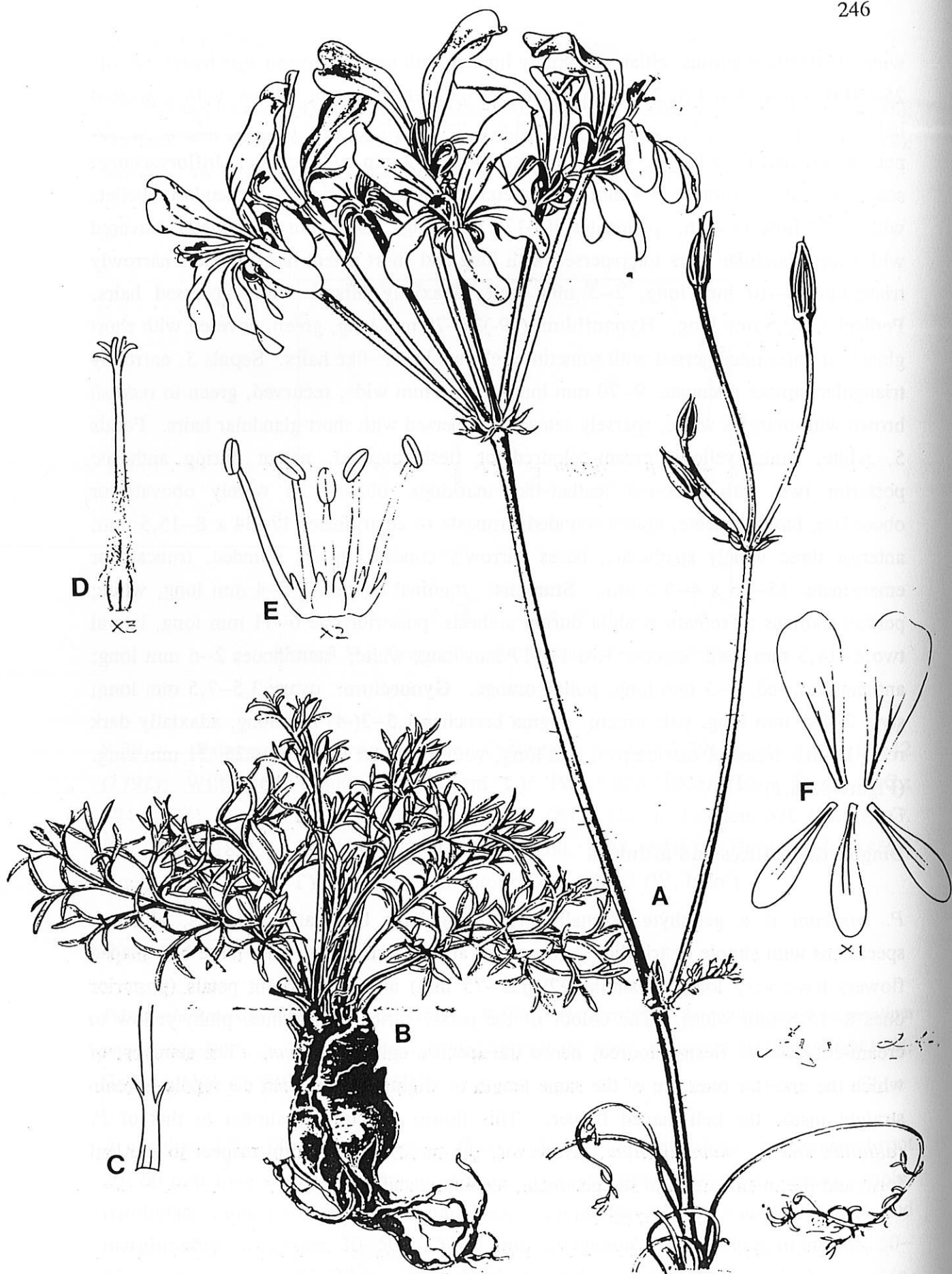


Figure 8.38.1 *Pelargonium carneum*. A, inflorescence x1; B, plant with leaves x1; C, leaf base x1; D, gynoecium x3; E, androecium x2; F, petals x1.

## Geographical distribution and ecology

*P. carneum* occurs along the southern Cape Province, from Worcester and Villiersdorp in the west to the Gamtoos river in the east (Figure 8.38.2). The annual rainfall of this distribution area varies from 200--800 mm. In the west the precipitation occurs mainly in winter, but to the east it occurs throughout the year. Plants occur on limestone hills, in rock crevices, on stony sandy hillsides or on flats in stony sand, or clay or loamy soil. The occurrence varies from rare or occasionally to locally abundant in renosterveld, marginal coastal renosterveld and also in fynbos. *P. carneum* flowers from November to March, after the leaves have died.

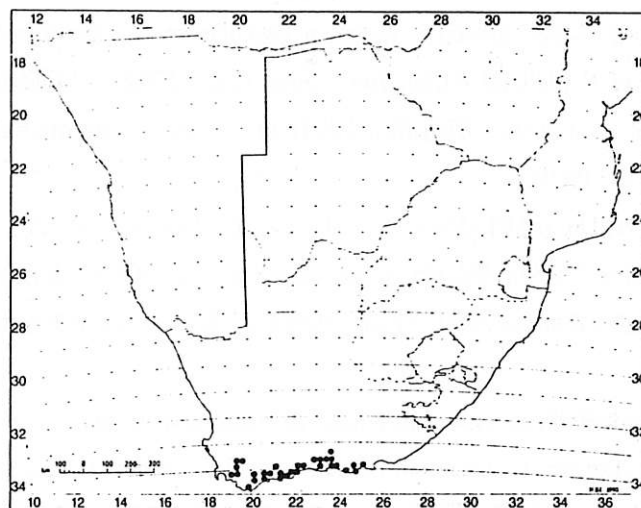


Figure 8.38.2 Geographical distribution of *P. carneum*.

## Material studied

--3319 (Worcester): SE of Brandvlei dam (-CB), *Van Zyl s.n.* (STEU 3855, 3959); Rooihoogte, Villiersdorp (-CD), *Bayer 3173* (NBG); Terras, near Worcester (-DA), *Lavranos & Pehlemann 17448* (STEU).

--3321 (Ladismith): Springfontein, between Muiskraal & Barrydale (-CC), *Lavranos 20887* (STEU); Paardeberg, Riverdale (-CC), *Muir 35* (PRE); Garcia's Pass (-CC), *Ryder 19985* (BOL, K); Near Muiskraal (-CC), *Van der Walt s.n.* (STEU 1653, 1654).

--3322 (Oudtshoorn): Moerasrivier, S slopes of Witberg (-CC), *Hugo 133* (PRE, STE); Camfer (-CD), *Esterhuysen 16831* (BOLx3, K); Klipdrift (-CD), *Schlechter 2277* (Z); Mannetjiesberg, Kammanassie, Uniondale (-DB), *Esterhuysen 4707* (BOL).

--3323 (Willowmore): Baviaanskloof road, 31 km S of Willowmore (-BC), *Marais 147* (STEU); Uniondale (-CA), *Burchell 5013* (K); *Esterhuysen 12543* (PRE); *Esterhuysen 19970* (BOL, PRE);



Sondagsberg, Avontuur (-CA), *Fischer 363* (STEU); Hills near Avontuur (-CA), *Fourcade 2072* (BOL, BOL-FOURCADE); Avontuur (-CA), *Van Zyl s.n.* (STEU); 41 km from Joubertina to Avontuur (-CB), *Marais 157* (STEU); N of Joubertina (-CC), *Fourcade 2933* (K); Dwaasrivier, Kouga, Joubertina (-DA), *Manson 251* (STE); 32 km from Joubertina to Avontuur (-DC), *Marais 153, 154* (STEU); Joubertina (-DD), *Esterhuysen 19949, 21259* (BOL).

--3324 (Steytlerville): Uitvlugt, near Groothoek, Humansdorp (-DC), *Fourcade 3513, 5124* (BOL-FOURCADE).

--3325 (Port Elizabeth): Gamtoos River (-CC), *Hall NBG66/59* (BOL).

--3419 (Caledon): Houhoek (-AA), *Schlechter 9421* (BM, BOL, E, Gx3, K, L, MO, P, PREx3, S, W, Z); Caledon (-AB), *Drijfhout s.n.* (STEU); Zeekoeikraal, Riviersonderend (-AB), *Oliver 5476* (STE); Near Caledon (-AB), *Van der Walt s.n.* (STEU); Near Elim (-DB), *Bolus 12958* (BOL).

--3420 (Bredasdorp): Stormsvlei (-AA), *Zeyher 2046* (G, K, MEL, Px2, S, W, Z); Goerreesoe, Swellendam (-AC), *Acocks 23097* (PRE); Between Swellendam & Heidelberg (-BA), *Barker 8887* (NBGx2); Suurbraak, E of Heidelberg (-BA), *Burt-Davy 12552* (PRE); Middelpaas, Suurbraak (-BA), *Viviers 1145* (STE); W of Heidelberg (-BB), *Hall 860* (NBG); Frans Rietfontein near Cape Infanta (-BD), *Esterhuysen 29384* (BOL, K, PRE).

--3421 (Riversdale): Riversdale (-AB), *Muir 2941* (BOL); *Schlechter 1998* (Z); Stilbaai (-AD), *Bohnen 4841* (PRE, STE); *Compton 23176* (NBGx2); *Esterhuysen 19531* (BOLx2, K); *Van Schalkwyk 45* (PU); Meeufontein, Stilbaai (-AD), *Bohnen 7780* (STE); Between Mossel Bay & Riversdale (-BB), *Gillett s.n.* (STE).

--3422 (Mossel Bay): Groot-Brakrivier, station (-AA), *Forrester s.n.* (NBG).

--3424 (Humansdorp): Lower Tsitsikamma, flats near Kromrivier (-AB), *Fourcade 2964* (PRE); Humansdorp (-BB), *Burchell 4854, 4926* (K); *Burt-Davy 12001* (BOL, PRE); *Thode A712* (PRE); Cape St. Francis (-BB), *Coutnik s.n.* (STEU); Between Jeffreys Bay & Kabeljou (-BB), *Fourcade 6350* (STE).

