

CHAPTER 8

TAXONOMIC TREATMENT

Section Hoarea (*Sweet*) *DC.*, Prodrromus 1: 649 (1824); Loudon: 569 (1829); G. Don: 725 (1831); Harv.: 261 (1860); Benth. & Hook. f.: 273 (1862); Knuth: 320 (1912); Van der Walt: xiii (1977); Marais: 240, 241 (1989a).

LECTOTYPE: *Hoarea corydaliflora* Sweet, Geraniaceae. 1: t. 18 (1820), at present included in the synonymy of *P. rapaceum* (L.) L'Hérit. (Marais 1989a).

Genus *Hoarea* Sweet: viii (1820); Eckl. & Zeyh.: 60 (1835).

Genus *Dimacria* Sweet: viii (1820).

Section *Dimacria* (Sweet) *DC.*: 653 (1824); Loudon: 571 (1829); Don: 728 (1831).

Genus *Seymouria* Sweet: t. 206 (1824).

Section *Seymouria* (Sweet) Loudon: 573 (1829); Don: 731 (1831); Harv.: 271 (1860); Benth. & Hook. f.: 273 (1862); Knuth: 349 (1912); Van der Walt: xiii (1977).

Genus *Grenvillea* Sweet: t. 262 (1825).

Section *Grenvillea* (Sweet) G. Don: 731 (1831).

Deciduous geophytes with regularly shaped subterranean tubers with apically a dense crown of petiole remains, 80--500 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root with a short flattened stem, covered with flaking dark brown periderms, main tuber 10--150 mm long and 10--150 mm in diameter. **Leaves** radical, hysteranthous, rosulate, heteroblastic, petiolate; lamina simple, trifoliate, pinnate, irregularly bipinnatisect, or palmate-pinnate, 15--300 mm long, adaxially and abaxially with different types of glandular and non-glandular hairs (long soft patent hairs, appressed curly hairs, appressed stiff hairs, patent stiff hairs and bristles) and different combinations thereof, in all cases appressed non-glandular hairs are distally orientated; petiole 15--200 mm long, prostrate, erect or erecto-patent; stipules subulate, triangular or obtrullate, adnate to petioles with apices free, usually ciliate. **Inflorescence:** scape 10--300 mm long, 1--5 mm in diameter, unbranched with 1 pseudo-umbel or branched, bearing 2--9 pseudo-umbellets with 3--60 flowers each; peduncles 30--300 mm long, 1--3 mm in diameter, with different types of glandular and non-glandular hairs and different combinations thereof; bracts triangular or lanceolate;

flower buds, flowers and fruits erect. **Pedicel** 0,5--1 mm long. **Hypanthium** 6--100 mm long, green, reddish brown or greenish red, indumentum usually as on peduncle. **Sepals** 5, lanceolate, apices acute or attenuate, 5--15 mm long, 1--5 mm wide, all patent or all recurved or posterior one erect, others reflexed, green to pale reddish brown. **Petals** 2, 4 or 5, white, cream-coloured, pale yellow, yellow, pale pink, bright pink, or bright purple, claws forming a sheath; posterior two ligulate (14--42 mm long), spathulate (6--25--36 mm long), obovate or obcordate (17--34 mm long), with V-shaped or feather-like markings or prominent dark blotches, bases cuneate or narrowly cuneate, apices rounded, truncate or emarginate; anterior three spathulate or ligulate, bases attenuate, apices rounded, truncate or emarginate. **Stamens:** filaments 7, 8 or 10, basally connate, staminal column 1--5 mm long, white, pink or wine-red, smooth or papillate; perfect stamens 2, 3, 4 or 5, of different lengths, concealed within the floral sheath or protruding from the flower, white, pink or wine-red; staminodes 1--6 mm long; anthers pink, red or wine-red, 1--3 mm long, pollen white, pale pink, yellow or orange. **Gynoecium:** ovary superior, oblong-conical, 4--5-lobed, densely sericeous; style filiform, pale green, pink or wine-red; stigma with 5 branches. **Fruit:** a schizocarp consisting of 4--5 mericarps, bases of mericarps 4--8 mm long, with or without glandular hairs, tails 13--55 mm long.

Key to the floral groups

- | | | |
|----|--|--------------------------|
| 1a | All stamens shorter than the sepals | 2 |
| 1b | Anterior stamens or all stamens the same length or longer than the sepals | 3 |
| 2a | Posterior petals spathulate, length/width ratio of posterior petals smaller than five | |
| | | <i>Fissifolium</i> group |
| | | <i>Pinnatum</i> group |
| | | <i>Proliferum</i> group |
| 2b | Posterior petals ligulate, length/width ratio of posterior petals bigger than five | |
| | | <i>Fissifolium</i> group |
| | | <i>Attenuatum</i> group |
| 3a | Anterior stamens or all stamens the same length as the sepals | 4 |
| 3b | All stamens much longer than the sepals | 7 |
| 4a | Anterior petal conduplicate | <i>Rapaceum</i> group |
| 4b | Anterior petal not conduplicate | 5 |
| 5a | Anterior petals wider than the posterior ones, lateral and anterior petals enclose stamens | |
| | | <i>Luteolum</i> group |
| 5b | Anterior petals narrower than the posterior ones | 6 |

6a	All stamens more or less the same length, staminal column papillate	<i>Aurium</i> group	
6b	Obvious differences between the lengths of the posterior, lateral and anterior stamens	<i>Aciculatum</i> group	
		<i>Heterophyllum</i> group	
		<i>Incrassatum</i> group	
		<i>Luteum</i> group	
7a	Anterior petal conduplicate	<i>Rapaceum</i> group	
7b	Anterior petal not conduplicate		8
8a	Anterior petals wider than the posterior ones, lateral and anterior petals enclose stamens		
		<i>Luteolum</i> group	
8b	Anterior petals narrower than the posterior ones		9
9a	All stamens more or less the same length		10
9b	Obvious differences between the lengths of the posterior, lateral and anterior stamens		11
10a	Staminal column papillate	<i>Aurium</i> group	
10b	Staminal column smooth	<i>Triphyllum</i> group	
11a	Stamens straight	<i>Incrassatum</i> group	
		<i>Caroli-henrici</i> group	
11b	Stamens very long and curved upwards	<i>Punctatum</i> group	

FISSIFOLIUM GROUP

Geophytes with simple ovate leaves or pinnately compound to irregularly bipinnatifid leaves. Scape branched, bearing 2--5 pseudo-umbellets with 3--14 flowers each. Flowers with cream-coloured, pale yellow or pink, spatulate or ligulate petals. Stamens 5 fertile, much shorter than the sepals, concealed within the floral sheath. Tectum of pollen reticulate-striate. Basic chromosome number $x = 9$.

8.1 *Pelargonium aestivale* E.M. Marais, sp. nov. in sectione *Hoarea*, *P. fissifolio* affine.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napiforme vel elongatum, interdum moniliforme, 30--80 mm longum, 12--30 mm in diam. Folia hysterantha, rosulata, viridia, petiolata; lamina ovata vel ternata, integra vel serrata, 25--95 mm longa, 14--48 mm lata, utrinque hirsuta et glandulosa; petiolus 25--90 mm longus, prostratus, densim hirsutus et glandulosus, pilis adpressis; stipulae petiolo adnatae. Inflorescentia: scapus pseudoumbellis 2--4, utraque 3--8(-11) floribus. Pedicellum ca. 0,5 mm longum. Hypanthium 33--66 mm longum, hirsutum et glandulosum. Sepala 5, lanceolata, 6,5--11 mm longa, 1,5--3 mm lata, unum posterium erectum, cetera recurvata. Petala 5, crenea vel flava, dua

postica unguiculata spatulata, subtiliter carmineo rubra 14--25 mm longa, 3,5--6 mm lata, tria antica spatulata, 12--20 mm longa, 3,5--5 mm lata. **Stamina fertilia** 5, staminodia 5.

TYPE - Cape Province: " In clivis montosis prope Murraysburg." *Tyson* 328 (BOL, holotype; BM, K, SAM, Z).

A deciduous geophyte with a regularly shaped subterranean tuber, 120--200 mm tall when in flower. **Tuber**: a turnip-shaped or elongated, sometimes moniliform root with a short flattened stem, covered with flaking dark brown periderms, 30--80 mm long and 12--30 mm in diameter. **Leaves** radical, hysteranthous, rosulate, simple or ternate, green, petiolate; lamina ovate, apex acute, margin entire to serrate, revolute, 25--95 x 14--48 mm, adaxially and abaxially hirsute or sparsely hirsute with stiff hairs interspersed with short glandular hairs and long soft non-glandular hairs; petiole 25--90 mm long and 1--3 mm in diameter; prostrate, densely hirsute with short appressed hairs and sparsely interspersed with short glandular hairs; stipules subulate, adnate to petioles with apices free, 5 mm long and *ca.* 1 mm wide, ciliate. **Inflorescence**: scape 10--70 mm long, 1--3 mm in diameter, branched, bearing 2--4 pseudo-umbellets with 3--8(-11) flowers each; peduncles 35--85 mm long, 1--2,5 mm in diameter, densely hirsute with distally appressed curly hairs interspersed with long glandular hairs; bracts lanceolate, 4--8 mm long, 1,5--2 mm wide, abaxially hirsute with distally appressed hairs interspersed with glandular hairs; flower buds, flowers and fruits erect. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 33--66 mm long, pale green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6,5--11 mm long, 1,5--3 mm wide, posterior one erect, others reflexed, green to pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured to yellow, claws forming a sheath; posterior two with wine-red feather-like markings, unguiculate-spatulate, bases cuneate, apices emarginate, 14--25 x 3,5--6 mm; anterior three spatulate, bases attenuate, apices rounded, 12--20 x 3--5 mm. **Stamens** 10, basally connate, staminal column 1,5--2 mm long, white; perfect stamens 5, concealed within the floral sheath, posterior one 2--3,5 mm long, lateral two 3--4,5 mm long, anterior two 4--7 mm long, white; staminodes 2,5--3 mm long; anthers pink, 1,5--2 mm long, pollen orange. **Gynoecium**: ovary superior, oblong-conical, 5-lobed, 2,5--4 mm long, densely sericeous; style filiform, 0,5--2 mm long, pale green; stigma with 5 recurved branches, 1-2 mm long, adaxially wine-red. **Fruit**: a schizocarp consisting of 5 mericarps, bases of mericarps *ca.* 7 mm long, with glandular hairs, tails *ca.* 36 mm long. (Figure 8.1.1).

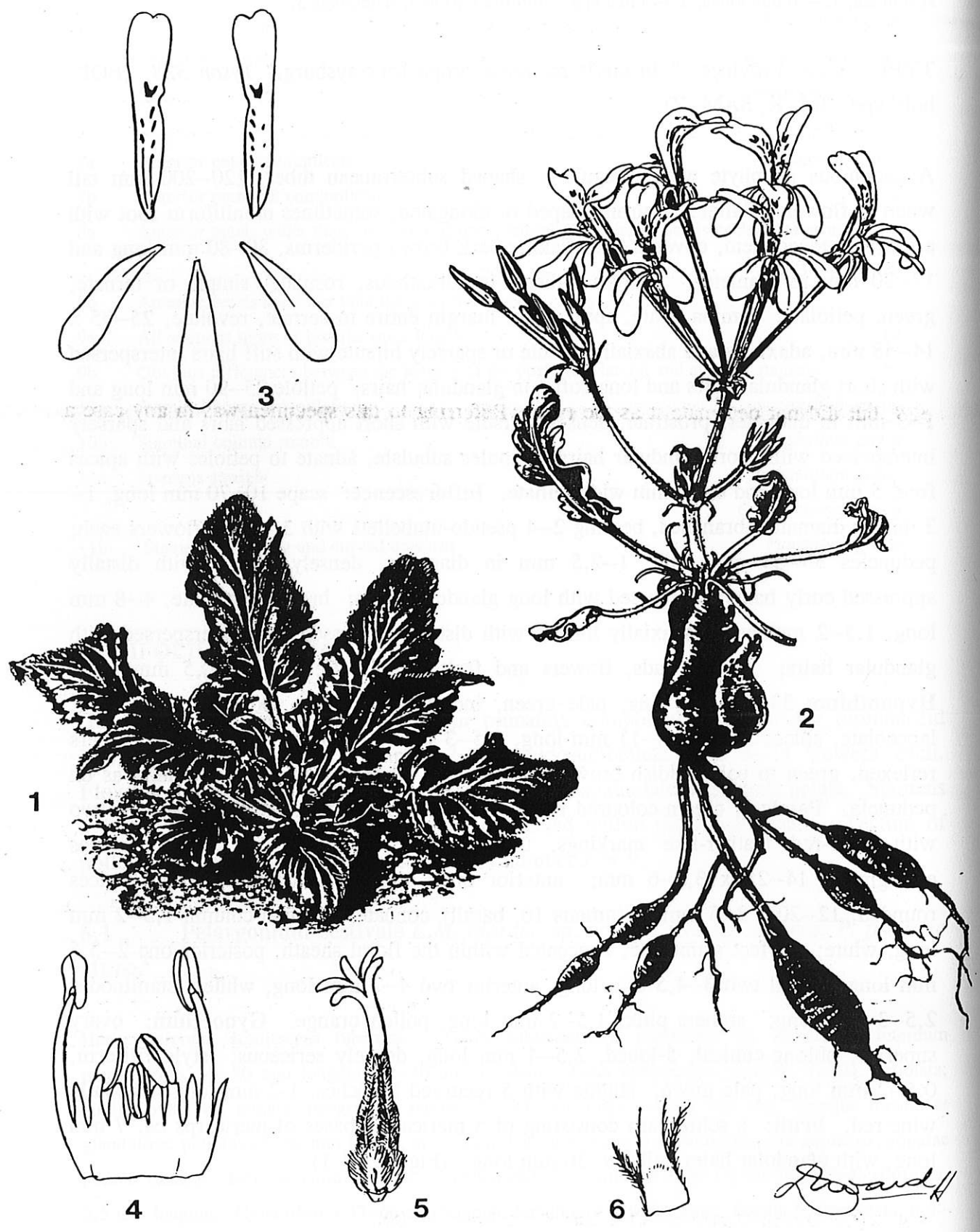


Figure 8.1.1 *Pelargonium aestivale*. 1, plant with leaves x1; 2, flowering plant x1; 3, petals x1,5; 4, androecium x5; 5, gynoecium x5; 6, leaf base x3.