**8.39 *Pelargonium radiatum* (Andr.) Pers.**, Synopsis plantarum 2: 226 (1806); Ait. f.: 160 (1812); Link: 186 (1822); DC.: 650 (1824); Spreng.: 50 (1826); Loudon: 568 (1829); G. Don: 729 (1831); Loudon: 272 (1832); Steud.: 679 (1840); Steud.: 289 (1841). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 222 (1802b).

*Geranium radiatum* Andr.: t. 222 (1802b); Poir.: 757 (1812). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 222 (1802b).

*Dimacria radiata* (Andr.) Sweet: 77 (1826c).

*Hoarea radiata* (Andr.) Eckl. & Zeyh.: 62 (1835).

*Geranium oxalioides* Andr.: C, ic (1805b). ICONOTYPE: Andrews, Geraniums: C, ic (1805b).

*Pelargonium crinitum* Harv.: 263 (1860); Knuth: 327 (1912); non Nees: 163 (1845). TYPE - Cape Province: "Dutoitskloof", Drège 1290 (K, lecto!, designated here, E!, G!, L!, MEL!, MO!, OXF!, Px2!, S!, W!).

*Geranospermum crinitum* (Harv.) Kuntze: 94 (1891).

*Pelargonium pulcherrimum* Leighton: 229, 232 (1932); non Sweet: t. 134 (1822). TYPE - Cape Province: "Near Worcester", Leipoldt s.n. sub. BOL19969 (BOL, holo!, K!).

A geophyte 130--230 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 10--60 mm long and 5--20 mm in diameter. **Leaves** mostly simple, sometimes compound with 2 or more lateral pinnae at base of laminae, green, petiolate; lamina (or median pinna) ovate, base cuneate or truncate, apex obtuse, margin entire, 15--45 x 10--36 mm; small lateral pinnae ovate, 12--22 x 6--9 mm, adaxially sparsely to densely hirsute with long appressed stiff hairs interspersed with glandular hairs, abaxially the indumentum varies from densely hirsute with appressed hairs to setose with appressed hairs only along the larger veins; petiole 10--70 mm long and 1--3 mm in diameter, prostrate, setose, interspersed with appressed curly hairs and long and short glandular hairs; stipules subulate, adnate to the petioles for half their length, 5--10 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 30--90 mm long, 1,5--3 mm in diameter, branched, bearing 2--3 pseudo-umbellets with 2--6(-8) flowers each; peduncles 50--120 mm long, 1--2 mm in diameter, covered with short glandular hairs interspersed with long and short soft patent hairs; bracts narrowly triangular, 5--8 mm long, 2--3 mm wide, abaxially hirsute with appressed hairs interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 30--62 mm long, green, densely covered with glandular hairs sparsely interspersed with stiff patent hairs. **Sepals** 5, lanceolate, apices attenuate, 11--14 mm long, 1,5--3,5 mm wide, patent or sometimes recurved, green, covered with glandular hairs interspersed with appressed stiff hairs. **Petals** 5, pink or bright pink, pale yellow or cream-coloured, patent during anthesis; posterior two with wine-red feather-like markings, obovate to widely obovate or obcordate, bases cuneate, apices rounded, truncate or emarginate, 19--32 x 7,5--16,5 mm; anterior three widely spathulate, bases narrowly cuneate, apices rounded, truncate or emarginate, 16,5--30 x 5--12 mm. **Stamens:** staminal column 1,5--4 mm long, white; perfect stamens 5, remain straight during anthesis, posterior one 8--11 mm long, lateral two 9--14 mm long, anterior two 11--17 mm long, white; staminodes 2--5,5 mm long; anthers wine-red, 2,5--3,8 mm long, pollen orange. **Gynoecium:** ovary 3,5--6 mm long; style 2--6 mm long, white or pale green; stigma branches 1,2--3 mm long, adaxially wine-red. **Fruit:** bases of mericarps 6--8 mm long, with glandular hairs, tails 25--32 mm long. (Figure 8.39.1).



Figure 8.39.1 *Pelargonium radiatum*. A, flowering plant x1; B, androecium x2; C, gynoecium x4; D, petals x1.

Edward H.  
11/15/57

### Diagnostic features and affinities

*P. radiatum* is a geophyte with simple or trifoliolate prostrate leaves, arranged in a radiating manner, hence the specific epithet. Like *P. carneum*, it has rather large bell-shaped flowers with very long hypanthia (30--62 mm) and wide patent petals (posterior ones 7,5--16,5 mm wide). The two species exhibit more or less the same variation in flower colour and in both species the stamens remain straight inside the bell-shaped flower. However, the two taxa differ in respect to the leaf form. *P. radiatum* has simple or trifoliolate leaves, whereas *P. carneum* usually has irregularly bipinnatisect ones. The non-glandular hairs on the peduncle, hypanthia and the sepals of *P. carneum* are more bristle-like and those of *P. radiatum* are a softer type of hair.

### Geographical distribution and ecology

*P. radiatum* has a small distribution in the mountainous region of the south-western Cape. It occurs on the Dutoitskloof and Slanghoek Mountains, and on Jonaskop in the Riviersonderend Mountain range (Figure 8.39.2). This area receives an annual rainfall of over 1000 mm. *P. radiatum* also occurs in lowland areas in the vicinity of Worcester and Villiersdorp. Plants grow in shallow stony sand between rocks in fynbos. It flowers in summer from October to January at a time when the leaves are dying.

*P. radiatum* seems to be restricted to sandstone areas with a rather high annual rainfall, whereas *P. carneum* occurs on a variety of substrates in areas where the annual rainfall varies from as low as 200 mm to about 800 mm.

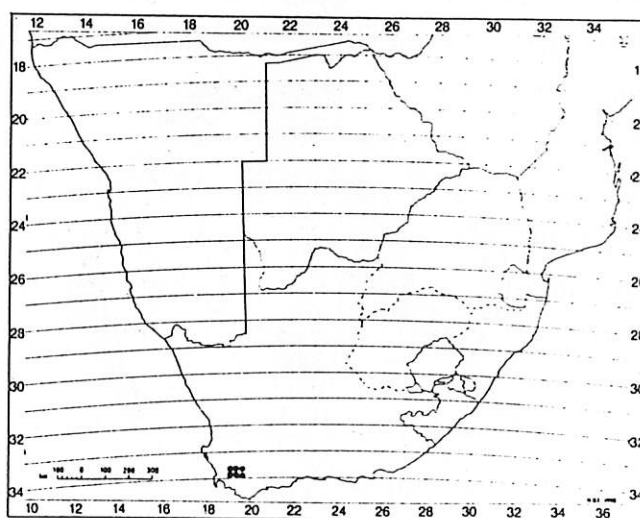


Figure 8.39.2 Geographical distribution of *P. radiatum*.



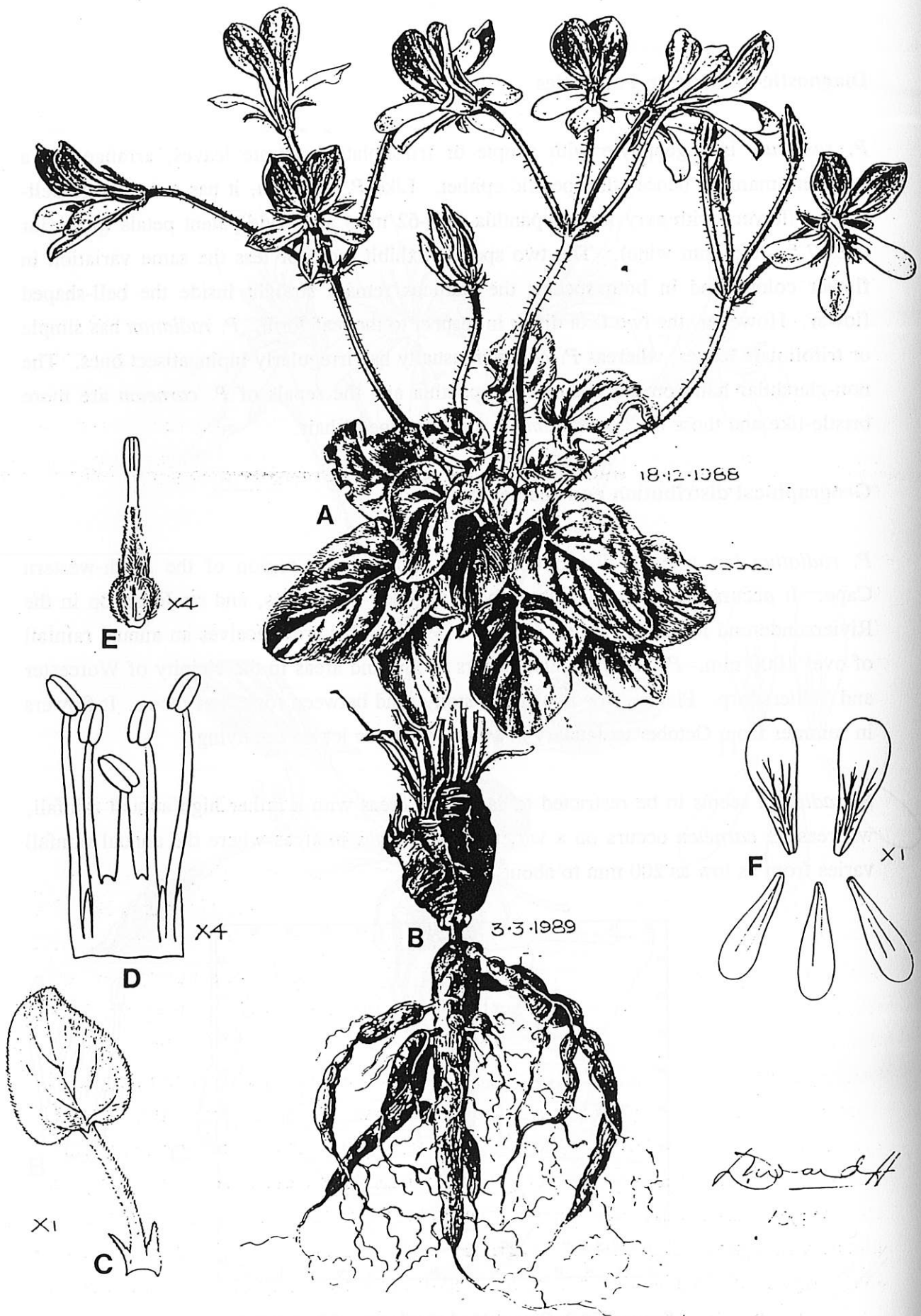


Figure 8.40.1 *Pelargonium nummifolium*. A, flowering plant x1; B, tuber x1; C, leaf x1; D, androecium x4; E, gynoecium x4; F, petals x1.