Diagnostic features and affinities

P. aestivale is a geophyte with simple or ternate, prostrate leaves. The laminae are revolute and the margins entire to serrate. Furthermore, *P. aestivale* is characterized by the cream-coloured or yellow flowers with short stamens and very long hypanthia. The colour and structure of the flowers resemble those of *P. fissifolium*. However, leaves of *P. fissifolium* are usually irregularly bipinnatifid, although juvenile leaves could be simple or tripartite.

Leighton (1933) referred to the specimen *Tyson 328*, collected at Murraysburg, as the type of *P. tysonii* Szyszyl., and that a substitute name for *Geranium ciliatum* Cav. was necessary, because *P. ciliatum* L'Hérit. (1792), a synonym for *P. heterophyllum* Jacq. already existed. When renaming *G. ciliatum* Cav., Szyszylowics (1888) did cite *Tyson 328*, but did not designate it as the type. Referring to this specimen was in any case a misidentification, because it neither corresponds to the illustration accompanying Cavanilles's original description, nor agrees with the Thunberg specimen in Madrid herbarium on which *G. ciliatum* was based and which is the same as *P. proliferum*.

Geographical distribution and ecology

P. aestivale is one of the few species of section *Hoarea* occurring in the Great Karoo, and also one of the few species restricted to the summer rainfall area, hence the specific epithet *aestivale*. Its distribution area extends from Carnarvon and De Aar in the north to Klaarstroom, north of Meiring's Poort in the south and to Middelburg (C.P.) in the east (Figure 8.1.2), an area receiving an annual rainfall of 100--300 mm. Plants grow in karroid vegetation on rocky hillsides, but also on flat areas where they are locally common. According to herbarium records, flowering time is from September to December. This apparent long flowering season reflects the irregular start of the raining season. New leaves appear after early spring showers or any rain following a drought. Growing time is short and the flowering stage is reached soon. Thus early spring showers will bring an early flowering season or with later showers the flowering season will be delayed accordingly. Sometimes leaves are still present at this stage, but often flowers appear after the leaves have died.

Material studied

--3022 (Carnarvon): Carnarvon (-CC), *Hafström & Acocks 743* (S).

--3024 (De Aar): Poortjiesfontein, Hanover (-CD), *Du Toit 310* (PRE).

- 3123 (Victoria West): Murraysburg (-DD), *Tyson 328* (BM, BOL, K, SAM, Z).
- 3124 (Hanover): Vlakplaats, Richmond (-CB), *Bolus 13774* (BOL, BOL-FOURCADE); Leopard's Vlei, Richmond (-CB), *Watermeyer 20058* (BOL, K); Gordonville, Sneeuberge (-DA), *Acocks 16533* (PRE); Near Zuurpoort Hotel (-DD), *Bolus 1800* (BOL); Blaauwater, Sneeuberge (-DD), *Gill 65* (BOL); Sneeuberge (-DD), *Watermeyer s.n.* (BOL).
- 3125 (Steynsburg): Middelburg, N of College (-AC), *Van der Walt 1454* (STEU).
- 3223 (Rietbron): Rietfontein, between Murraysburg & Aberdeen (-BA), *Marais 146* (STEU).
- 3224 (Graaff Reinet): Doornbosch, in Koudeveldberge (-AA), *Oliver 5471* (STE).
- 3322 (Oudtshoorn): Klaarstroom (-BC), *Lavranos 20952* (STEU).

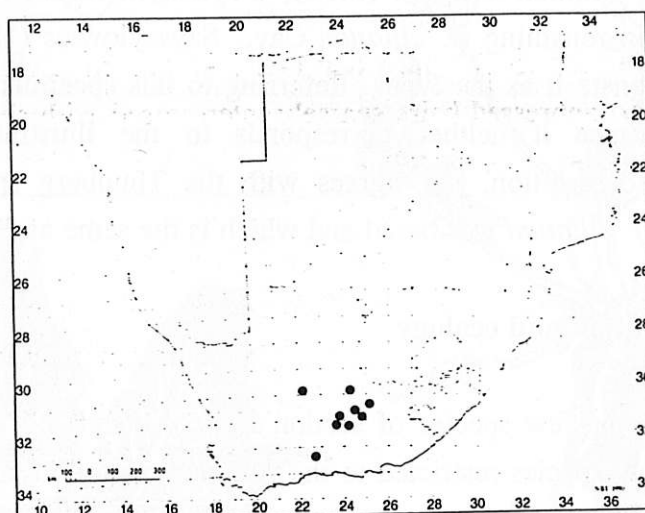


Figure 8.1.2 Geographical distribution of *P. aestivale*.

8.2 *Pelargonium fissifolium* (Andr.) Pers., Synopsis plantarum 2: 227 (1806); Ait. f.: 163 (1812); DC.: 652 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 728 (1831); Loudon: 271 (1832); Steud.: 678 (1840); Steud.: 286 (1841); Harv.: 270 (1860); Knuth: 342 (1912). ICONOTYPE: Andrews, The Botanist's Repository 6: t. 378 (1804b).

Geranium fissifolium Andr.: t. 378 (1804b); Poir.: 757 (1812). ICONOTYPE: Andrews, The Botanist's Repository 6: t. 378 (1804b).

Dimacria fissifolia (Andr.) Sweet: 77 (1826c).

Geranospermum fissifolium (Andr.) Kuntze: 94 (1891).

Geranium floribundum Andr.: t. 420 (1805a); ICONOTYPE: Andrews, The Botanist's Repository 6: t. 420 (1805a).

Pelargonium floribundum (Andr.) Ait. f.: 163 (1812); DC.: 652 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 728 (1831); Loudon: 271, 272 (1832); Steud.: 678 (1840); Steud.: 286 (1841); Harv.: 270 (1860); Knuth: 346 (1912).

Dimacria floribunda (Andr.) Sweet: 77 (1826c).

Geranospermum floribundum (Andr.) Kuntze: 94 (1891).

A geophyte 70--140 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, often moniliform root 15--45 mm long and 8--25 mm in diameter. **Leaves** green, petiolate; lamina varies from simple, trifoliolate, pinnately divided to irregularly bipinnatifid, cordate to elliptic in outline, 25--70 mm long, pinnae 8--25 mm long, sometimes deeply incised so that segments are laciniate, 1--3 mm wide, apices obtuse, sometimes ending in a single hair, hirsute or sparsely hirsute with long appressed hairs, sometimes glabrous; petiole 25--70 mm long and 1--2 mm in diameter, rigid, erecto-patent, hirsute with short appressed hairs sparsely interspersed with short glandular hairs and stiff non-glandular hairs; stipules subulate, adnate to the petioles for almost their full length, with apices free, 5--15 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 15--30 mm long, 1,5--2 mm in diameter, branched, bearing 2--5 pseudo-umbellets with 4--9(-14) flowers each; peduncles 20--60 mm long, 1--1,5 mm in diameter, hirsute with appressed curly hairs interspersed with long glandular hairs; bracts lanceolate, 4--5 mm long, 1--1,5 mm wide, abaxially hirsute, interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 28--65 mm long, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6--8,5 mm long, 1--2,5 mm wide, posterior one erect, others reflexed, green or pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured or pale yellow; posterior two with wine-red feather-like markings, spatulate, bases cuneate, apices obtuse to rounded or emarginate, 14--22 x 3,2--5,5 mm, length/width ratio smaller than 5; anterior three narrowly spatulate, bases attenuate, apices rounded, 11--18 x 2--4,5 mm. **Stamens:** staminal column 1--1,5 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2--3 mm long, lateral two 3--4 mm long, anterior two 5--6 mm long, white; staminodes 1--2 mm long; anthers pink, 1,5--2 mm long, pollen orange. **Gynoecium:** ovary 2--4 mm long; style 0,2--2 mm long, pink; stigma branches 1--1,5 mm long, wine-red. **Fruit:** bases of mericarps 4--6 mm long, with glandular hairs, tails 25--26 mm long. (Figure 8.2.1).

Diagnostic features and affinities

Although *P. fissifolium* can be described as a geophyte with pinnate to irregularly bipinnatifid leaves, the plants may exhibit a variation in leaf form. This may be due to



Figure 8.2.1 *Pelargonium fissifolium*. 1, flowering plant x1; 2, petals x2; gynoecium x 5; androecium x5.

the heteroblastic leaf development. Young plants usually have simple to trifoliolate leaves, whereas those of the older plants are bipinnatifid. This leaf development is an annual phenomenon, as the first leaves of the season are simple to pinnatifid and the younger ones pinnate to bipinnatifid. The pinnae are usually deeply incised and the segments lacinate, hence the specific epithet *fissifolium* or the common name of cleft-leaved geranium (Don 1831). The segments sometimes end in a single hair. The floral structure of *P. fissifolium* resembles that of *P. aestivale*, *P. aristatum* and *P. petroselinifolium*. The stamens of all four species are very short and concealed in the floral sheath. The former three species have pale yellow flowers with wine-red feather-like markings on the posterior petals. In the case of *P. aristatum* the petals are ligulate with the length/width ratio of greater than five, and those of *P. fissifolium* are spatulate with the length/width ratio of smaller than five. The flowers of *P. petroselinifolium* are pink, the petals are smaller and the hypanthia shorter than those of the other three species.

Geographical distribution and ecology

P. fissifolium is well established on the Roggeveld plateau and its distribution area extends to the Witteberge and the vicinity of Nougaspoot. It also occurs on the Koue Bokkeveld plateau and as far south as Worcester (Figure 8.2.2). This is mainly a winter rainfall area, receiving an annual precipitation of 200--300 mm. *P. fissifolium* grows in succulent karoo or transitional vegetation between succulent karoo and fynbos, and also in renosterveld, occurring on sandstone or shale in direct or partial sunlight. Plants usually occur in large populations, and flower from October to November.

Material studied

--3220 (Sutherland): Farm Geelhoek on Calvinia-Sutherland road (-AB), *Marais 238, 239* (STEU); Sutherland, 19 km on Ouberg road (-AD), *Marais 248, 249* (STEU); Kanolfontein on Ouberg road (-AD), *Marais 250* (STEU); Sutherland plateau, near Ouberg Pass (-AD), *Marais 251* (STEU); 6 km from Sutherland-Calvinia road, on Kariega turnoff (-BA), *Marais 235* (STEU); 20 km from Sutherland-Calvinia road, on Kariega turnoff (-BA), *Marais 236* (STEU); 2 km from Sutherland on Calvinia road (-BC), *Marais 227* (STEU); 4 km from Sutherland on Calvinia road (-BC), *Marais 228* (STEU); Klipplaat, at Kariega turnoff (-BC), *Marais 231, 232, 233, 234* (STEU); Sutherland, 3 km on the Ouberg turnoff (-BC), *Marais 244* (STEU); Sutherland, 7 km on the Ouberg turnoff (-BC), *Marais 247* (STEU); Matjiesfontein on the Sutherland-Merweville road (BD), *Forrester 236* (NBG); Kookfonteinberg, Tankwa Karoo (-CC), *Lavranos & Pehlemann 18831* (STEU); Thyshoogte (-CC), *Marais 219* (STEU); Komsberg

Pass (-DB), *Lavranos s.n.* (STEU); *Marais 142* (STEU); *Van der Walt s.n.* (STEU); Oranjefontein, Komsberg (-DB); *Van der Walt s.n.* (STEU).

-3319 (Worcester): Loch Lynne (AB), *Oliver 5182* (PRE, STE); Buffelskraal-Wes, De Doorns (-BC), *Forrester 130* (NBG); Between Moordhoogte & Kleinstraat, on N1 (-BD), *Marais 348* (STEU); Karoo Garden, Worcester (-CB), *Barker 4271* (NBG); *Bayer s.n.* (NBG); *Dobay 79, 86* (NBG); *Fairall & Whitlock s.n.* (NBG); *Fischer 133* (STEU); *Perry 791, s.n.* (NBG); *Van der Walt 1057* (STEU); Nature Reserve, Worcester (CB); *Olivier 196* (PRE); Lemoenpoort (-CD), *Perry 1230* (NBG).

-3320 (Montagu): *Jagerskraal* (-AB), *Bayer 3605* (NBG); Memorial, Laingsburg (-AB), *Van der Walt s.n.* (STEU); 15 km E of Lettaskraal (-AD), *Bayer 2625* (NBG); Bantams Karoo, Witteberge (-BC), *Compton 12153* (NBG); Foothills of Bantamskop, Witteberge (-BC), *Marais 354* (STEU); Nougaspoort, 34 km SE of Touwsrivier (-CA), *Drijfhout 2657* (STEU); Vandeventerskloof, between Touwsrivier & Montagu (-CA), *Marais 108* (STEU).