## Material studied

--3319 (Worcester): Dutoitskloof (-CA), *Drège 1290* (E, G, K, L, MEL, MO, OXF, Px2, S, W); Observation Peak, Slanghoek Mountains (-CA), *Esterhuysen 1706* (BOLx2, K); Molenaarsberg, Slanghoek Mountains (-CA), *Esterhuysen 14350* (BOL); Suurvlakte, above Dutoitskloof (-CA), *Esterhuysen 21111* (BOL); Eikeboom on Slanghoek road (-CA), *Van der Walt 1063* (STEU); Near Brandvleidam, Worcester (-CB), *Albers s.n.* (STEU); Worcester, Airfield (-CB), *Bayer 2631* (NBGx2); Worcester West, building plots (-CB), *Forrester s.n.* (NBG); Worcester (-CB), *Leipoldt BOL19969* (BOL, K); Die Nekkie, Brandvleidam (-CB), *Perry 760* (NBG); Worcester, Karoo Garden (-CB), *Van der Walt 1058* (STEU); Dutoit's Peak (-CC), *Esterhuysen 8603* (BOL); *Esterhuysen 16630* (BOL, K); *Esterhuysen 18923* (BOL); Seven Sisters Mountain (-CC), *Esterhuysen 18309* (BOLx2, K, PREx2); Villiersdorp (-CD), *Middlemost s.n.* (BOL); Farm Moddergat, Ou Plaas (-CD), *Rossouw 445* (NBG); Effata farm, De Wet (-DA), *Bayer 963* (NBG); Jonaskop (-DC), *Marais 386* (STEU); *Van der Walt 970, 1494* (STEU).

**8.40** *Pelargonium nummulifolium* Salisb., *The paradisus londinensis* 1: t. 23 (1806); Loudon: 271 (1832) (*sub. P. nummularifolium*). ICONOTYPE: Salisbury, *The paradisus londinensis* 1: t. 23 (1806).

*Hoarea nummularifolia* (Salisb.) Sweet: 76 (1826c).

A geophyte 110--150 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 25--40 mm long and 18--30 mm in diameter, densely crowned with numerous prostrate leaves. **Leaves** simple, greyish green, petiolate; lamina ovate or cordiform, base truncate or cordate, apex obtuse, margin entire, 18--28 x 13--22 mm, adaxially densely hirsute with long appressed stiff hairs interspersed with short glandular hairs, abaxially sparsely hirsute with appressed hairs interspersed with short glandular hairs mainly along the large veins; petiole 12--55 mm long and 1,5--3 mm in diameter, prostrate, hirsute or densely hirsute interspersed with short glandular hairs; stipules subulate, adnate to the petioles for half their length, 3--10 mm long and 1--3 mm wide, ciliate. **Inflorescence:** scape 10 mm long, 2--3 mm in diameter, branched, bearing 2 pseudo-umbellets with 3--5 flowers each; peduncles 50--60 mm long, 1,5--2 mm in diameter, covered with short glandular hairs interspersed with long soft patent hairs and appressed curly hairs; bracts lanceolate, 5 mm long, 2--3 mm wide, abaxially hirsute with appressed stiff hairs interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 25--40 mm long, pale reddish green, densely covered with glandular hairs sparsely interspersed with coarse patent hairs. **Sepals** 5, lanceolate, apices

attenuate, 9--10 mm long, 2--3 mm wide, patent, reddish brown to green, hirsute with appressed curly hairs interspersed with glandular hairs. Petals 5, bright pink or flesh-coloured, patent during anthesis; posterior two with wine-red feather-like markings, obovate to widely obovate or obcordate, bases cuneate, apices rounded or truncate, 20--23 x 7,5--10 mm; anterior three widely spatulate, bases narrowly cuneate, apices rounded or truncate, 18--21 x 5--6 mm. Stamens: staminal column 2 long, white; perfect stamens 5, remain straight during anthesis, posterior one 7 mm long, lateral two 9--10 mm long, anterior two 11,5--12 mm long, white; staminodes 2,5--3 mm long; anthers dark red, 2 mm long, pollen orange. Gynoecium: ovary 4 mm long; style 1--1,5 mm long, dark red; stigma branches 2 mm long, dark red. Fruit: bases of mericarps with glandular hairs. (Figure 8.40.1).

### Diagnostic features and affinities

*P. nummulifolium* is a geophyte with numerous densely arranged leaves growing from a short flattened stem, giving it a cushion or alpine growth form. This species is very similar to *P. radiatum* in respect to the leaf form and the floral structure. They differ, however, in respect to the indumentum and the pollen structure.

The specific epithet *nummulifolium* refers to the leaves of *Nummularia* Hill, a genus of the Primulaceae. These plants usually have basally arranged leaves like *P. nummulifolium*.

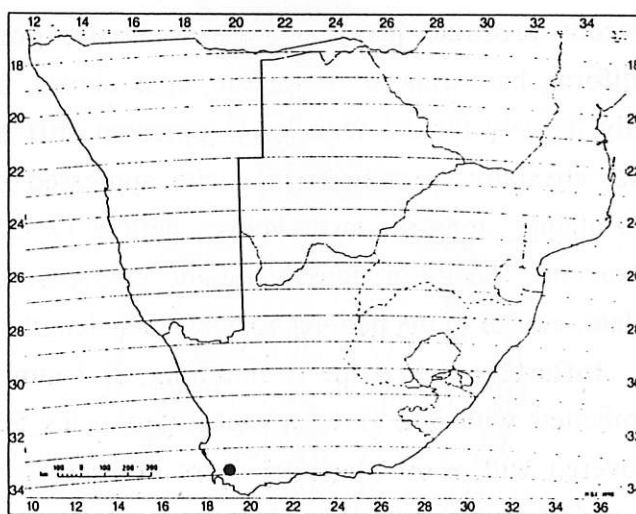


Figure 8.40.2 Geographical distribution of *P. nummulifolium*.

### Geographical distribution and ecology

So far *P. nummulifolium* is known from a small distribution area in the mountainous region of the south-western Cape (Figure 8.40.2), an area receiving a rather high rainfall of over 1000 mm per annum. It occurs in sand in mountain fynbos and large populations grow in full sun. This species, like other *Hoarea* species which grow on high mountains, flowers in summer from December to March.

### Material studied

--3319 (Worcester): Agter-Tafelberg, Du Toitskloof (-CC), *Watson 71* (NBG, STEU).

### LUTEOLUM GROUP

Geophytes with palmately compound leaves and very thin, erect petioles. Scape branched, bearing 2--3 pseudo-umbellets with 3--16 flowers each. Flowers white, cream-coloured, yellow or pink; posterior petals ligulate or unguiculate-spathulate and the anterior petals unguiculate-obovate, wider than the posterior ones. Stamens 5 fertile, remain straight during anthesis, and are enclosed by the anterior petals. Tectum of pollen striate-reticulate.

**8.41** *Pelargonium luteolum* *N.E. Br.* in *Kew Bulletin* 1913: 299 (1913); Van der Walt & Vorster: 93, fig. (1981a). TYPE - Cape Province: "near Prince Albert", *Pearson s.n.* (K, holo!).

A geophyte 80--300 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root, or sometimes branched with several stem-growing points, 20--60 mm long and 15--45(-60) mm in diameter. **Leaves** green, petiolate; lamina palmately compound with three main pinnae; pinnae 18--120 mm long, sometimes deeply incised, segments 20--50 mm long, sometimes lacinate, 0,5--5 mm wide, with apices acute, hirsute with long appressed hairs; petiole (10-)60--90(-140) mm long and 0,5--1 mm in diameter, rigid, erect, hirsute with appressed hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles for half their length, 5--12 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 10--70 mm long, 1--2 mm in diameter, branched, bearing 2--3 pseudo-umbellets with 3--16 flowers each; peduncles 30--170(-280) mm long, 1--1,5 mm in diameter, densely covered with appressed stiff hairs



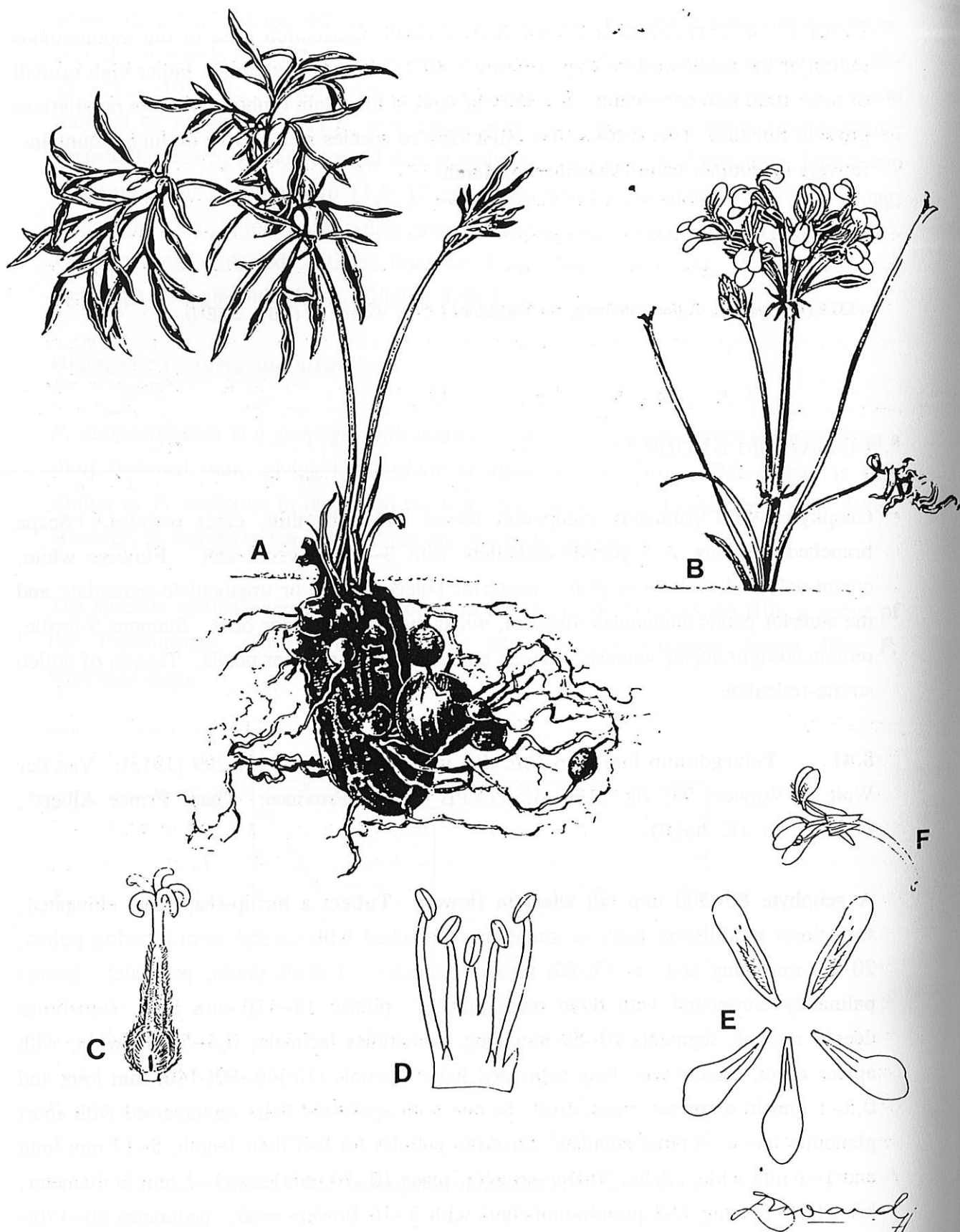


Figure 8.41.1 *Pelargonium luteolum*. A, plant with leaves x1; B, flowering plant x1; C, gynoecium x6; D, androecium x4; E, petals x2; F, flower x1,5.

interspersed with short glandular hairs; bracts lanceolate, 2--4 mm long, 1--1,5 mm wide, abaxially hirsute with appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 13--20(-24) mm long, green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute to attenuate, 5--9,5 mm long, 1--3 mm wide, posterior one erect, others reflexed, green with reddish brown apices and membranous margins, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured, almost white or yellow, claws forming a sheath; posterior two ligulate or unguiculate-spathulate, with wine-red markings along the main veins, 7--14,5 x 2--4 mm, claws 4,5--7 mm long and 1,5--2 mm wide, cuneate, adaxially usually with long soft hairs along the main vein, apices rounded, truncate or emarginate, laterally recurved during anthesis; anterior three unguiculate-obovate, 7--14 x 2,5--5 mm, claws obtriangular, with V-shaped wine-red stripes, 3,5--5 mm long, apices rounded, connivent, the lateral two covering the median one. **Stamens**: staminal column 1,5--3,5 mm long, white; perfect stamens 5, remaining straight during anthesis, covered by the anterior petals, posterior one 4--8,5 mm long, lateral two 4,5--9 mm long, anterior two 5--9,5 mm long, white; staminodes 2--4 mm long; anthers 1--1,8 mm long, pollen orange. **Gynoeceum**: ovary 2--5 mm long; style 0,5--2,5 mm long, pale green; stigma branches 0,5--1,5 mm long, adaxially pink. **Fruit**: bases of mericarps ca. 4 mm long, with glandular hairs, tails ca. 25 mm long. (Figure 8.41.1).

#### Diagnostic features and affinities

*P. luteolum* has a peculiar flower with two ligulate or unguiculate-spathulate posterior petals with adaxially long soft hairs along the main veins and laterally recurved during anthesis. The three unguiculate-obovate anterior petals are wider than the posterior ones and connivent, the lateral two covering the median one. At the same time the stamens are concealed by the anterior petals. This floral structure is similar to that of *P. gracillimum*. The latter has pink flowers with long hypanthia (22--35 mm long), whereas *P. luteolum* has yellow flowers and short hypanthia (13--20 mm long). The specific epithet *luteolum* refers to the pale yellow colour of the flowers.

The leaves of *P. luteolum* are very variable. Leaves of young plants or the first leaves of the season are often trilobate, whereas the leaves of older plants or the later leaves of the season are deeply incised with segments sometimes laciniate. The erect palmately compound leaves with three main pinnae are similar to those of *P. attenuatum* and *P. angustipetalum*, both species with a different floral structure than that of *P. luteolum*. Although the petioles of *P. luteolum* are very thin, they remain erect because of the large amount of sclerenchymatous tissue surrounding the vascular cylinder.

## Geographical distribution and ecology

*P. luteolum* has a large distribution area. It occurs from Garies in Namaqualand, along the west coast to Worcester in the south and along the southern coast as far as Steytlerville and Kleinpoort in the eastern Cape (Figure 8.41.2). The western part of the distribution area is mainly a winter rainfall region, whereas the southern and eastern Cape receive rain throughout the year. The annual rainfall for this distribution area varies between 100 and 300 mm. *P. luteolum* occurs on a variety of substrates, like sandstone, shale or quartzite, and also in a variety of vegetation types. It occurs in karroid vegetation or in different types of fynbos under bushes or in direct sunlight. In drier areas single plants or large populations usually occur on rocky southern slopes of steep hillsides. Flowering time is from November to March, with the peak in January and February.

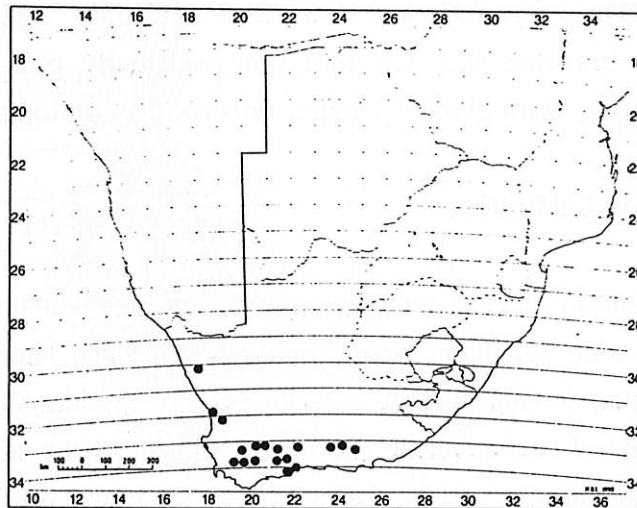


Figure 8.41.2 Geographical distribution of *P. luteolum*.

## Material studied

- 3017 (Hondekliptbaai): 8 km from Garies to Hondekliptbaai (-DB), *Drijfhout 1345* (STEU).
- 3118 (Vanrhynsdorp): Knakarberge, Vanrhynsdorp (-CD), *Drège s.n.* (P, S).
- 3218 (Clanwilliam): Clanwilliam (-BB), *Leipoldt 4234*, (BOL).
- 3319 (Worcester): Karoo Poort (-BA), *Marloth 9011, 9013* (PRE); Airfield, Worcester (-CB), *Dobay 110/75* (STEU); Worcester (-CB), *Esterhuysen 10128* (BOL); *Leighton 1035* (BOL); *Leipoldt 20514* (BOL); Karoo Garden, Worcester (-CB), *Leighton 1999* (BOL); *Van der Walt 1056, s.n.* (STEU 740) (STEU); Brandvleidam, Matjieskloof (-CB), *Marais 410* (STEU); Worcester, Veld Reserve (-CB), *Olivier 13* (PRE); Hammansberg (-CD), *Forrester 94, 95* (NBG); Cement Factory, Nuy (-DA), *Barker 10703*

(NBG); Sandhills (-DA), *Dobay 1/75* (STEU); Keeromsberge (-DA), *Esterhuysen 22880, 27639* (BOL); 1 km S of Langvlei Station (-DC), *Van der Walt & Vorster 1389* (STEU); Robertson (-DD), *Van der Walt s.n.* (STEU); Robertson, road to McGregor (-DD), *Van Zyl s.n.* (STEU).

--3320 (Montagu): Tweedside, Matjiesfontein (-AB), *Marloth 12089* (BOL); 4 km from Matjiesfontein on Sutherland road (-BA), *Marais 212* (STEU); 6 km SE of Nougaspoot (-CA), *Fischer 227* (STEU); Nougaspoot (-CA), *Marais 105, 106, 107* (STEU); 8 km S of Lettaskraal (-CB), *Muller 4034* (STEU); Keurkloof (-CC), *Barker 8270* (NBG); Montagu Baths (-CC), *Bolus s.n.* (NBG); Kogmanskloof (-CC), *Marais 111, 112, 113* (STEU); *Van Zyl s.n.* (STEU); Boesmansdrif, 5 km E of Bonnievale (-CC), *Van der Walt 1390* (STEU).

--3321 (Ladismith): Seweweekspoot (-AD), *Marais 330, 389* (STEU); Vanwyksdorp (-CB), *Marais 167* (STEU); Springfontein, Riversdale district (-CC), *Bayer 3756* (NBG); Top of Rooiberg (-DA), *Acocks 20370* (PRE); Rooiberg Pass (-DA), *Lavranos 20266* (STEU); *Van der Walt 1305* (STEU).