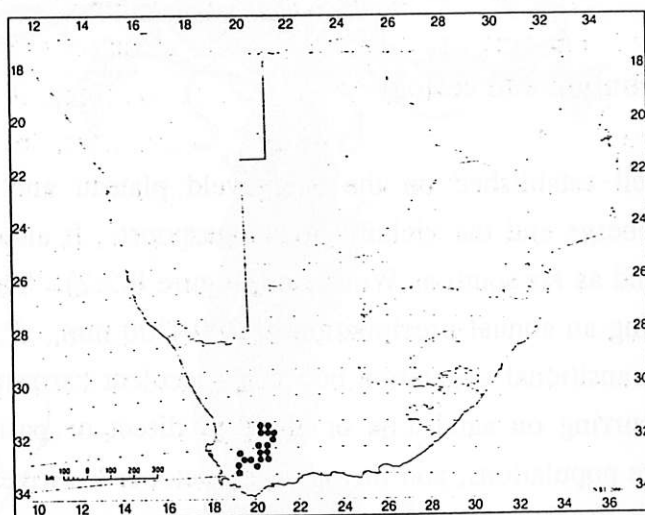


Figure 8.2.2 Geographical distribution of *P. fissifolium*.

8.3 *Pelargonium petroselinifolium* G. Don, A general system of gardening and botany 1: 728 (1831): substitute name for *Geranium apiifolium* Andr.: C, ic (1805b).
 ICONOTYPE: Andrews, Geraniums: C, ic (1805b).

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

Dimacria apiifolia (Andr.) Sweet: 77 (1826c).

Pelargonium apiifolium (Andr.) Loudon: 272 (1832); non J. Jacq.: t. 27 (1812).

Geranium pilosum Andr.: t. 259 (1802b); Andr.: C, ic (1805b); Poir.: 758 (1812); non Cav.: 273 (1788a). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 259 (1802b).

Pelargonium pilosum Pers.: 227 (15-11-1806); Ait. f.: 164 (1812); Link: 186 (1822) (excl. Willd.); DC.: 652 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 288 (1841); Harv.: 268 (1860); Knuth: 341 (1912); non F.G. Dietr.: 69 (May 1806).
 ICONOTYPE: Andrews, The Botanist's Repository 4: t. 259 (1802b).

Hoarea pilosa (Pers.) Sweet: 76 (1826c).

Geranospermum pilosum (Pers.) Kuntze: 95 (1891).

A geophyte 80--180 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 15--40 mm long and 10--30 mm in diameter. **Leaves** green, petiolate; lamina elliptic in outline, 30--60 mm long, pinnately compound, irregularly bipinnatifid, pinnae obtriangular, 12--18 x 6--10 mm, bases cuneate, apices deeply incised; segments 2--3 mm wide, apices obtuse, with or without a single hair, adaxially and abaxially hirsute with appressed hairs interspersed with short glandular hairs; petiole 30--50 mm long and 1--2 mm in diameter, rigid, erecto-patent, densely covered with very short curly hairs interspersed with short glandular hairs; stipules subulate, adnate to the petiole for half to almost its full length, 7--20 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 5--50 mm long, 1,5--3 mm in diameter, branched, bearing 2--5 pseudo-umbellets with (3-)5--8(-10) flowers each; peduncles 35--120 mm long, 1--2 mm in diameter, densely covered with short appressed curly hairs interspersed with long and short glandular hairs; bracts lanceolate, 2--4 mm long, 1,5--2 mm wide, abaxially hirsute with appressed hairs interspersed with short glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 13--25 mm long, green to pale reddish brown, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5,5--7 mm long, 1,5--2,5 mm wide, posterior one erect, others reflexed, green or pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, pink; posterior two with wine-red feather-like markings, ligulate to narrowly spatulate, bases cuneate, apices emarginate, 11--16,5 x 2,2--3,5 mm, length/width ratio 4--5; anterior three narrowly spatulate, bases attenuate, apices rounded, 10,5--14 x 2--3 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2--3 mm long, lateral two 3--5 mm long, anterior two 4--6 mm long, white; staminodes 1,5--3 mm long; anthers pink, 1,3--1,8 mm long, pollen orange. **Gynoecium:** ovary 2,5--3 mm long; style 0,5--1,5 mm long, wine-red; stigma branches 1--1,5 mm long, wine-red. **Fruit:** bases of mericarps 5--6 mm long, with glandular hairs, tails 27--28 mm long. (Figure 8.3.1).



Figure 8.3.1 *Pelargonium petroselinifolium*. 1, flowering plant x1; 2, petals x2; 3, androecium x4; 4, gynoecium x8.

Edward H

Diagnostic features and affinities

P. petroselinifolium is a geophyte with pinnate to irregularly bipinnatifid leaves. The pinnae are usually deeply incised, hence the specific name of parsley-leaved geranium. The morphology and the indumentum of the leaves resemble those of *P. aristatum* and *P. fissifolium*, but segments do not necessarily end in a single hair. The floral structures of these three species are also very similar. All of them have very short stamens which are concealed in the floral sheath. *P. petroselinifolium* has small pink flowers, whereas the other two have larger flowers with cream-coloured or pale yellow petals. All three species have wine-red feather-like markings on the posterior petals.

Geographical distribution and ecology

P. petroselinifolium has a small distribution area around Ceres and on the Koue Bokkeveld plateau, from Gydo in the west to Karoo Poort in the east (Figure 8.3.2). This is a winter rainfall area, receiving up to 1000 mm rain per annum. Plants grow in mountain fynbos or in karroid vegetation and flower during October and November.

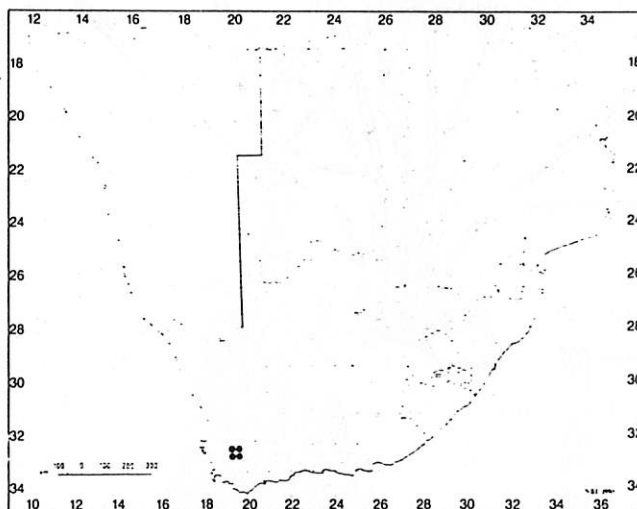


Figure 8.3.2 Geographical distribution of *P. petroselinifolium*.

Material studied

--3319 (Worcester): Die Erf, between Gydo & Baviaanshoek (-AB), *Marais 51* (STEU); Gydo (-AB), *Leipoldt 4003* (BOL); *Marais 65* (STEU); Ceres (-AD), *Bayliss 4033* (Z); 4 km N of Karoo Poort (-BA), *Lavranos & Pehlemann 17471* (STEU); On R46, at turnoff to Op-Die-Berg (-BC), *Forrester 499* (NBG); Karoo Poort side of Theronsberg Pass (-BC), *Perry 3059* (NBG).

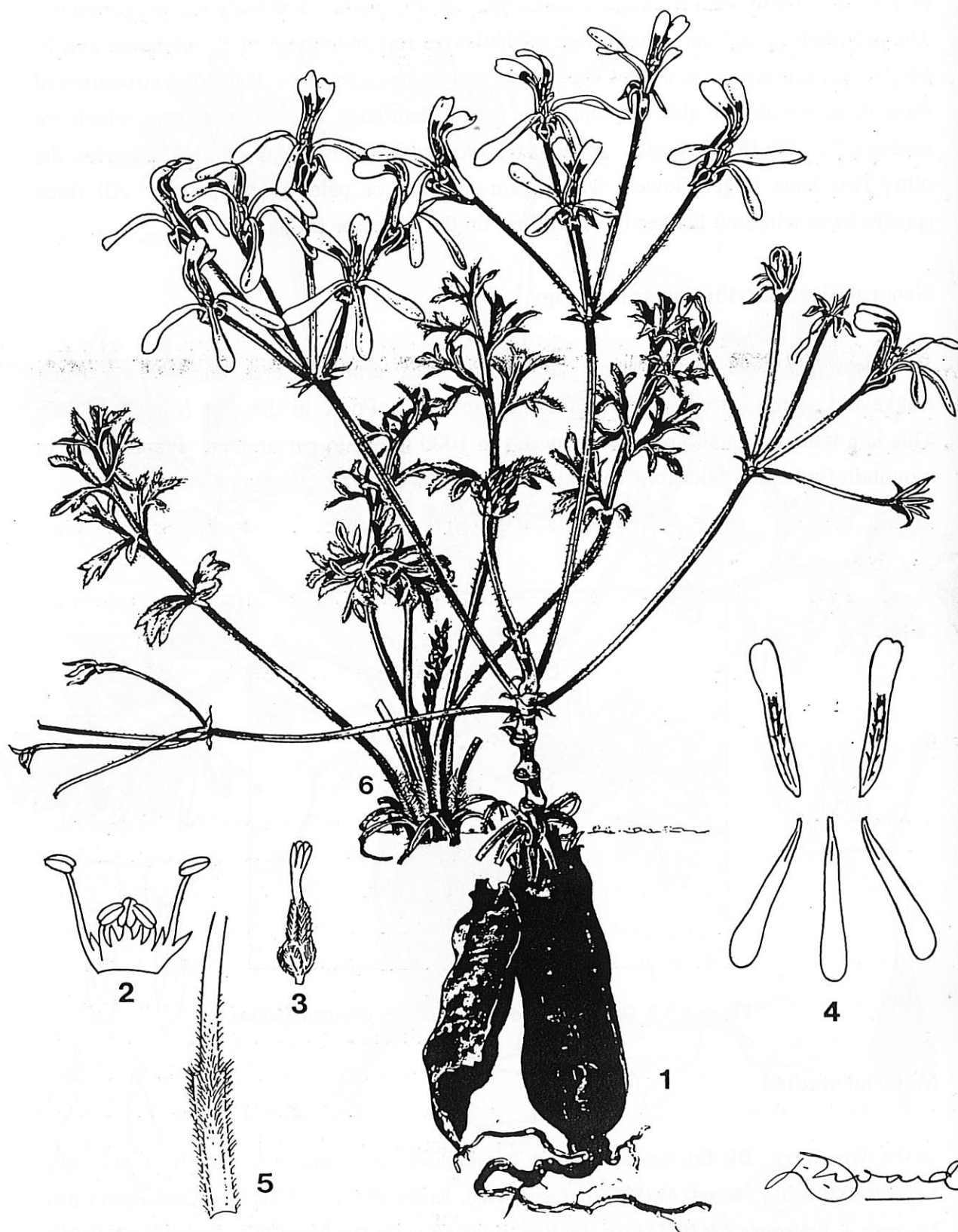


Figure 8.4.1 *Pelargonium aristatum*. 1, flowering plant x1; 2, androecium x3; 3, gynoecium x4; 4, petals x1,5; 5, leaf base x1,5; 6, plant with leaves.

Edward H.

8.4 **Pelargonium aristatum** (Sweet) G. Don, A general system of gardening and botany 1: 728 (1831): substitute name for *Geranium barbatum* var. *undulatum* Andr.: t. 366 (1804b); Loudon: 272 (1832); Steud.: 283 (1841). ICONOTYPE: Andrews, The Botanist's Repository 6: t. 366 (1804b).

Geranium barbatum var. *undulatum* Andr.: t. 366 (1804b). ICONOTYPE: Andrews, The Botanist's Repository 6: t. 366 (1804b).

Dimacria aristata Sweet: 77 (1826c): substitute name for *Geranium barbatum* var. *undulatum* Andr.: t. 366 (1804b).

Geranium barbatum Andr.: t. 303 (1803b). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 303 (1803b).

Dimacria barbata (Andr.) Sweet: 77 (1826c).

Pelargonium aristatum Steud.: 677 (1840): substitute name for *Geranium barbatum* Andr.: t. 303 (1803b).

Geranium barbatum var. *minor* Andr.: t. 323 (1803b). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 323 (1803b).

Dimacria recurvata Sweet: 77 (1826c): substitute name for *Geranium barbatum* var. *minor* Andr.: t. 323 (1803b).

Pelargonium recurvatum (Sweet) G. Don: 728 (1831); Steud.: 289 (1841); non Sweet: t. 223 (1824).

(*Pelargonium barbatum* Jacq. (1791b): see *P. proliferum* (Burm. f.) Steud.)

A geophyte 90--300 mm tall when in flower. **Tuber:** a turnip-shaped, sometimes moniliform root 20--40 mm long and 15--30 mm in diameter. **Leaves** green, petiolate; lamina elliptic in outline, 30--80 mm long, pinnately compound, irregularly bipinnatifid, pinnae 20--30 mm long, deeply incised, segments laciniate, 2--3 mm wide, apices obtuse, with a single hair or a tuft of hairs at the apices, sparsely hirsute with long appressed hairs; petiole 30--120 mm long and 1,5--2,5 mm in diameter, rigid, erecto-patent, hirsute with short appressed hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles with apices free, 7--8 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 5--120 mm long, 1,5--3 mm in diameter, branched, bearing 2--5(-8) pseudo-umbellets with 4--11 flowers each; peduncles 40--160 mm long, 1--2 mm in diameter, hirsute with appressed curly hairs interspersed with long glandular hairs with large heads; bracts lanceolate, 3--4 mm long, 1 mm wide, abaxially hirsute, interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 19--35 mm long,

indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5--10 mm long, 1--3 mm wide, posterior one erect, others reflexed, green or pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured or pale yellow; posterior two with wine-red feather-like markings, ligulate, bases cuneate, apices rounded or emarginate, 14--26 x 2--4 mm, length/width ratio greater than 5; anterior three narrowly spathulate, bases attenuate, apices rounded, 11,5--24 x 1,5--3 mm. **Stamens**: staminal column 1--1,5 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 1,5--3 mm long, lateral two 3--4 mm long, anterior two 4,5--6 mm long, white; staminodes 1,5--2 mm long; anthers pale pink, 1,5--2 mm long, pollen orange. **Gynoecium**: ovary 2--4 mm long; style 0,5--1,5 mm long, pale pink; stigma branches 1--2,5 mm long, pale pink. **Fruit**: bases of mericarps 4 mm long, with glandular hairs, tails 20--24 mm long. (Figure 8.4.1).