--3322 (Oudtshoorn): Prince Albert (-AA), *Pearson s.n.* (K); Prince Albert, entrance to Swartbergpas (-AC), *Marais 368* (STEU).

--3323 (Willowmore): Trompetterskloof, Willowmore (-BA), *Scheltema 21* (STEU); 5 km E of Willowmore (-BC), *Lavranos & Pehlemann 19837* (STEU).

--3324 (Steytlerville): Noorspoort farm (-AD), *Craven s.n.* (STEU); Kleinpoort (-BD), *Craib s.n.* (STEU).

--3421 (Riversdale): Naphymond, Riversdal (-BA), *Bayer 2671* (NBG).

--3422 (Mosselbaai): Mosselbaai (-AA), *Ryder 21* (BOL).

**8.42** *Pelargonium gracillimum* *Fourc.* in Transactions of the Royal Society of South Africa 21: 91 (1932). TYPE - Cape Province: "Hills north of Avontuur", *Fourcade 3570* (BOL-FOURCADE, lecto!, designated here; K!; STE!).

A geophyte 80--270 mm tall when in flower. **Tuber:** a turnip-shaped or narrowly elongated, sometimes moniliform root, 15--50(-80) mm long and 6--20 mm in diameter. **Leaves** green, petiolate; lamina palmately compound with three main pinnae; pinnae (15-)25--120 mm long, sometimes deeply incised, segments 17--60 mm long, sometimes lacinate, 2--4 mm wide, with apices acute, hirsute with long appressed hairs; petiole 25--150 mm long and 0,5--1 mm in diameter, rigid, erect, hirsute with appressed hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles for half their length, 5--12 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 15--95 mm long, 1--2 mm in diameter, branched, bearing 2--3 pseudo-umbellets with 3--12(-16) flowers each; peduncles 50--185 mm long, 0,5--1 mm in diameter, densely covered with appressed stiff hairs interspersed with short glandular hairs; bracts lanceolate, 1,5--4 mm long, 1--1,5 mm wide, abaxially hirsute with appressed hairs. **Pedice**l ca. 0,5 mm long.



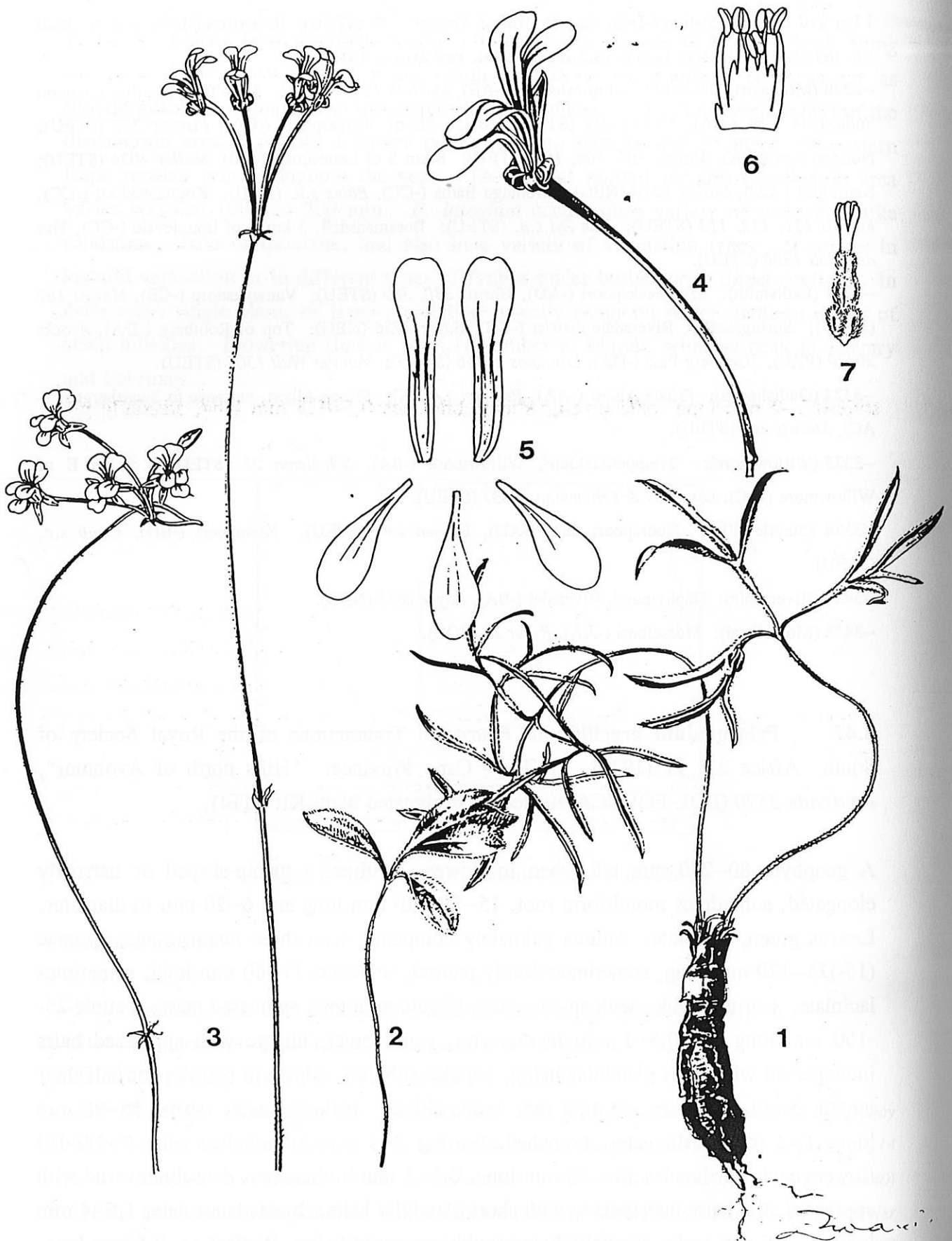


Figure 8.42.1 *Pelargonium gracillimum*. 1, plant with leaves x1; 2, leaf x1; 3, inflorescence x1; 4, flower x3; 5, petals x5; 6, androecium x4; 7, gynoecium x6.

**Hypanthium** (15-)22--35 mm long, green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute to attenuate, 4,5--7,5 mm long, 1--2,5 mm wide, posterior one erect, others reflexed, green with reddish brown apices and membranous margins, indumentum abaxially as on peduncle. **Petals** 5, white to pale pink or pink, claws forming a sheath; posterior two unguiculate-spathulate, with wine-red markings along the main veins, 9--14 x 2,5--3,5 mm, claws 4--7 mm long and 1,5 mm wide, cuneate, apices rounded, truncate or emarginate, laterally recurved during anthesis; anterior three unguiculate-obovate, 8--11,5 x 2,2--4,2 mm, claws obtriangular, with V-shaped wine-red stripes, 2--4 mm long, apices rounded, connivent, the lateral two covering the median one. **Stamens**: staminal column 1--2,5 mm long, white; perfect stamens 5, remaining straight during anthesis, covered by the anterior petals, posterior one 3,5--6 mm long, lateral two 4--7 mm long, anterior two 4,5--7,5 mm long, white; staminodes 2--3,5 mm long; anthers 1,5--1,8 mm long, pollen orange. **Gynoecium**: ovary 2--5 mm long; style 0,5--2 mm long, pale green; stigma branches 0,5--1,5 mm long, adaxially pink. **Fruit**: bases of mericarps 4--5,5 mm long, with glandular hairs, tails 20--26 mm long. (Figure 8.42.1).

#### Diagnostic features and affinities

*P. gracillimum* has the same peculiar flower as *P. luteolum*. The unguiculate-spathulate posterior petals are also laterally recurved during anthesis, but are without the trichomes. The three unguiculate-obovate anterior petals are also wider than the posterior ones and connivent, the lateral two covering the median one. In *P. gracillimum* these petals are markedly shorter (8--11,5 mm long) than the posterior ones (9--14 mm long). The stamens are concealed by the anterior petals. Other differences between the two species are the pink flowers and long hypanthia (22--35 mm long) of *P. gracillimum*, whereas *P. luteolum* has yellow flowers and short hypanthia (13--20 mm long).

The leaves of *P. gracillimum* show the same variability as those of *P. luteolum*. Leaves of young plants or the first leaves of the season are often trilobate, whereas the leaves of older plants or the later leaves of the season are deeply incised with segments sometimes lacinate. The specific epithet *gracillimum*, meaning thin or slender, refers to the long thin petioles and the thin and slender appearance of the deeply incised laminae. The erect palmately compound leaves with three main pinnae are similar to those of *P. attenuatum* and *P. angustipetalum*, both species with different floral structures from those of *P. gracillimum* and *P. luteolum*.

## Geographical distribution and ecology

*P. gracillimum* has a relatively small distribution area in the southern Cape, occurring from Seweweekspoort in the west to Baviaanskloof in the east (Figure 8.42.2). This area receives rain throughout the year and the annual precipitation varies from 100–300 mm. *P. gracillimum* occurs on sandstone in fynbos, usually on the southern slopes of very steep hillsides. However, records of plants growing in stony clay or well-drained loam are also known. Populations usually consist of small numbers of plants and flower from January to March.

Although both *P. gracillimum* and *P. luteolum* occur in the southern Cape, the small distribution area of *P. gracillimum* is adjacent to the much larger one of *P. luteolum*, overlapping only in the Seweweekspoort.

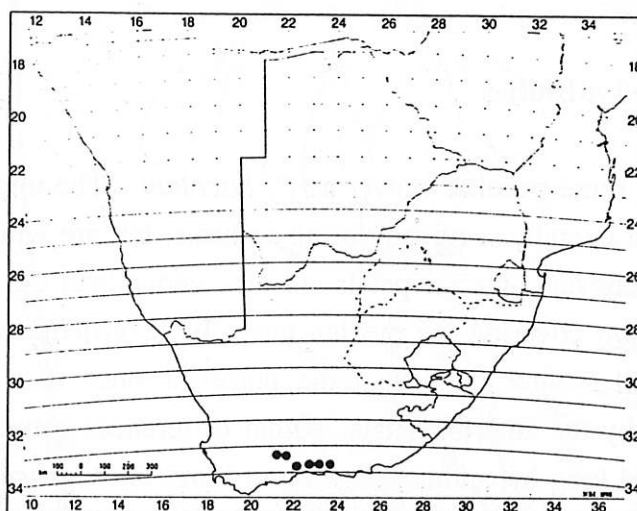


Figure 8.42.2 Geographical distribution of *P. gracillimum*.