Diagnostic features and affinities

P. aristatum is a geophyte with pinnate to irregularly bipinnatifid leaves. The pinnae are usually deeply incised and the segments lacinate, ending in a single hair or a tuft or hairs, resembling an awn, thus the names bearded-leaved geranium (Andrews 1803b), awn-leaved Stork's bill (Don 1831) or the epithet *aristatum*. The floral structure of *P. aristatum* resembles that of *P. fissifolium*. The stamens of both species are very short and concealed in the floral sheath. Both species have pale yellow flowers with wine-red feather-like markings on the posterior petals, but the petals of *P. aristatum* are ligulate with the length/width ratio of greater than five, and those of *P. fissifolium* are spathulate with the length/width ratio of smaller than five. The leaves of these two species are also very similar.

Geographical distribution and ecology

P. aristatum occurs around Vanrhynsdorp, Nieuwoudtville and Calvinia (Figure 8.4.2), an area with an annual rainfall of 200--300 mm mainly in winter. It grows in full sun or partial shade in dry rocky areas in clay or loam, and on flats in Dwyka tillite. Flowering time is in October and November when leaves are fading or after they have dried.

Material studied

--3118 (Vanrhynsdorp): Near Vanrhynsdorp (-DA), *Marloth 7801* (PRE).

--3119 (Calvinia): 11 miles E of Nieuwoudtville (-AC), *Barker 9762* (NBG); 4 miles N of Nieuwoudtville (-AC), *Barker 10547* (NBG); 7 km from Nieuwoudtville to Brandkop (-AC), *Fischer 27a, 28* (STEU);

Nieuwoudtville, near turnoff on road to Rondekop (-AC), *Marais 126, 127* (STEU); Nieuwoudtville Nature Reserve (-AC), *Perry & Snijman 2382* (NBG); Saaikloof, Nieuwoudtville (AC), *Schonken 215* (STEU); 10 km N of Nieuwoudtville (-AC), *Van der Walt 1442* (STEU); Calvinia (-BD), *Thode A1885* (PRE); Near farm Rooiwal, 23 km S of Bo-Downes (-DB), *Snijman 770* (NBG); 14,2 miles along road from Middelpos (-DD), *Snijman 24* (NBG).

--3120 (Williston): 68 km from Calvinia on Blomfontein road to Middelpos (CC), *Goldblatt 4618* (MO).

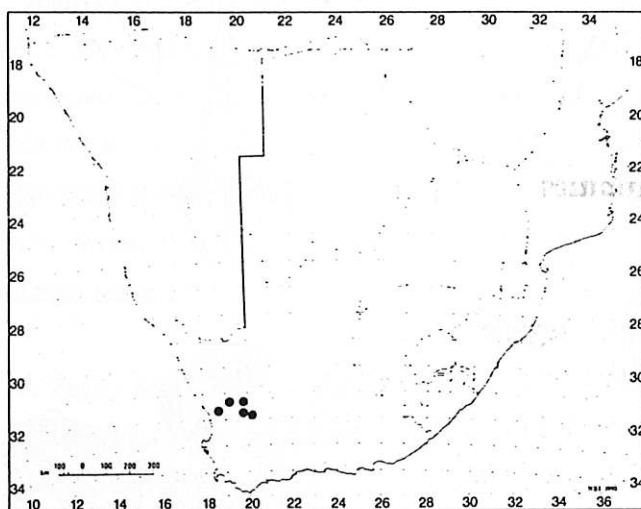


Figure 8.4.2 Geographical distribution of *P. aristatum*.

PINNATUM GROUP

Geophytes with simple, trifoliolate, pinnate, bipinnate or palmately compound leaves. Scape branched, bearing 2--8 pseudo-umbellets with 2--9(-17) flowers each. Flowers with white, cream-coloured, pale yellow pink or bright pink, spathulate petals; posterior petals 7--24 mm long, and length/width ratio smaller than five. Stamens 5 fertile, much shorter than the sepals, concealed within the floral sheath.

8.5 *Pelargonium chelidonium* (Houtt.) DC., Prodrumus 1: 650 (1824); G. Don: 726 (1831); Harv.: 265 (1860); Knuth: 334 (1912); Merrill: 349 (1938); Marais: t. 2018 (1990a). TYPE - "Planta Capensis", specimen in Collection Burman (G, holo! specimen with Houttuyn's handwriting).

Geranium chelidonium Houtt.: 8, t. 61, f. 1 (1779). TYPE - "Planta Capensis", specimen in Collection Burman (G, holo! specimen with Houttuyn's handwriting).

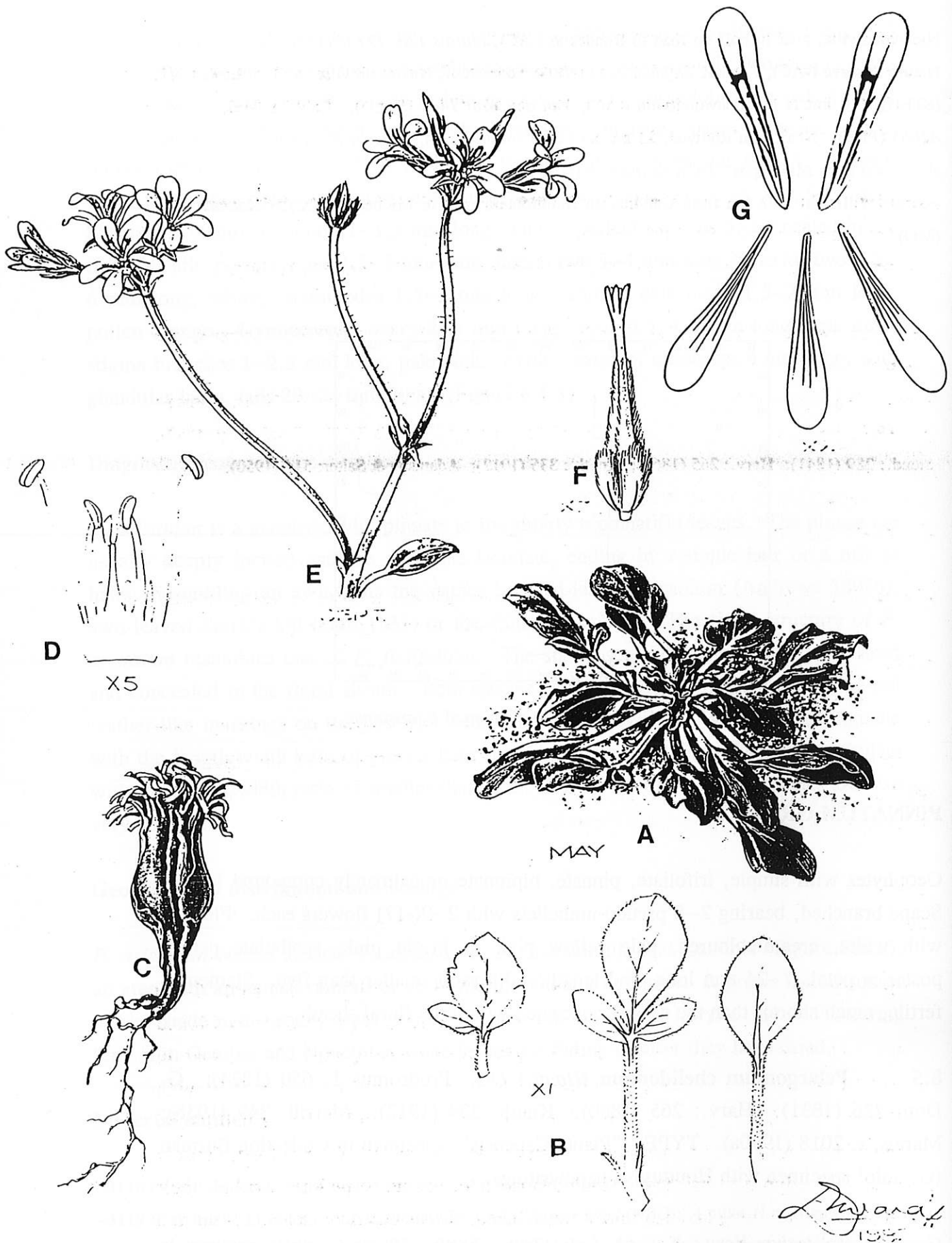


Figure 8.5.1 *Petargonium chelidonium*. A, plant with leaves x1; B, leaves x1; C, tuber x1; D, androecium x5; E, inflorescence x1; F, gynoecium x7; G, petal x2.

Geranospermum chelidonium (Houtt.) Kuntze: 94 (1891).

Pelargonium ficaria Willd.: 643 (1800): substitute name for *Geranium chelidonium* Houtt.: 8, t. 61, f. 1 (1779); Pers.: 226 (1806); Spreng.: 51 (1826); Steud.: 677 (1840); Steud.: 286 (1841).

Geranium ficaria (Willd.) Poir.: 745 (1812).

Geranium trilobum Thunb.: 114 (1800); Thunb.: 519 (1823). TYPE - "e. Cap. b. Spei", specimen in Thunberg herbarium, no. 15669 (UPS, holo!).

Pelargonium trilobum (Thunb.) DC.: 680 (1824); G. Don: 742 (1831); Steud.: 290 (1841).

Geranium revolutum Andr.: t. 354 (1804a); Poir.: 757 (1812). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 354 (1804a).

Pelargonium revolutum (Andr.) Pers.: 226 (1806); Ait. f.: 162 (1811); DC.: 651 (1824); Spreng.: 51 (1826); Loudon: 568 (1829); G. Don: 729 (1831); Loudon: 271, 272 (1832); Steud.: 679 (1840); Steud.: 289 (1841); Harv.: 265 (1860); Knuth: 335 (1912); Adamson & Salter: 514 (1950).

Dimacria revoluta (Andr.) Sweet: 77 (1826c).

Geranospermum revolutum (Andr.) Kuntze: 95 (1891).

Hoarea bijuga Eckl. & Zeyh.: 65 (1835). TYPE - Cape Province: "campestrium vallis `Tulbagh' prope `Kloof'", Ecklon & Zeyher 499 (S, lecto.!, here designated, MEL!, S!, SAM!).

Pelargonium bijugum (Eckl. & Zeyh.) Steud.: 290 (1841).

Pelargonium meyeri Harv.: 262 (1860) p.p. (teste Drège s.n. sub *P. ficaria* Willd.). TYPE - Cape Province: "Zwischen Eikenboom und Riebekkasteel", Drège s.n. (TCD, lecto.!, here designated, CGE!, E!, Gx2!, K!, MEL!, MO!, Px2!, S!).

Geranospermum meyeri (Harv.) Kuntze: 95 (1891) p.p.

Misidentifications:

Geranium auritum auct. non L.: Thunb.: 113 (1800); Thunb.: 515 (1823).

A geophyte 70--180 mm tall when in flower. **Tuber:** a turnip-shaped root 15--40 mm long and 8--20 mm in diameter. **Leaves** simple to trilobed or trifoliate to 5-lobed or 5-parted, bright green; lamina widely ovate, base cuneate, apex obtuse, margin entire, 18--30 mm long and 12--25 mm wide, adaxially glabrous, abaxially with bristles along main veins, margins usually with short adpressed bristles; small lateral pinnae widely ovate, 9 mm long and 5--6 mm wide; petiole 10--60 mm long, densely covered with adpressed bristles; stipules lanceolate, adnate to petioles for half their length, ca. 10 mm long and 1,5 mm wide, ciliated. **Inflorescence:** scape 20--90 mm long, branched, bearing 3--6 pseudo-umbelllets with 4--9 flowers each; peduncles 30-

-120 mm long, densely covered with glandular hairs interspersed with coarse hairs; bracts lanceolate, 5--8 mm long, 2--3 mm wide, adaxially and abaxially hirsute. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 9--16 mm long, densely covered with glandular hairs interspersed with soft hairs. **Sepals** 5, lanceolate, apices acute, 6--9 mm long, 1,5--3 mm wide, reddish brown to green, abaxially densely covered with glandular hairs and adpressed coarse hairs. **Petals** 5, bright pink, oblanceolate, bases cuneate, apices rounded, reflexed at 90°; posterior two with dark pink markings, 13--20 mm long and 3--5,5 mm wide; anterior three 12--19 mm long and 2,5--5 mm wide. **Stamens**: staminal column *ca.* 2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 4 mm long, lateral two 5 mm long, anterior two 7 mm long, pale pink; staminodes *ca.* 3 mm long; anthers pale pink, 1,5 mm long, pollen white. **Gynoecium**: ovary 4--5 mm long, densely sericeous and with glandular hairs; style 1--3 mm long, pink; stigma branches 1--1,5 mm long, pink. **Fruit**: bases of mericarps 5--8 mm long; with prominent glandular hairs, tails 25--30 mm long. (Figure 8.5.1).

Diagnostic features and affinities

P. chelidonium is a small geophyte with bright pink flowers and bright green leaves. The flowers with the oblanceolate petals and short stamens, concealed in the floral sheath, resemble those of *P. pinnatum*. The leaves of *P. chelidonium* vary from entire to trilobed or trifoliate to five-lobed or five-parted. A noteworthy feature of this species is the appressed bristles on the petioles and along the margins of the laminae. The leaf form resembles that of *P. tenellum* and *P. heterophyllum*. Although there is a great similarity in leaf form among these three species, the flowers are quite different. *P. chelidonium* has bright pink petals of more or less the same form and size, whereas in *P. tenellum* and *P. heterophyllum* the posterior petals differ in form and size from the anterior ones. *P. tenellum* has flesh-coloured flowers, whereas those of *P. heterophyllum* are white or cream-coloured with prominent wine-red blotches on the posterior petals.

In the original description Houttuyn (1779) mentioned that the leaves of *Geranium chelidonium* resemble "*speenkruid*", the Dutch name for pilewort (*Ranunculus ficaria* L.), a herb with kidney-shaped leaves and small tubers. According to Wittstein (1856), *Chelidonium* is an early name for *Ranunculus ficaria*. This may explain Houttuyn's choice of the epithet and also the name change by Willdenow (1800).

Geographical distribution and ecology

P. chelidonium grows in clay soil in renosterveld, on foothills or in open areas on dry flats. It occurs in the south-western Cape, from Clanwilliam in the north to Riebeeek-Kasteel in the south, and from Vredenburg in the west to Tulbagh in the east (Figure 8.5.2). This is mainly a winter rainfall area with an annual precipitation of 200 mm in the west to 600 mm in the east. Adamson and Salter (1950) regarded *P. revolutum*, i.e. *P. chelidonium*, as very rare and probably exterminated in the Cape Peninsula, but no herbarium record of a collection in the Cape Peninsula could be found except one, namely *Schlechter 512* in Bolus Herbarium, supposedly collected on the Kenilworth Flats. This record, as Adamson and Salter (1950) stated, is almost certainly false, an observation with which I agree.

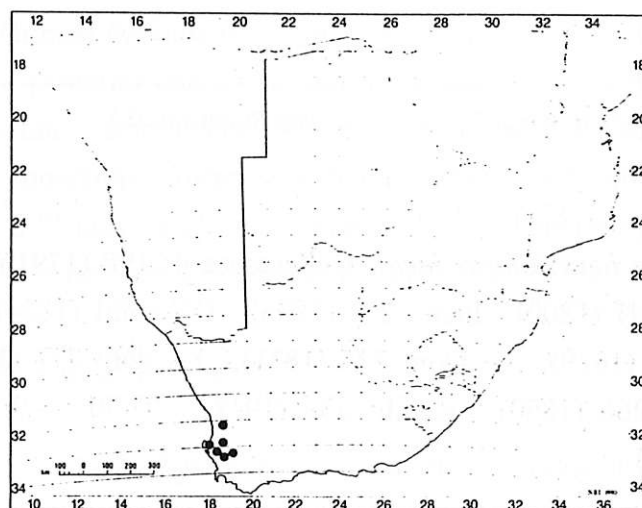


Figure 8.5.2 Geographical distribution of *P. chelidonium*.

Pelargonium chelidonium flowers in spring, from September to October and can be regarded as an early flowering species of the section *Hoarea*. In contrast with the majority of species in this section, the leaves are still present when the bright pink flowers appear. After fruit formation, the leaves and scapes die away and the plant reappears above ground level only after the first winter rains of the next season.

Material studied

--3218 (Clanwilliam): Near Clanwilliam (-BB), *Bolus 8949* (BOL); Driehoeksfontein, near Langebaanweg (-CC), *Boucher 3218* (STE); Near Piketberg (-DD), *Bolus 13526* (BM, BOL, PRE); *Edwards 212* (Z); *Guthrie 18* (NBG); *Visser s.n.* (STE).

--3318 (Cape Town): Near Hopefield (-AB), *Bachmann 1536* (Zx2); *Marloth 8263* (PRE); Lucasfontein near Moorreesburg (-BA), *Acocks 24389* (K, PRE); *Marais 261* (STEU); Near Moorreesburg (-BA), *Bolus 9953* (BOL, NH, Z); Eikenboom (-BD), *Drège 1248* (P); Between Eikenboom and Riebeek Kasteel (-BD), *Drège s.n.* (CGE, E, G, K, MEL, MO, P, S, TCD).

--3319 (Worcester): Saron (-AA), *Lewis 22059* (BOL); Tulbagh (-AC), *Esterhuysen 17490* (BOL); *Marloth 7480* (PRE); *Marloth 9568* (PRE, STE); *Meyer s.n.* (STE); *Pappe s.n.* (K, MEL, TCDx2); *Ross Frames s.n.* (BOL); Near Tulbagh and Tulbaghkloof (-AC), *Bolus 5375* (BOLx2); *Bolus 7539* (K); *Bolus s.n.* (STE); Tulbagh, near Kloof (-AC), *Ecklon & Zeyher 499* (MEL, Sx2, SAM); Artois, Tulbagh (-AC), *Compton 11679* (NBG); Kleinberg, Tulbagh (-AC), *Duthie s.n.* (BOLx3); Steintal, Tulbagh (-AC), *Ecklon & Zeyher 10* (PRE); *Ecklon & Zeyher s.n.* (PRE, STE); *MacOwan 512* (BOL, G, K, P, PRE, SAM, UPS, W); *MacOwan 2592* (SAM); *Pappe 10* (K, TCD); Tulbagh Road (-AC), *Guthrie 19* (NBG); Tulbagh Road, to Waterfall (-AC), *Oliver 4003* (K, PRE, STE); Bergrivier near Tulbagh (-AC), *Rubidge 6252* (BOL); Gouda (-AC), *Forrester 860* (NBG); *Leipoldt s.n.* (BOL); Wolsely (-AC), *Van Breda 556* (K, PRE); Elandsberg Private Nature Reserve (-AC), *Burgers 2920* (STE).

Specimens without localities:

Masson s.n. (BM); *Thunberg s.n.* (Gx2, Sx2, UPSx3); *Van Royen s.n.* (L).

8.6 *Pelargonium nervifolium* Jacq., *Collectanea* 4: 198 (1791b); *Jacq.*: 9, t. 517 (1792); *Willd.*: 647 (1800); *Pers.*: 227 (1806); *DC.*: 651 (1824); *Spreng.*: 52 (1826); *Loudon*: 568 (1829); *G. Don*: 726 (1831); *Loudon*: 271 (1832); *Steud.*: 288 (1841); *Harv.*: 266 (1860); *Knuth*: 336 (1912). TYPE - "Ex Promontorio bonae Spei" (W, holo!).

Geranium nervifolium (Jacq.) Poir.: 746 (1812).

Hoarea nervifolia (Jacq.) Sweet: 76 (1826c).

Geranospermum nervifolium (Jacq.) Kuntze: 95 (1891).

A small geophyte 80--130 mm tall when in flower. **Tuber**: a turnip-shaped or elongated root 20--70 mm long and 15--25 mm in diameter. **Leaves** simple, trilobate or trifoliate, petiolate; lamina (or main pinna) ovate, base cuneate or truncate, apex rounded or obtuse, margin entire to irregularly crenate, 20--35 x 15--25 mm, small lateral pinnae ovate, 8--12 x 3--4 mm, adaxially dark green, hirsute with appressed hairs interspersed with very short glandular hairs, abaxially reddish purple, veins usually very prominent, hirsute with appressed hairs interspersed with very short glandular hairs, with non-glandular hairs usually prominent along the veins, margins sometimes ciliate; petiole 30--130 mm long and 1--2 mm in diameter, prostrate to

erecto-patent, hirsute with appressed curly hairs interspersed with glandular hairs; stipules subulate, adnate to petioles for two thirds of their length, 3--12 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 15--70 mm long and 2--3 mm in diameter, branched, bearing 3--6(-9) pseudo-umbellets with 4--13(-17) flowers each; peduncles 10--30 mm long, 1--2 mm in diameter, covered with glandular hairs interspersed with appressed curly hairs; bracts lanceolate, 4--6 mm long, 1--3 mm wide, abaxially covered with glandular hairs. **Pedice**l *ca.* 0,5 mm long. **Hypanthium** 30--45 mm long, green, sparsely hirsute with appressed curly hairs interspersed with glandular hairs. **Sepals** 5, lanceolate, apices acute, 6--9 mm long, 1,5--3,2 mm wide, patent, green, indumentum abaxially as on peduncle. **Petals** 5, white, cream-coloured or pale yellow, claws forming a sheath and apices patent during anthesis; posterior two with pink or wine-red blotches in the centre, spatulate, bases cuneate, apices rounded or emarginate, 16--19 x 3,2--5 mm; anterior three spatulate, bases attenuate, apices rounded or emarginate, 13--17 x 3--5 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2--3,5 mm long, lateral two 4--5 mm long, anterior two 6--6,5 mm long, white; staminodes 2--3 mm long; anthers pink, 1,5--2 mm long, pollen yellow. **Gynoecium:** ovary 2,5--5 mm long; style 0,8--2 mm long, pink; stigma branches 0,8--2 mm long, pink. **Fruit:** bases of mericarps 5 mm long, with prominent glandular hairs, tails 22--25 mm long (Figure 8.6.1).

Diagnostic features and affinities

P. nervifolium is a small geophyte with prostrate to erecto-patent leaves. The abaxial side of the simple, trilobate or trifoliate laminae are usually reddish purple and the veins are usually very prominent, hence the specific epithet. The white, cream-coloured or pale yellow petals are spatulate and the five fertile stamens are shorter than the sepals. This floral structure is similar to that of *P. pinnatum* and *P. chelidonium*. In all three species the claws of the petals form a sheath in which the stamens are concealed, and the apices of the petals are patent during anthesis. There are also similarities in the leaf structure of *P. chelidonium* and *P. nervifolium*. The petioles of *P. nervifolium* are usually long and often erecto-patent, whereas those of *P. chelidonium* are short and always prostrate.

Geographical distribution and ecology

P. nervifolium occurs on the south-western escarpment, from Calvinia in the north to Karoo Poort in the south, and to Sutherland and Matjiesfontein in the east (Figure

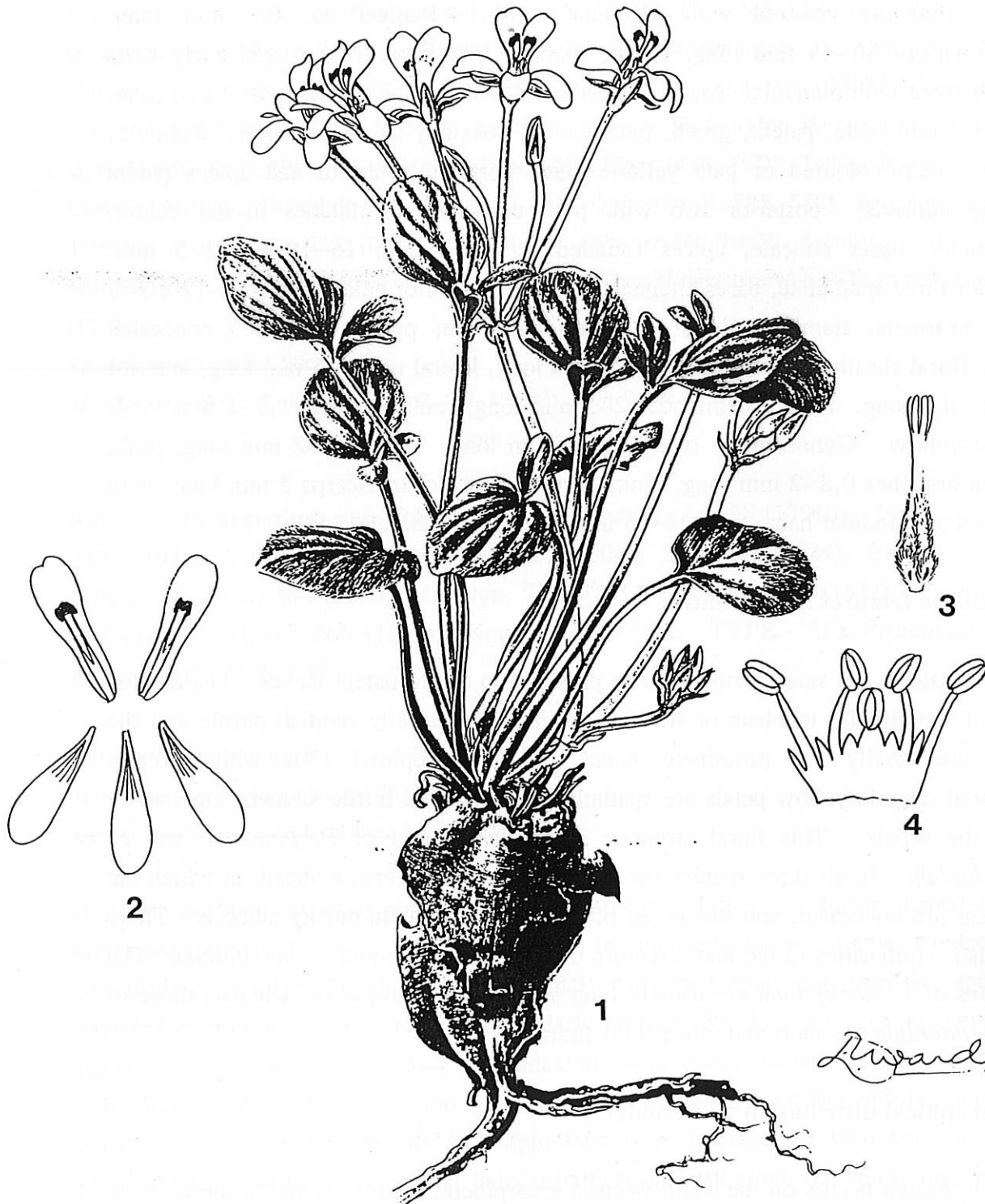


Figure 8.6.1 *Pelargonium nervifolium*. 1, flowering plant x1; 2, petals x1,5; 3, gynoecium x5; 4, androecium x4.