## Material studied

--3321 (Ladismith): Seweweekspoort (-AD), *Bayliss 1975* (NBG); *Hugo 2567* (PRE, STE); *Wurtz 1656* (NBG); Gamka Mountain Nature Reserve (-BC), *Cattell & Cattell 328* (STE).

--3322 (Oudtshoorn): 7 km from Uniondale to Baviaanskloof road (-CA), *Perry 1441* (NBG); Moerasrivier, district Oudtshoorn (-CC), *Taylor 320* (BOL); Laudina, Uniondale (-DB), *Esterhuysen 18400* (BOL).

--3323 (Willowmore): Uniondale (-CA), *Esterhuysen 16872* (BOL); Avontuur (-CA), *Fourcade 3570* (BOL-FOURCADE, K, STE); 5 km N of Avontuur (-CA), *Marais 161* (STEU); 7 km N of Uniondale (-CA), *Marais 162* (STEU); Uniondale Poort, southern entrance (-CA), *Marais 367* (STEU); Nuwekloof

Pass, Baviaanskloof (-DA), Bruyns 2197 (STEU); Marais 148, 149 (STEU); Van Jaarsveld 7665a (STEU).

## RAPACEUM GROUP

Geophytes with erect irregularly bipinnatisect leaves. Scape branched, bearing 2--4 pseudo-umbellets with 6--30(-47) flowers each. Hypanthium of variable length, 12--55 mm long. The papilionaceous type of flower is extremely zygomorphic, the anterior petal is usually wide and conduplicate, enclosing the stamens and forming a keel, the lateral petals or wings cover the keel. Stamens 5 fertile, long and straight during anthesis. Tectum of pollen striate-reticulate.

**8.43** *Pelargonium rapaceum* (L.) L'Hérit. in Aiton, Hortus Kewensis edn 1, 2: 418 (1789); Jacq.: 190 (1791b); Jacq.: 8, t. 510 (1792); Willd.: 649 (1800); Pers.: 228 (1806); Ait. f.: 164 (1812); Link: 186 (1822); DC.: 651 (1824); Spreng.: 54 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 679 (1840); Steud.: 289 (1841); Harv.: 269 (1860); Szyszyl.: 8 (1888); Knuth: 348 (1912); Adamson & Salter: 513 (1950); Van der Walt: 39 fig. (1977); Wijnands: 108 (1983). LECTOTYPE: Commelijn, Horti Medici Amstelaedamensis 2: 125, t. 63; original plate in Moninckx collection in Amsterdam (Commelijn 1706, Wijnands 1983).

*Pelargonium rapaceum* (L.) L'Hérit. var *luteum* Sims: t. 1877 (1817); Harv.: 269 (1860); Knuth: 348 (1912).

*Geranium rapaceum* L.: 1141 (May-June 1759); Poir.: 746 (1812). LECTOTYPE: Commelijn, Horti Medici Amstelaedamensis 2: 125, t. 63; original plate in Moninckx collection in Amsterdam (Commelijn 1706, Wijnands 1983).

*Hoarea rapacea* (L.) Sweet: 75 (1826c); Eckl. & Zeyh.: 65 (1835).

*Geranospermum rapaceum* (L.) Kuntze: 95 (1891).

*Geranium myrrhifolium* L.  $\beta$ : 677 (1753).

*Geranium myrrhifolium* L.  $\beta$  *rapaceum* (L.) Burm. f.: 45 (17 Aug. 1759).

*Geranium prolificum* L.  $\alpha$ : 949 (1763); Substitute name for *G. rapaceum* L.: 1141 (1759); Burm. f.: 19 (1768).

*Geranium selinum* Andr.: t. 239 (1802b). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 239 (1802b).

*Pelargonium selinum* (Andr.) Pers.: 228 (1806); Steud.: 290 (1841).



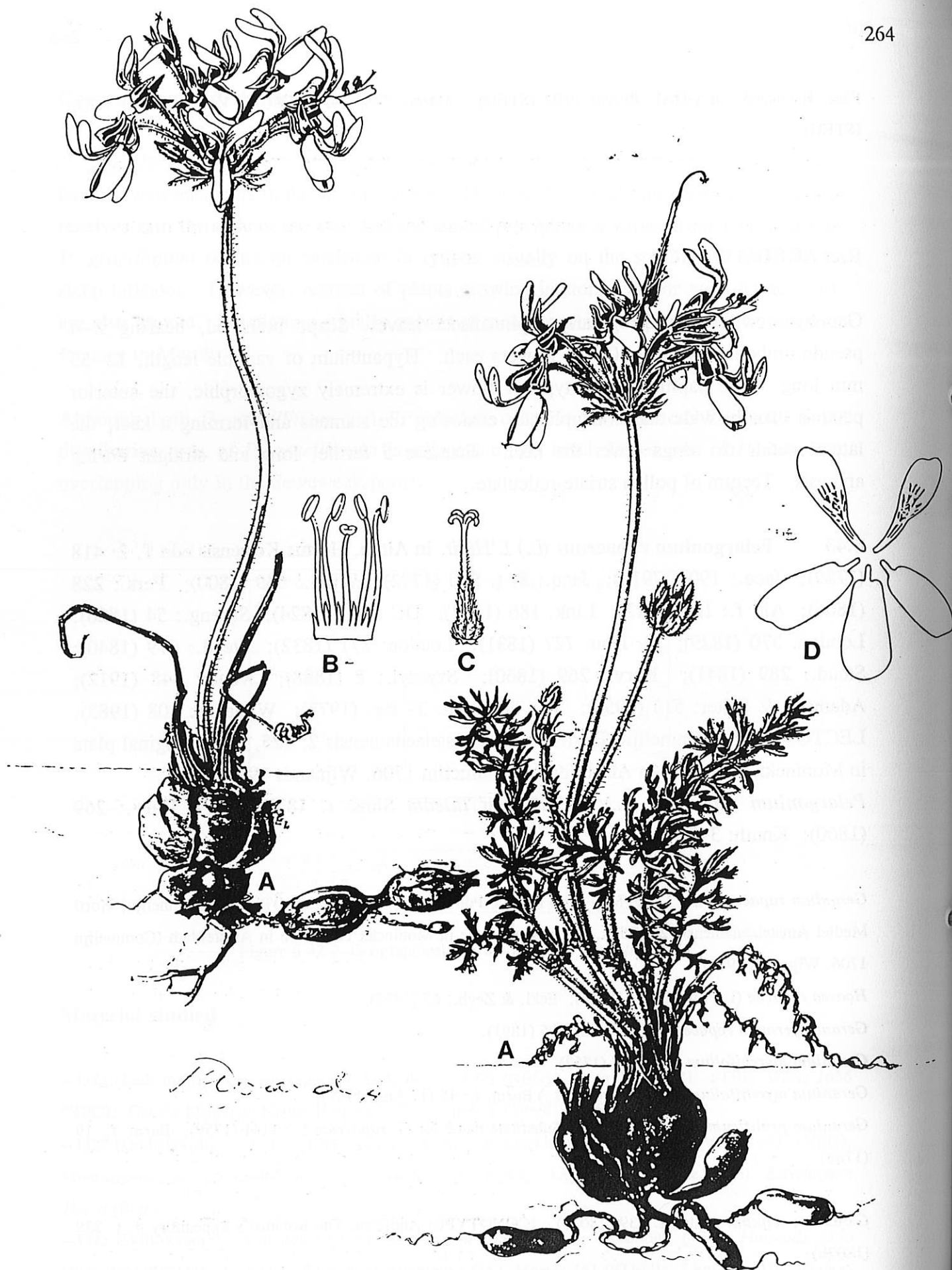


Figure 8.43.1 *Pelargonium rapaceum*. A, flowering plant x1; B, androecium x2; C, gynoecium x2; D, petals x1,5.

*Pelargonium rapaceum* (L.) L'Hérit. var. *selinum* (Andr.) Harv.: 269 (1860); Knuth: 348 (1912).

*Pelargonium carinatum* J.C. Wendl.: 79, t. 71 (1810); Loudon: 271 (1832). ICONOTYPE: Wendland, Collectio plantarum 2: t. 71 (1810).

*Hoarea carinata* (J.C. Wendl.) Sweet: t. 135 (1822); Sweet: 75 (1826c); Ecklon. & Zeyh.: 65 (1835).

*Geranospermum carinatum* (J.C. Wendl.) Kuntze: 94 (1891).

*Hoarea corydaliflora* Sweet: t. 18 (1820); Sweet: 75 (1826c); Eckl. & Zeyh.: 65 (1835). ICONOTYPE: Sweet, Geraniaceae 1: t. 18 (1820).

*Pelargonium corydaliflorum* (Sweet) DC.: 652 (1824); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 285 (1841).

*Pelargonium rapaceum* (L.) L'Hérit. var. *corydalifolium* (Sweet) Harv.: 269 (1860), (by mistake in place of *corydaliflorum*); Kunth: 348 (1912).

*Geranium selinum* var. *flavum* Andr.: C, ic (1822). ICONOTYPE: Andrews, Geraniums: C, ic (1822).

*Pelargonium nutans* DC.: 651 (1824): Substitute name for *G. selinum* var. *flavum* Andr.: C, ic (1822); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 288 (1841).

*Pelargonium rutaefolium* Bak.: t. 27 (1868). ICONOTYPE: Baker in Saunders's Refugium Botanicum 1: t. 27 (1868).

A geophyte (100-)170--300(-400) mm tall when in flower. **Tuber:** a turnip-shaped, elongated or sometimes moniliform root, older plants often with more than one stem-growing point, 18--40(-80) mm long and 10--50 mm in diameter. **Leaves** green, petiolate; lamina irregularly bipinnatisect, elliptic in outline, 50--250 mm long; pinnae irregularly and deeply incised, 8--40(-60) mm long, segments 1--3 mm wide, adaxially and abaxially hirsute to densely hirsute; petiole 25--120 mm long and 2--4 mm in diameter, erect, hirsute with long hairs and shorter appressed curly hairs, interspersed with glandular hairs; stipules subulate, attenuate, adnate to the petioles for two thirds of their length, 18--35 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 10--80(-110) mm long, 2--4 mm in diameter, branched, bearing 2--4 pseudo-umbellets with 6--30(-47) flowers each; peduncles 70--290 mm long, 1--3 mm in diameter, densely covered with glandular hairs and sparsely interspersed with long soft patent non-glandular hairs; bracts subulate, 6--10 mm long, 1--2 mm wide, abaxially densely hirsute interspersed with glandular hairs. **Pedicel** 1(-10) mm long. **Hypanthium** varies extremely in length, 12--55 mm long, long ones slightly curved, reddish-brown, densely covered with glandular hairs, sometimes interspersed with soft patent non-glandular hairs. **Sepals** 5, lanceolate, apices acute, 7--14 mm long, 2--5 mm wide, reflexed,

reddish-brown with green margins, abaxially densely hirsute with appressed hairs, interspersed with glandular hairs. **Petals** 5, white, cream-coloured, pale yellow, primrose yellow, pink or salmon pink; posterior two unguiculate-spathulate, reflexed above the claws, 10--20 x 2--6 mm, claws straight with wine-red feather-like markings, 5--9 mm long, apices rounded; lateral two unguiculate-elliptic, connivent with the anterior one, 11--18 x 3,5--6 mm, claws narrowly linear, 2 mm long, apices rounded; anterior one unguiculate-elliptic, conduplicate, 11--17 x 5--11 mm, claws narrowly linear, 2 mm long, apices rounded. **Stamens**: staminal column 2,5--5 mm long, white, smooth; perfect stamens 5, enclosed by the anterior petal, remaining straight during anthesis, posterior one 7--12 mm long, lateral two 8--14,5 mm long, anterior two 9--15 mm long, free filaments white; staminodes 3,5--8 mm long; anthers dark red, 1,5--2,5 mm long, pollen orange. **Gynoecium**: ovary 3--9 mm long; style 2,5--8,5 mm long, pale green; stigma branches 0,5--2 mm long, adaxially wine-red. **Fruit**: bases of mericarps 6--8 mm long, with glandular hairs, tails 20--37 mm long. (Figure 8.43.1).

#### Diagnostic features and affinities

*P. rapaceum* is characterized by its extremely zygomorphic and papilionaceous type of flower and its typical bipinnatisect leaves. The two posterior petals are unguiculate-spathulate and bend backwards above the claws. The anterior petal is usually very wide and conduplicate like the keel of a papilionaceous type of flower, enclosing the relatively long and straight stamens. At the same time the two lateral petals or wings cover the keel. This flower type is not only unique for section *Hoarea*, but also for the genus *Pelargonium*. The long and straight stamens are similar to those of *P. moniliforme*, *P. incrassatum* and *P. radicum*, but in none of these species the stamens are covered by the anterior petals.

Several synonyms are known for this species. In each case, when a new species was described, the author explained the differences between the so called related species. Harvey (1860) and Knuth (1912) distinguished three different subspecies on the basis of flower colour, but in this study no differences in floral structure could be found to support such a division. Neither did the distribution patterns of the different flower colours contribute any support for such a subdivision. The same variation in flower colour occurs in other species of this section also, like *P. pinnatum*. Instead, the large variation in hypanthium length was examined. Specimens were divided in plants with long hypanthia (44--55 mm long), plants with medium length hypanthia (24--36 mm long), and plants with short hypanthia (12--23 mm long). The majority of specimens have yellow flowers, and the majority of specimens have short hypanthia, but there exists

no correlation between flower colour and the length of the hypanthium. Nothing could be found either in the distribution patterns, flowering time, floral structure, leaf morphology or the indumentum on the leaves or flowers to support a subdivision of this species on the basis of hypanthium length. Like the variation in flower colour, the large variation in hypanthium length is not unique for this section. The same variation occurs in *P. dipetalum* and *P. pinnatum*.

The specific epithet *rapaceum*, meaning turnip-shaped, refers to the thickened tuber.

### Geographical distribution and ecology

*P. rapaceum* has the largest distribution area of all the species in section *Hoarea*. It occupies more or less the same area as the whole section and occurs from the Richtersveld in the north, along the west coast on the coastal plain, as well as on the escarpment, and along the southern coastal plain. One herbarium record is from as far east as Grahamstown (Figure 8.43.2). This area is mainly a winter rainfall region, although the southern and eastern Cape can receive rain in summer as well. A large variation in the annual precipitation occurs. It varies between 100--500 mm per annum and it seems that the amount of rain is not so crucial in the case of this species than in some others species of this section.

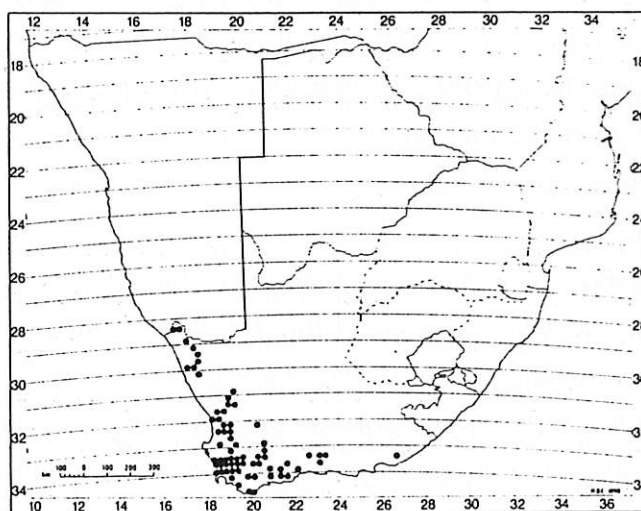


Figure 8.43.2 Geographical distribution of *P. rapaceum*.

*P. rapaceum* is very common in the south-western Cape and occurs in different vegetation types like fynbos, renosterveld and marginal strandveld. The vegetation varies from a low and open one and plants grow in direct sunlight or in gentle shade when the



vegetation is higher. *P. rapaceum* usually grows in sandy soil, but plants also occur in stony places, rocky clefts, clay or calcareous soils, quartzite or weathered granite. Flowering time for this species is from October to February with the peak in November and December. Sometimes the leaves are still present at flowering time, but often the plants flower after the leaves have died.

### Material studied

- 2816 (Oranjemund): Die Koei, Helskloof, Richtersveld (-BD), *Drijfhout 2943* (STEU).
- 2817 (Vioolsdrif): 15 km E of Helskloof, on road to Grasdrif (-AC), *Williamson 3528* (STEU); NE of Paradysberg, Richtersveld (-AC), *Wisura 1490* (NBG); Tierpoortberge (-CD), *Drijfhout 1432* (STEU).
- 2917 (Springbok): Klipfontein (-BA), *Le Roux s.n.* (STEU); Steinkopf (-BD), *Meyer sub. Marloth 6317* (PRE); Komaggas (-CD), *Drijfhout 2810* (STEU); 4 km from Okiep to Concordia (-DB), *Fischer 14* (STEU); 12 km from Springbok on Kleinsee road (-DB), *Marais 283* (STEU); Between Wildepaardehoek & Komaggas (-DC), *Drijfhout 1370* (STEU); Wildepaardehoek Pass (-DC), *Weber 1* (STEU).
- 3017 (Hondeklipbaai): 8,4 km from Kamieskroon to Bovlei (-BB), *Fischer 3* (STEU); 4 km E of Grootvlei (-BB), *Van Jaarsveld 4271* (STEU).
- 3019 (Loeriesfontein): Loeriesfontein, Village ground (-CD), *Marais 122* (STEU).
- 3118 (Vanrhynsdorp): Between Knakkiesberg & Doringbaai (-CD), *Drijfhout 1300* (STEU); Sandkraal (-DA), *Acocks 15164* (PRE); Vleikraal (-DA), *Schonken 36* (STEU); *Walters 84* (STE); *Walters 91* (PRE, STE); Gifbergpas (-DB), *Marais s.n.* (STEU); Heerenloggement (-DC), *Boucher s.n.* (STEU); *Marais 200* (STEU); Klawer (-DC), *Leipoldt 4104* (BOL); Gifberg (-DC), *Van der Walt s.n.* (STEU).
- 3119 (Calvinia): Bokkeveld near Nieuwoudtville (-AA), *Marloth 7799* (PRE); Glenridge, Nieuwoudtville (-AC), *Barker 9186* (NBG); Arendskraal, Calvinia (-AC), *Barker 9768* (NBG); Bottom of Vanrhyns Pass (-AC), *Barker 10538* (NBG); Between Grasberggrivier & Waterval (-AC), *Drège s.n.* (Gx3, Px2, S, TCD, Wx3); 14 km from Nieuwoudtville to Leeuriet (-AC), *Fischer 35* (STEU); Nieuwoudtville Nature Reserve (-AC), *Perry & Snijman 2331* (NBGx2); 77 km from Clanwilliam on Botterkloof road (-AD), *Fischer 39* (STEU).
- 3218 (Clanwilliam): Between Clanwilliam and Boschkloof (-BB), *Drège s.n.* (G, K, Px2, W); *Drège 1286* (P); Ramskop Nature Reserve, Clanwilliam (-BB), *Leipoldt 516* (BOL, SAM); *Van der Walt 1043* (STEU); Nardouwskloof (-BB), *Marais 322* (STEU); Amon track, Cedarberg (-BB), *Taylor 11208* (STE), 2 km from Graafwater to Paleisheuwel (-BC), *Schonken 87* (STE); Paleisheuwel (-BC), *Van der Walt 1047* (STEU); Olifantsriviervallei, Clanwilliam (-BD), *Bolus s.n.* (BOL); Clanwilliam, 6 km on Paleisheuwel road (-BD), *Van der Walt 1048* (STEU); Versveld Pass, Piketberg (-DC), *Nordenstam 3357* (STE); Kapteinskloof (-DC), *Stirton 10050* (STE).
- 3219 (Wuppertal): Pakhuis Pass (-AA), *Marais 196* (STEU); *Middelmost NBG1698/37* (NBG); *Stirton 10185* (PRE, STE); *Stokoe SAM57305* (SAM); Hoeksberg on Wuppertal turnoff (-AA), *Marais 402* (STEU); 30 km from Clanwilliam to Wuppertal (-AA), *Van der Walt 750* (STEU); Between Wuppertal &

Bidouwvallei (-AA), *Van der Walt 755* (STEU), Algeria (-AC), *Compton 6253* (NBG); *Van der Walt s.n.* (STEU); Ezelsbank (-AC), *Leipoldt 513* (BOL); Katsterdrif, farm Geelkrans (-CA), *Van der Walt 1022* (STEU); 0,8 km from Gydo-Clanwilliam road to Ceres-Karoo (-CD), *Marais' 378* (STEU).