8.6.2). This area receives an annual rainfall of 100--300 mm, which occurs mainly during the winter months. *P. nervifolium* grows in stony clay soil, quartzite areas or dolorite hillsides in low and open karroid vegetation. Plants usually occur in direct sunlight. The leaves of plants collected under these field conditions are usually reddish purple on the abaxial side and the tubers are covered with exceptionally many layers of flaking periderms. This serves probably as an insulation layer against the high summer temperatures of this area. *P. nervifolium* is one of the early flowering species of section *Hoarea*, and flowers in September and October before the leaves wither.

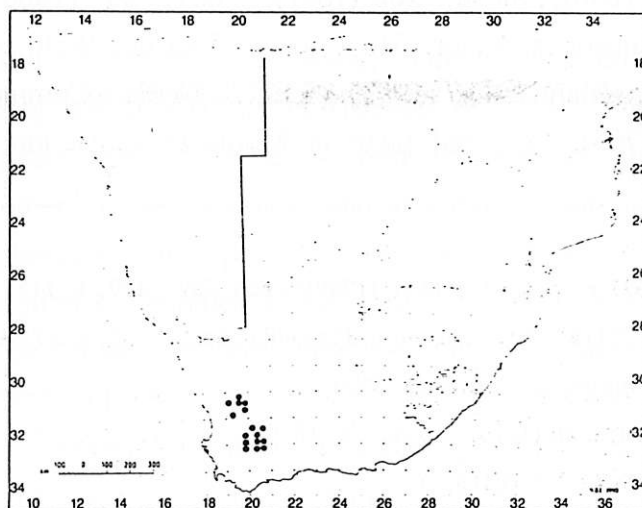


Figure 8.6.2 Geographical distribution of *P. nervifolium*.

Material studied

--3119 (Calvinia): Oorlogskloof & Papkuilsfontein (-AC), *Leipoldt* 3078 (BOL); Witkleigat (-BA), *Marais* 276 (STEU); 7 miles W of Calvinia (-BC), *Leighton* 3196 (BOL); 20 km from Calvinia on the road to Loeriesfontein (-BC), *Marais* 274 (STEU); Akkerendam, Calvinia (-BD), *Barker* 9504 (NBG); *Bayer* 1856 (NBG); Calvinia (-BD), *Thode* A1885 (PRE, STE); 17 miles N of Botterkloof (-CD), *Johnson* 565 (NBG); Menzieskraal, between Botterkloof & Calvinia (-DB); *Lewis* 4066 (SAM).

--3219 (Wuppertal): Ceres Karoo (-DB), *Compton* 3811 (BOL, NBG); Beukesfontein (-DD), *Wisura* 3507 (NBG).

--3220 (Sutherland): Tankwa-Karoo, Sutherland to Onder-Karoo road (-AC), *Marais* 253 (STEU); Sutherland (-BC), *Leipoldt* s.n. (BOL); 47 miles S of Sutherland (-CB), *Leighton* 3184 (BOL); Sutherland-Ceres road, farm Windheuwel (-CD), *Marais* 334 (STEU); Oranjefontein, Komsberg (-DC), *Van der Walt* s.n. (STEU).

--3319 (Worcester): Inverdoorn farm (-BB), *Forrester 494* (NBG); *Marais 141* (STEU); 15 km N of Karoopoort (-BB), *Hall s.n.* (BOL).

--3320 (Montagu): Patatsrivier (-AB), *Esterhuysen 23526* (BOL, K); *Lavranos & Pehlemann 18999* (STEU); 7 km from Matjiesfontein, on Sutherland road (-BA), *Marais 145* (STEU); Matjiesfontein (-BA), *Marloth 9581, 10753* (PRE); Dwars in die Weg, near Matjiesfontein (-BA), *Marloth 10789* (PRE).

8.7 *Pelargonium pinnatum* (L.) L'Hérit. in Aiton, Hortus Kewensis edn 1, 2: 417 (1789); L'Hérit.: t. 8 (1792); Willd.: 647 (1800); Sims: t. 579 (1802); Pers.: 227 (1806); Dietr.: 48 (1807) (excl. ref. Andr.); Ait. f.: 163 (1812) (excl. ref. Andr.); Steud.: 679 (1840); Steud.: 288 (1841); Harv.: 269 (1860) p.p.; Knuth: 346 (1912) p.p.; Adamson & Salter: 513 (1950); Van der Walt: 34 (1977) p.p.; Wijnands: 108 (1983); Marais: 126 (1993). LECTOTYPE: Commelijn, *Praeludia botanica*: 53, t. 3 (1703); original plate in Moninckx collection in Amsterdam (Wijnands 1983).

Geranium pinnatum L.: 677 (1753); L.: 1141 (1759); non Cav.: 257, t. 115, f. 2 (1787); nec Andr.: t. 311 (1803b). LECTOTYPE: Commelijn, *Praeludia botanica*: 53, t. 3 (1703); original plate in Moninckx collection in Amsterdam (Wijnands 1983).

Dimacria pinnata (L.) Sweet: t. 46 (1820); Sweet: 76 (1826c).

Hoarea pinnata (L.) Eckl. & Zeyh.: 64 (1835).

Geranospermum pinnatum (L.) Kuntze: 95 (1891).

Geranium prolificum var. *pinnatum* (L.) L.: 950 (1763).

Geranium astragalifolium Cav.: 257, t. 104, f. 2 (1787); Jacq.: t. 511 (1789); Jacq.: 184 (1791b); J.F. Gmelin: 1025 (1792); Thunb.: 116 (1800); Andr.: C. ic (1822); Thunb.: 527 (1823); non Andr.: t. 190 (1801b). LECTOTYPE: Commelijn, *Praeludia botanica*: 53, t. 3 (1703), here designated.

Pelargonium astragalifolium (Cav.) Jacq.: 8 (1795); Pers.: 227 (1806) (excl. ref. Andr.); DC.: 653 (1824) (excl. ref. Sweet & Andr.); Spreng.: 52 (1826); G. Don: 782 (1831) (excl. ref. Sweet & Andr.); Steud.: 677 (1840); Steud.: 283 (1841) (excl. ref. Sweet); Harv.: 268, 269 (1860) p.p.; Szyszyl.: 9 (1888); Knuth: 345 (1912) p.p.

Hoarea astragalifolia (Cav.) Eckl. & Zeyh.: 64 (1835).

Geranospermum astragalifolium (Cav.) Kuntze: 94 (1891).

Hoarea lessertiaefolia Eckl. & Zeyh.: 64 (1835). TYPE - Cape Province, ' .lateris orientalis montis "Tafelberg" prope "Constantiam". . ' *Ecklon & Zeyher 495* (S!, lecto, designated here; SAM!).

Pelargonium lessertiaefolium (Eckl. & Zeyh.) Steud.: 287 (1841).

Hoarea ornithopifolia Eckl. & Zeyh.: 64 (1835). TYPE - Cape Province, .'. . in latere orientali montis "Tafelberg" non procul a "Constantia". .'. *Ecklon & Zeyher 496* (S!, lecto, designated here; L!; MO!; OXF!; S!; SAM!). (Specimens in L 9920 143, B & W are *P. trifoliolatum* (Eckl. & Zeyh) E.M. Marais.)

Pelargonium ornithopifolium (Eckl. & Zeyh.) Steud.: 288 (1841).

Misidentifications

Geranium pinnatum sensu Burm. f.: 49 (1759) = *P. trifoliolatum*; *G. pinnatum* sensu Cav.: 257, t. 115, f. 2 (1787) = *P. viciifolium* DC.; *G. pinnatum* sensu Andr.: t. 311 (1803b) = *P. viciifolium*.

A geophyte 110--300 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root 12--40 mm long and 10--30 mm in diameter. **Leaves:** lamina pinnate, 25--70 mm long, pinnae ovate, acute, 5--12 x 3--6 mm, the terminal pinna more or less the same size as the other pinnae, adaxially and abaxially hirsute with appressed hairs interspersed with glandular hairs; petiole 25--80 mm long and *ca.* 1 mm in diameter, indumentum as on pinnae; stipules 15--30 mm long and 1,5--2 mm wide, hirsute. **Inflorescence:** scape (25-)40--180 mm long, 1--2 mm in diameter, branched, bearing 2--4 pseudo-umbellets with (2-)4--8 flowers each; peduncles 25--140 mm long, 1,5--2 mm in diameter, densely hirsute with distally appressed curly hairs interspersed with long soft patent hairs and glandular hairs; bracts narrowly triangular, 2--6(-9) mm long, 1 mm wide, abaxially hirsute with distally appressed hairs. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 11--35(-45) mm long, covered with distally appressed curly hairs, interspersed with glandular hairs. **Sepals** 5, lanceolate, apices acute, 6--11 mm long, 1,2--3,5 mm wide, posterior one erect, others recurved, indumentum abaxially as on peduncle. **Petals** 5, white, cream-coloured, yellow, pale pink to salmon-pink or bright pink or deep purple, claws orientated close together forming a floral sheath, apices patent during anthesis; posterior two with feather-like wine-red markings, spatulate, bases cuneate, apices rounded to emarginate, 11--24 x 3--10 mm, claws 9--14 mm long; anterior three spatulate, bases attenuate, apices rounded, 10--23 x 2--5,5 mm. **Stamens:** staminal column 0,5--2,5 mm long, white; perfect stamens 5, concealed in floral sheath, posterior one 1,5--4 mm long, lateral two 2,5--5,5 mm long, anterior two 4,5--7 mm long, white; staminodes 1,5--3,5 mm long; anthers pink, 1--2,5 mm long, pollen orange. **Gynoecium:** ovary 2,5--4 mm long; style 0,3--1,5 mm long, red; stigma branches 1--2,5 mm long, dark pink. **Fruit:** bases of mericarps 5--6 mm long, without glandular hairs, tails 23--28 mm long (Figure 8.7.1).



Figure 8.7.1 *Pelargonium pinnatum*. A, flowering plant x1; B, petals x1,5; C, androecium x3; D, gynoecium x5; E, stipules x1.

R. Broad

Diagnostic features and affinities

P. pinnatum is a geophyte with pinnate leaves, hence the specific epithet. The flowers have spatulate petals with wine-red feather-like markings on the posterior two and the length/width ratio of the posterior petals is usually smaller than five. The stigma branches are always longer than the style and the anterior stamens are shorter than the calyx and hidden in the floral sheath. The scape is branched, bearing two to five pseudo-umbellets with four to eight flowers each. *P. pinnatum* shows variation in the length of the hypanthia and the width of the petals; as a result some plants have very large flowers. Specimens with very long hypanthia (33--45 mm) were collected in the southern Cape, especially in the Riversdale area, but also in the Cape Peninsula. Plants with very long hypanthia do not necessarily have large petals.

P. pinnatum has similar pinnate leaves to *P. viciifolium* and *P. trifoliolatum*. However, the floral structures of the three species differ. Both *P. pinnatum* and *P. viciifolium* have short stamens and feather-like markings on the posterior petals, whereas *P. trifoliolatum* has longer stamens and very prominent blotches on the posterior petals (Marais 1993). *P. pinnatum* has spatulate petals, whereas the petals of *P. viciifolium* are ligulate.

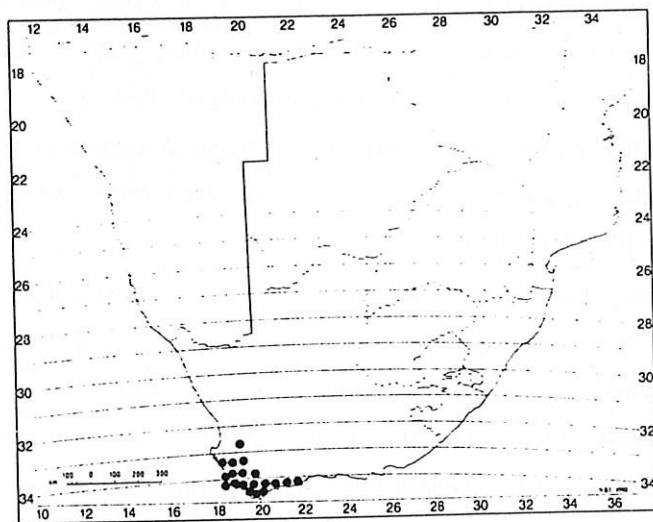


Figure 8.7.2 Geographical distribution of *P. pinnatum*.

Geographical distribution and ecology

P. pinnatum occurs in the south-western Cape Province, from the Cederberg in the north to Albertinia in the east (Figure 8.7.2), an area with an annual rainfall of 400--

600 mm occurring mainly in winter. Populations of *P. pinnatum* are formed by plants occasionally scattered amongst shrubs in different types of soil. It occurs in coastal fynbos, coastal renosterveld or in grassveld in sandy soil, rocky outcrops, well-drained humus-rich loam or shale and clay soils. The peak of the flowering time throughout the distribution area is from November to January, but in the southern Cape flowers are quite common until March.

Material studied

--3219 (Wuppertal): Apollo Peak, Cederberg (-CA), *Esterhuysen 25492* (BOL); Middelberg, 7 km E of Citrusdal (-CA), *Muller s.n.* (STEU).