--3220 (Sutherland): Bo-Visrivier (-AB), *Lavranos & Pehlemann 18846* (STEU); Fransplaas, Sutherland (-AB), *Marloth 9830* (PREx2); Farm De Hoop, Komsberg (-DC), *Van der Walt 816* (STEU); Oranjefontein, Komsberg (-DC), *Van der Walt s.n.* (STEU).

--3318 (Cape Town): Contreberg farm, Darling (-AD), *Fischer 329* (STEU); Bontberg, between Darling & Yzerfontein (-AD), *Marais 25* (STEU); Near Groot Post (-AD), *Salter 6460* (BOL); *Salter NBG2346/36* (NBG); Mamre Road (-BC), *Barker NBG616/41* (NBG); Riebeek-Kasteel (-BD), *Boucher 49* (STEU); Voorspoed, Malmesbury (-BD), *Van der Walt 1035* (STEU); Groenekloof (-CB), *Zeyher 166* (BM, E, Gx3, MELx2, Px2, PREx3, S, SAM, W, WU, Z); Rosebank, near Cape Town (-CD), *Bolus 2990* (BOL); Camp Ground (-CD), *Bolus 2996* (BOL); Lion's Head (-CD), *Dümmer 846* (E); *Ecklon & Zeyher 502* (MO, Px2, Sx2); *Marloth 388* (PRE); *Van der Walt 467* (STEU); Lion's Back (-CD), *Salter 6533, 6534* (BOL); Table Mountain (-CD), *Ecklon 605* (K, MO); *Ecklon s.n.* (P); Table Mountain & Devil's Peak (-CD), *Ecklon & Zeyher 501* (Sx2, SAM); Camps Bay (-CD), *Marloth 5613* (PRE); *Prior s.n.* (PRE, Z); Signal Hill (-CD), *Van der Walt 480, 661* (STEU); Cape Town (-CD), *Young s.n.* (PRE); Kalbaskraal (-DA), *Marais s.n.* (NBG, STEU); S of Klipheuwel (-DA), *Van der Walt 1026* (STEU); Paarl & Paarlberg (-DB), *Drège s.n.* (G, Px2, TCD); *Drège 7502* (P); Klein Drakenstein & Dal Josefats (-DB), *Drège s.n.* (BOL, E, G, K, MO, Px2, PRE, W); Wellington (-DB), *Thompson 27* (PRE); Tygerberg Nature Reserve (-DC), *Loubser 3472* (MO, NBG); Langverwacht (-DC), *Oliver 4807* (STE); N'dabeni (-DC), *Salter 8713* (BOL); Stellenbosch (-DD), *Duthie s.n.* (BOL); Jonkershoek (-DD), *Marloth 1838* (PREx2); Jonkershoek, Eerste Waterval (-DD), *De Kock 59* (STE); *Van der Walt 503* (STEU); Banhoek (-DD), *Marloth 10023* (PREx2); Lynedoch (-DD), *Pillans 10892* (MO, STE).

--3319 (Worcester): De Hoekvallei, Saron (-AA), *Compton 10049* (NBG); Visgat, Ceres (-AA), *Esterhuysen 13426* (BOL); Nuwekloof Pass (-AC), *Compton 12051* (BOL, NBG); Waterfall, Tulbagh (-AC), *Compton 12415* (NBG); Winterhoek, Tulbagh (-AC), *Ecklon & Zeyher 39* (PRE); Tulbagh (-AC), *Pappe 39* (TCD); Romansrivier, Wolseley (-AC), *Van der Walt 575* (STEU); Near Ceres (-AD), *Bolus 493* (BOL, E, G, P, PREx3, SAM, UPS, W, Z); *Bolus s.n.* (Z); 2 km N of Ceres on road to Prince Alfred Hamlet (-AD), *Cillie s.n.* (STEU); Michell's Pass (-AD), *Compton 10060* (NBG); *Fischer 337* (STEU); *Szyszyłowicz 2345, 2346* (Z); Mostertshoek Twins (-AD), *Esterhuysen s.n.* (PRE); Koekoedouwskloof, E end of Neethlingsberg (-AD), *Esterhuysen 22551* (BOL); Ceres (-AD), *Thode 3966* (STE); *Thode A2226* (PRE); W slope of Matroosberg (-BC), *Esterhuysen 14196* (BOL); W foot of Roodeberg, Hex River Mountains (-BC), *Esterhuysen 20919* (BOL); Hex River (-BC), *Fischer 207* (STEU); De Doorns (-BC), *Wisura 121* (NBG); Dutoitskloof (-CA), *Adamson 3577* (STE); W foot of Bailey's Peak (-CA), *Esterhuysen 22348* (BOL); Bainskloof (-CA), *Schlechter 9109* (Gx2, Z); *Stokoe SAM63205* (SAM); Gevonden (-CA), *Walters 907, 2386* (NBG); Veld of Karoo Garden, Worcester (-CB), *Bayer 261* (NBG); Worcester (-CB), *Fine 34* (PRE); Franschoek (-CC), *Bolus 4550* (NBG); La Motte, Franschoek (-CC), *Drijfhout s.n.* (STEU); Wemmershoek (-CC), *Esterhuysen 4086* (BOL, NBG);

*Lewis 1178* (SAM); Purgatory outspan, next to Du Toits River (-CC), *Hugo 2144* (STE); Haalsneekop (-CC), *Stokoe SAM57287* (SAM); 9 km on Koppies turnoff, Villiersdorp (-CD), *Marais 408* (STEU); Sandhills (-DA), *Van der Walt s.n.* (STEU).

--3320 (Montagu): 15 km SE of Constable Station (-AD), *Fischer 238* (STEU); Karoo Garden, Whitehill (-BA), *Compton 16382* (NBG); Matjiesfontein (-BA), *Lavranos 20889* (STEU); *Ward 44a* (STEU); 3 km N of Matjiesfontein (-BA), *Lavranos & Pehlemann 19742* (STEU); Whitehill (-BA), *Marais 97* (STEU); 88 km from Karoo Poort to Matjiesfontein (-BA), *Marais 393* (STEU); Hillandale, Matjiesfontein (-BA), *Marloth 11010* (PRE); Witteberge, 32 km SE of Konstabel (-BC), *Drijfhout 2663* (STEU); FM-tower Bantamskop, Matjiesfontein (-BC), *Van der Walt 819* (STEU); Pypsteelfontein, Waboomberge (-CA), *Maggs 44* (STEU); Waboomberge (-CB), *Compton 10291* (BOL, NBG); Witbooskloof, Langeberge (-DD), *Marais 388* (STEU).

--3321 (Ladismith): Cannaland, Gauritzrivier, Swellendam (-CD), *Ecklon & Zeyher 500* (Sx2); Dwars in die Weg, Ladismith (-DA), *Marloth 9845* (PRE).

--3322 (Oudtshoorn): 10 km E of De Rust (-BC), *Lavranos 20915, 20916* (STEU); Meiring's Poort (-BC), *Leipoldt s.n.* (BOL); 8 miles N of Robinson Pass (-CC), *Barker 7626* (NBG).

--3323 (Willowmore): Warm Baths, Olifantsrivier, Uniondale (-AC), *Fourcade 5047* (BOL-FOURCADE); Vaalkrans, SW of Willowmore (-AD), *Lavranos & Pehlemann 19832* (STEU); Uniondale (-CA), *Esterhuysen 19977* (BOLx2).

--3326 (Grahamstown): Grahamstown (-BC), *Rogers 27542* (Z).

--3419 (Caledon): Viljoen's Pass (-AA), *Rogers 28894* (SAM); Hermanus (-AD), *De Villiers NBG3305/32* (NBG); Between McGregor & Stormsvlei (-BB), *Esterhuysen 4295* (BOL); Riviersonderend (-BB), *Neethling s.n.* (BOL); *Schlechter 3289* (PRE); *Schlechter 9885* (BM, BOL, E, Gx3, K, L, MO, P, PRE, S, Z); 15 km from Bredasdorp to Heuningrug (-DB), *Fischer 282* (STEU).

--3420 (Bredasdorp): Stormsvleikloof (-AA), *Esterhuysen 4296* (BOL); 10 km E of Brakfontein (-AA), *Fischer 303* (STEU); Knoblauch farm (-AA), *Fischer 310* (STEU); Grootvadersbos, Swellendam (-BB), *Ecklon s.n.* (SAM); Cape Agulhas (-CC), *Leipoldt 4002* (BOL).

--3421 (Riversdale): Soetmelksrivier (-AB), *Bohnen 7374* (STE); Welgevonden, Herbertsdale (-BA), *Brits s.n.* (STEU).

## AURITUM GROUP

Geophytes with various leaf forms. Scape branched, bearing 2--7(-10) pseudo-umbellets with 3--15(-26) flowers each. Hypanthium short, 7--20 mm long. Petals 2 or 5, ligulate or sometimes spatulate, white, pink, wine-red or nearly black.