--3318 (Cape Town): Contreberg farm, Darling (-AD), *Marais 32* (STEU); Modderasvlei, Riebeeek-Kasteel (-BD), *Drijfhout 1625* (STEU); Devil's Peak, Cape Peninsula (-CD), *Baker s.n.* (BOL); *Esterhuysen 20836* (BOL); *Szyszyłowics 1126* (BM, Z); *Szyszyłowics 1127* (Z); Table Mountain (-CD), *Ecklon 604* (PRE, W); *Ecklon & Zeyher 492* (P, Sx2, SAM); *Ecklon & Zeyher 498* (L, OXF, Sx2, SAM); *Marloth 386* (PRE); *Prior s.n.* (K, PRE); Lion's Head (-CD), *Dummer 849* (E); *Ecklon 603* (E, MO, PRE, Wx2); *Ecklon & Zeyher 497* (Sx2, SAM); Little Lion's Head (-CD), *Hall 2231* (NBG); Lion's Rump (-CD), *Salter 6535* (BOL); Signal Hill (-CD), *Van der Walt 662* (STEU); Table Mountain above Kirstenbosch (-CD), *Esterhuysen 22394* (BOL); *Gillett 3328* (STE); *Wisura 941* (NBG); Oranjezicht (-CD), *Marloth 5615* (PRE); Rocks above Camps Bay (-CD), *Marloth 8400* (PRE); Pipe Track, Cairn Ravine, Table Mountain (-CD), *McKinnon s.n.* (STE); Klaasenskop, Table Mountain (-CD), *McKinnon s.n.* (STE); Kanonkop, Dassenberg (-DA), *Boucher 4392* (STE); Tygerberg Nature Reserve (-DC), *Loubser 3459* (MO); Tygerberg (-DC), *Salter 1819* (BOL); Between Bottelary & Stellenbosch (-DD), *Bolus s.n.* (BOL); Joubert's Peak, Simonsberg (-DD), *Buys 88* (STEU); Simonsberg (-DD), *Salter 241/17* (BM); Lower slopes of Stellenbosch Mountain (-DD), *Garside 1192* (K); Jakkalsvlei, Jonkershoek (-DD), *Taylor 4588* (PRE, STEx2); Langrivier, Jonkershoek (-DD), *Van der Walt 510* (STEU).

--3319 (Worcester): Michell's Pass (-AD), *Fischer 338* (STEU); Dutoiskloof (-CA), *Drège 7500* (BOL, E, MO, PRE, S, W); *Esterhuysen 20994* (BOL, PRE); *Van der Walt s.n.* (STEU); Vondeling, W slope of Groenberg (-CA), *Marais 381* (STEU); SW slopes of Seven Sisters Mountain (-CC), *Esterhuysen 18310* (BOL, PRE); Top of Franschoek Pass (-CC), *Hafström & Acocks 1974* (BOL, PRE); Franschoek Pass (-CC), *Schonken 209* (STEU); Amandelrivier between Franschoek and Villiersdorp (-CC), *Hugo s.n.* (STEU); Haelhoeksneekop (-CC), *Stokoe s.n.* (SAM 56879); Rooihoogte N of Villiersdorp (-CD), *Marais 407* (STEU); McGregor, end of unfinished pass (-DD), *Van der Walt 1562* (STEU).

--3418 (Simonstown): Muizenberg (-AB), *Bolus 3068* (BOL, SAM, Z); Constantia Mountain (-AB), *Compton 8237* (NBG); Table Mountain near Constantia (-AB), *Ecklon & Zeyher 495* (Sx2, SAM); Constantia Corner (-AB), *Pillans 10818* (MO, UPS); *Salter 9542* (BM); Constantia Nek (-AB), *Salter*

6394 (BOL); *Wolley Dod* 343 (K); Kommetjie (-AB), *Compton* 12597 (NBG); Silvermine (-AB), *Compton* 14281, 16619 (NBG); Chapman's Peak (-AB), *Compton* 15429 (NBG); Kalk Bay Mountains (-AB), *Fuller s.n.* (E); *Grosvenor* 69 (SRGH); *Moss* 2997 (K); *Wall* 627/55 (MO); *Wolley Dod* 2160 (K); Hout Bay (-AB), *Harvey* 666 (BM, E, K); Simon's Bay (-AB), *MacGillivray* 467 (K); Simonstown (-AB), *Salter* 242/01 (BM); Vlakkenberg (-AB), *Pillans s.n.* (PRE); *Salter* 1908 (BOL); *Salter* 2909 (BM, BOL, K); Peck's Valley (-AB), *Salter* 1887 (BM, K); *Salter* 2940, 3595 (BOL); Foot of Steenberg (-AB), *Salter* 5721 (BOL); 1 mile W of Brakkloof, Vishoek (-AB), *Salter* 7903 (BOL); Orange Kloof (-AB), *Wolley Dod* 2168 (K); Steenbras (-BB), *Bolus s.n.* (BOL); Helderberg (-BB), *Galpin* 12313 (K, PRE); *Marais* 289, 349 (STEU); *Salter* 4233 (BOL); Sir Lowry's Pass (-BB), *Goldblatt* 6731 (NBG); *Lewis* 1085 (SAM); Koeëlbaai Valley (-BD), *Boucher* 961 (STE); N slopes of Klein Hangklip (-BD), *Boucher* 1438 (STE); Rooi Els (-BD), *Compton* 23240 (NBG).

--3419 (Caledon): Grabouw, near Palmiet River (-AA), *Bolus s.n.* (BOL); Elgin (-AA), *Compton* 16522 (NBG); Between Villiersdorp & Viljoen's Pass (-AA), *Esterhuysen* 4312 (BOL); T-junction, Theewaterkloof Dam (-AA), *Marais* 385, 405 (STEU); Viljoen's Pass (-AA), *Rogers* 28836 (SAM); *Strey* 2960 (PRE); *Van der Walt* 1558, 1578 (STEU); Arieskraal, Elgin (-AA), *Van Jaarsveld & Sardien* 7687 (NBG); Houwhoek Pass (-AA), *Vorster* 2905 (STEU); Caledon (-AB), *Bolus s.n.* (BOL); *Purcell* 28, 30, 38, *SAM45918* (SAM); Zwartberg near Caledon Bath (-AB), *Bolus* 19181 (BOL, K); Caledon Bath (-AB), *Bolus* 20526 (BOL); Hermanus (-AC), *Compton* 14262 (NBG); Kleinmond (-AC), *De Vos* 304 (STE); Palmiet River Valley (-AC), *Stokoe s.n.* (SAM63197); Highlands State Forest (-AC), *Van der Walt* 1572 (STEU); Sandbaai, Hermanus (-AC), *Walters* 1794 (NBG); Happy valley, S foot of Riviersonderend Mountains (-BA), *Esterhuysen* 20766 (BOL, PRE); *Esterhuysen* 21073 (BOL); Genadendal (-BA), *Van der Walt* 1101 (STEU); Boesmanskloof E of Greyton (-BA), *Vorster* 2917 (STEU); Arieskraal, Caledon district (-BD), *Compton* 16466 (NBG); Napier (-BD), *Fischer* 271 (STEU); *Lavranos* 20905 (STEU); S slopes of Danger Point Mountain (-CB), *Leighton* 1571 (BOL); Near Elim (-DB), *Leighton* 2560 (BOL).

--3420 (Bredasdorp): Bontebok Park (-AB), *Grobler* 588 (STE); Zuurbraak, Swellendam (-BA), *Thode* A2299 (K, PRE, STE); Rietkuil, Buffeljachtrivier (-BA), *Zeyher* 2044 (S); *Zeyher* 2045 (G, P, W); Grootvadersbos, Swellendam (-BB), *Ecklon s.n.* (SAM); Ruggens near Heidelberg (-BB), *Galpin* 3815 (PRE); Potteberg, Cape Infanta (-BC), *Blum* 287 (E); Potberg, De Hoop Nature Reserve (-BC), *Marais* 82 (STEU); *Oliver* 3233 (STE); S slopes of Bredasdorp Mountain (-CA), *Hafström & Acocks* 1976 (BOL).

--3421 (Riversdale): Korinterivierdam (-AA), *Bohnen* 5363 (STE); *Boucher* 3671 (PRE, STE); Reisesbaan (-AB), *Bohnen* 7838 (PRE, STE); *Hugo* 97 (PRE, STE); 4,5 miles from Riversdale (-AB), *Bolus* 20513 (BOL); Riversdale Beacon (-AB), *Leighton s.n.* (BOL); Riversdale (-AB), *Muir* 3169 (PRE); *Schlechter* 2211 (Z); 3 km from Albertinia on road to Ystervarkfontein (-BA), *Marais* 169 (STEU); Hills behind Albertinia (-BA), *Muir* 1268 (BOL, PRE).

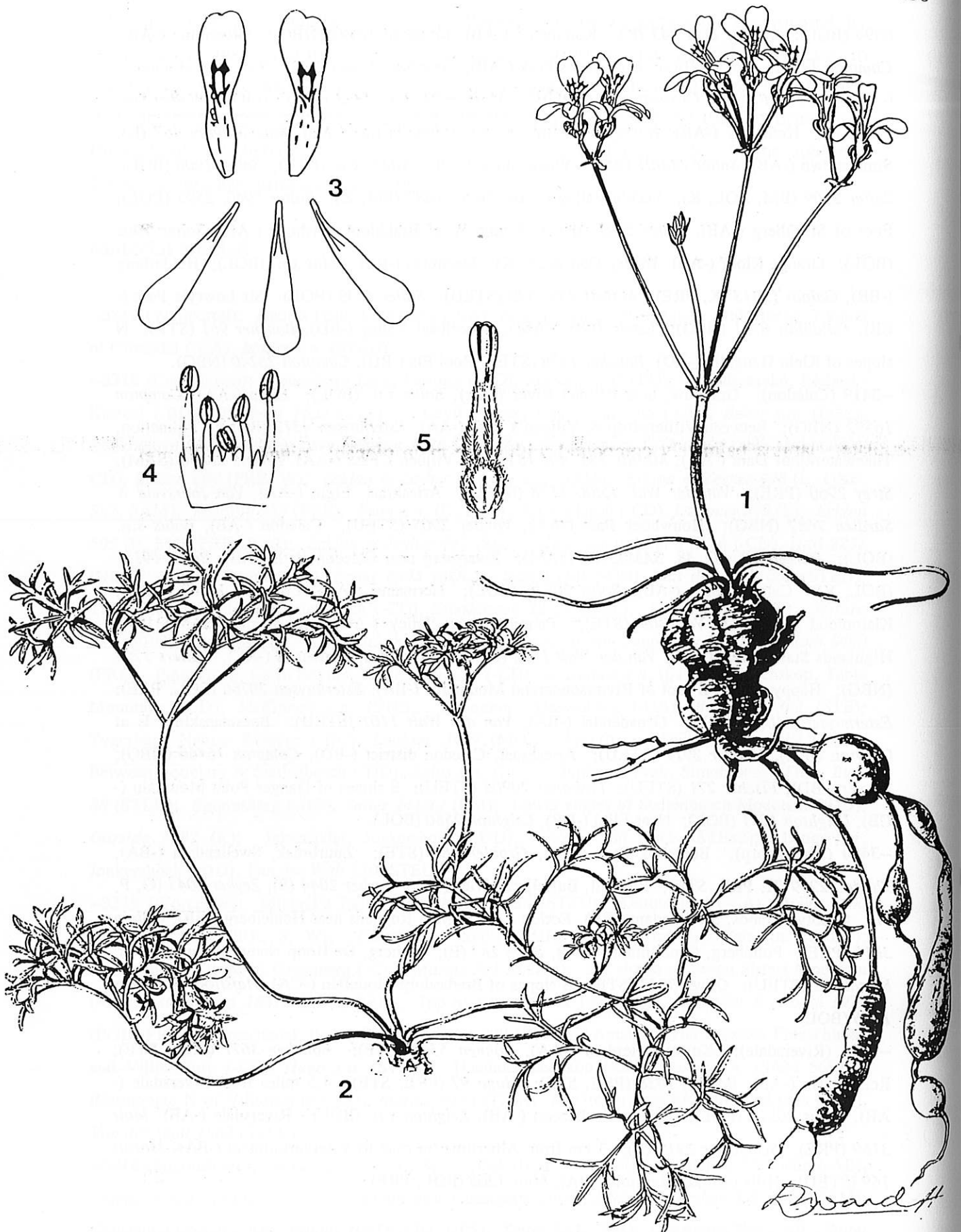


Figure 8.8.1 *Pelargonium reflexum*. 1, flowering plant x1; 2, plant with leaves x1; 3, petals x2; 4, androecium x4; 5, gynoecium x8.

8.8 **Pelargonium reflexum** (Andr.) Pers., Synopsis plantarum 2: 227 (1806); Ait. f.: 162 (1812); DC.: 651 (1824); Spreng.: 52 (1826); Loudon: 658 (1829); G. Don: 729 (1831); Loudon: 271 (1832); Steud.: 679 (1840); Steud.: 289 (1841); Harv.: 266 (1860); Knuth: 337 (1912). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 224 (1802b).

Geranium reflexum Andr.: t. 224 (1802b); Poir.: 758 (1812). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 224 (1802b).

Dimacria reflexa (Andr.) Sweet: 77 (1826c).

Geranospermum reflexum (Andr.) Kuntze: 95 (1891).

A geophyte 80--150 mm tall when in flower. **Tuber:** a turnip-shaped, sometimes moniliform root 15--30 mm long and 10--25 mm in diameter. **Leaves** green, petiolate; lamina palmately compound with three main pinnae; pinnae 20--70 mm long, deeply incised, segments laciniate with apices acute, hirsute with long appressed hairs interspersed with very short glandular hairs; petiole 20--150 mm long and 1--2 mm in diameter, rigid, spreading horizontally from the growing point and bending vertically in the middle, hirsute with long and short appressed or patent non-glandular hairs; stipules narrowly triangular, adnate to petioles for one third of their length, 3--5 mm long and *ca.* 1,5 mm wide, ciliate. **Inflorescence:** scape 15--40 mm long, 1--2 mm in diameter, branched, bearing 2--4 pseudo-umbellets with 2--4(-5) flowers each; peduncles 30--100 mm long, 0,5--1 mm in diameter, hirsute with appressed curly hairs interspersed with short glandular hairs; bracts lanceolate, 2--3 mm long, 1 mm wide, abaxially densely hirsute with appressed hairs. **Pedice** *ca.* 0,5 mm long. **Hypanthium** 13--22 mm long, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5--10 mm long, 1--3 mm wide, posterior one erect, others reflexed, pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, white, spatulate, patent during anthesis; posterior two with wine-red feather-like markings, bases cuneate, apices rounded or emarginate, 10--18 x 2,2--4 mm, length/width ratio smaller than 5,5; anterior three usually without markings, bases attenuate, apices rounded, 9--16 x 1,5--3 mm. **Stamens:** staminal column 1,5--2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 1--3 mm long, lateral two 2,5--4 mm long, anterior two 3,5--6 mm long, white; staminodes 1,5--2,5 mm long; anthers pale pink, 1,2--1,5 mm long, pollen yellow. **Gynoecium:** ovary 2--4 mm long; style 0,2--0,5 mm long, pale pink; stigma branches 1--1,5 mm long, pink. **Fruit:** bases of mericarps 4 mm long, with glandular hairs, tails 20--24 mm long (Figure 8.8.1).

Diagnostic features and affinities

P. reflexum is a geophyte with palmately compound leaves with very long and thin petioles which spread horizontally from the growing point and bend vertically in the middle. This orientation of the petioles resembles that of *P. ternifolium* and *P. fergusoniae*. The former has tripartite leaves, whereas the leaves of *P. fergusoniae* are identical to those of *P. reflexum*. The structure of the flower of *P. reflexum* resembles that of *P. pinnatum*. These species have medium size flowers with spathulate petals and very short stamens which are concealed in the floral sheath. Although the leaves of *P. fergusoniae* and *P. reflexum* are identical, the floral structures of the two species differ. The former has long ligulate petals (posterior two 20--33 mm long) with the length/width ratio greater than 6,5 and those of *P. reflexum* are spathulate and of medium length (posterior two 10--18 mm long) with the length/width ratio smaller than 5,5.

The specific epithet *reflexum* refers to the reflexed character which pervades the whole plant (Andrews 1802b), which includes the rolled-back leaflets, the reflexed petals, the recurved stigma branches and reflexed posterior stamen. None of these characters are unique for this species.

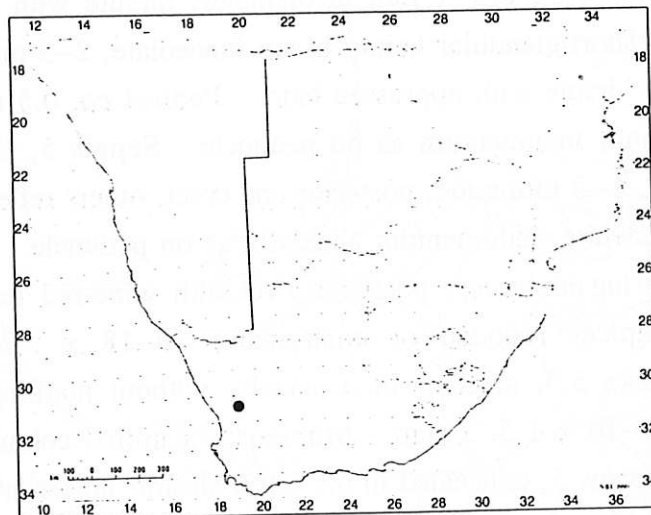


Figure 8.8.2 Geographical distribution of *P. reflexum*.

Geographical distribution and ecology

P. reflexum is known from a small distribution area on the Bokkeveld escarpment around Nieuwoudtville (Figure 8.8.2). It occurs in fynbos on rocky areas or sandy

flats. The area receives an annual rainfall of 200 mm occurring mainly in winter. The plants are locally common. *P. reflexum* flowers in summer, from December to January, after the leaves have died.

Material studied

--3119 (Calvinia): Glenridge, Nieuwoudtville (-AC), *Barker 9188* (NBG); Near Nieuwoudtville (-AC), *Lavis s.n.* (BOL); *Leipoldt 4218* (BOL); Top of Vanrhyn's Pass (-AC), *Marais 278* (STEU); Arendskraal (-AC), *Stirton 11031* (NBG); *Van Wyk 161* (STEU).

8.9 *Pelargonium violiflorum* (Sweet) DC., *Prodromus* 1: 652 (1824) (as "*violaefflorum*"); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 291 (1841); Harv.: 270 (1860). **ICONOTYPE:** Sweet, *Geraniaceae* 2: t. 123 (1822).

Hoarea violaefflora Sweet: t. 123 (1822); Sweet: 75 (1826c); Eckl. & Zeyh.: 63 (1835). **ICONOTYPE:** Sweet, *Geraniaceae* 2: t. 123 (1822).

Geranospermum violaefflorum (Sweet) Kuntze: 95 (1891).

Geranium heterophyllum Thunb.: 113 (1800); Thunb.: 515 (1823); non (Jacq.) Poir.: 746 (1812). **TYPE:** "Cap. bon Spei", *Thunberg s.n.* (UPS, holol!).

Hoarea heterophylla (Thunb.) Eckl. & Zeyh.: 63 (1835).

Pelargonium heterolobum DC.: 680 (1824): substitute name for *Geranium heterophyllum* Thunb.: 113 (1800); G. Don: 742 (1831); Steud.: 286 (1841).

Pelargonium variifolium Steud.: 678 (1840); Steud.: 291 (1841): substitute name for *Geranium heterophyllum* Thunb.: 113 (1800).

Hoarea nivea Sweet: t. 182 (1823); Sweet: 75 (1826c); Eckl. & Zeyh.: 63 (1835). **ICONOTYPE:** Sweet, *Geraniaceae* 2: t. 182 (1823).

Pelargonium niveum (Sweet) Loudon: 568 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 288 (1841).

Pelargonium longifolium (Burm. f.) Jacq. var *nivea* (Sweet) Knuth: 324 (1912).

(*Pelargonium heterophyllum* Jacq. (1791b): see *Pelargonium heterophyllum* Jacq.)

A geophyte 160--260 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root 20--40 mm long and 10--30 mm in diameter. **Leaves:** juvenile leaves simple,



Figure 8.9.1 *Pelargonium violiflorum*. 1, flowering plant x1; 2, gynoecium x7, 3, androecium x5; 4, petals x3.

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others trifoliolate, pinnate to irregularly bipinnatisect, dark green, petiolate; laminae of simple leaves spatulate, 20--70 x 8--20 mm; laminae of compound leaves elliptic or trullate in outline, 25--120 x 40--100 mm, pinnae spatulate or linear to lacinate, 20--60 mm long, 3--12 mm wide, apices acuminate, margins entire, adaxially glabrous, ciliate, abaxially hirsute with long stiff appressed hairs; petiole 10--110 mm long and 1,3--3 mm in diameter, rigid, erect, densely hirsute with appressed hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles for one to two thirds of their length, 12--27 mm long and *ca.* 2 mm wide, ciliate. **Inflorescence:** scape 70--200 mm long, 1,5--3 mm in diameter, branched, bearing 3--6 pseudo-umbellets with 7--14 flowers each; peduncles 30--80 mm long, 1--2 mm in diameter, covered with very long soft hairs interspersed with short glandular hairs; bracts subulate, 4--7 mm long, 1--2 mm wide, adaxially and abaxially hirsute. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 8--11 mm long, densely covered with glandular hairs. **Sepals** 5, lanceolate, apices acute, 5--7,5 mm long, 1--2,5 mm wide, patent, green, indumentum abaxially as on hypanthium. **Petals** 5, white, apices recurved during anthesis; posterior two spatulate, bases cuneate, apices rounded or emarginate, 7--12 x 2,5--4 mm; anterior three spatulate, bases attenuate, apices rounded, 6--9,5 x 1,2--2 mm. **Stamens:** staminal column 1,5--2 mm long, white; perfect stamens 5, concealed in floral sheath, posterior one 2--3 mm long, lateral two 2,5--4 mm long, anterior two 3--5 mm long, white; staminodes 2--3 mm long; anthers pink, 1,5 mm long, pollen orange. **Gynoecium:** ovary 2--3,5 mm long; style 0,2--1 mm long, dark pink; stigma branches 0,8--2 mm long, dark pink. **Fruit:** bases of mericarps 4--6 mm long, without glandular hairs, tails 21--28 mm long. (Figure 8.9.1).

Diagnostic features and affinities

P. violiflorum is a geophyte with various degrees of pinnate to bipinnatisect leaves and rigid upright petioles. The leaf structure is very similar to that of *P. leptum*, and *P. undulatum*. In *P. violiflorum* the lamina outline varies from elliptic (like *P. undulatum*) to trullate (like *P. leptum*). The indumentum of the leaves of the three different species are the same. *P. violiflorum* is characterized by the pompon-like pseudo-umbellets formed by a rather large number (7--14) of small white flowers with short hypanthia (8--11 mm long), and according to Sweet (1822) the specific epithet *violiflorum*, refers to the white violet type of flower of this species. The structure of the flower resembles that of *P. pinnatum*, both have spatulate petals and short stamens which are concealed in the floral sheath.

Geographical distribution and ecology

P. violiflorum is known from a very small distribution area around Ashton, Robertson and Bonnievale (Figure 8.9.2), where it grows in mountain renosterveld or karroid shrubland on shale or sandstone. This is mainly a winter rainfall area with an annual precipitation of 200--500 mm. *P. violiflorum* is one of the spring flowering species of section *Hoarea* and flowers during September and October before the leaves wither.

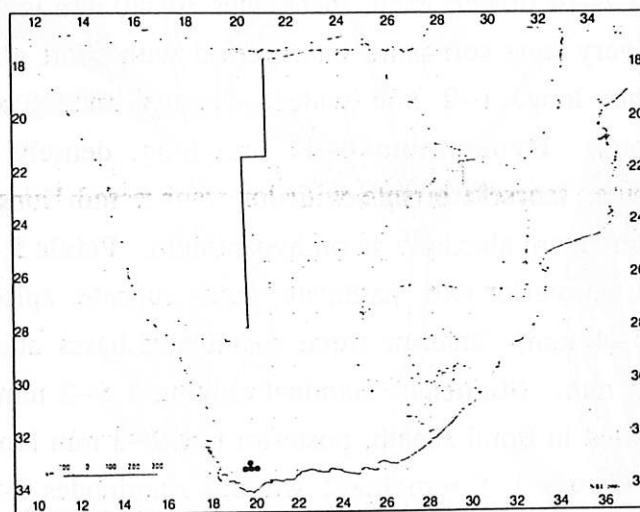


Figure 8.9.2 Geographical distribution of *P. violiflorum*.

Material studied

--3319 (Worcester): 1 km from Langvlei to Noree (-DB), *Fischer 217* (STEU); Langvlei, 16 km from Robertson (-DC), *Fischer 216* (STEU); Nuy, road from Vink to Eilandia (-DC), *Walters 2712* (NBG); 2 miles from Robertson (-DD), *McMurtry NBG407/67* (NBG).

--3320 (Montagu): Ashton (-CC), *Barker 1301* (BOL, NBG); Between Stormsvlei and Bonnievale (-CC), *Leighton 21158* (BOL); Bonnievale Hills (-CC), *Marloth 11824* (PRE, STE).

ATTENUATUM GROUP

Geophytes with simple lanceolate or pinnate, irregularly bipinnatisect or palmately compound leaves. Scape branched, bearing 2--7 pseudo-umbellets with 3--19 flowers each. Hypanthium 6--44 mm long. Flowers with white, cream-coloured, pale yellow or pink, ligulate petals, posterior petals 14--42 mm long, and length/width ratio bigger than

five. Stamens 4--5 fertile, much shorter than the sepals, concealed within the floral sheath.

8.10 *Pelargonium attenuatum* Harv. in Flora Capensis 1: 266 (1860): Knuth: 337 (1912). TYPE - Cape Province: Uitkomst, Brandenburg, Zeyher 169 (S, holo!, BOL!, K!).

Geranospermum attenuatum (Harv.) Kuntze: 94 (1891).

A geophyte 200--300 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 15--40 mm long and 10--20 mm in diameter. **Leaves** green, petiolate; lamina palmately compound with three main pinnae; pinnae 65--130 mm long, sometimes deeply incised, segments 35--50 mm long, 2--8 mm wide, sometimes lacinate with apices acute, sparsely hirsute with long appressed hairs; petiole 95--180 mm long and 1--3 mm in diameter, rigid, erect, hirsute or sparsely hirsute with appressed hairs interspersed with short glandular hairs; stipules narrowly triangular, adnate to petioles for half their length, 5--22 mm long and 2--3 mm wide, hirsute. **Inflorescence:** scape 80--170 mm long, 1,5--2 mm in diameter, branched, bearing 2--3 pseudo-umbellets with 4--7 flowers each; peduncles 60--90 mm long, 1--1,5 mm in diameter, densely covered with appressed curly hairs interspersed with long glandular hairs; bracts lanceolate, 3--4 mm long, 1--1,5 mm wide, abaxially hirsute with appressed hairs interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** (16-)22--31 mm long, green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices attenuate, 11--14 mm long, 1,5--2,5 mm wide, patent during anthesis, green with membranous margins, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured, almost white or pale yellow, ligulate, claws forming a sheath, apices patent or recurved; posterior two with wine-red feather-like markings in the centre, bases cuneate, apices rounded or obtuse, 31--42 x 2--4 mm, length/width ratio 10--11,5; anterior three with a wine-red stripe in the centre, bases attenuate, apices rounded or obtuse, 28--38 x 1,5--2,5 mm. **Stamens:** staminal column 1 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2--2,5 mm long, lateral two 3--4 mm long, anterior two 5--6,5 mm long, white; staminodes 1,5--2 mm long; anthers 1,5 mm long, pollen yellow. **Gynoecium:** ovary 2--4 mm long; style 0,3--1,5 mm long, pale green; stigma branches 0,5--1,5 mm long, adaxially red. **Fruit:** bases of mericarps 5--7 mm long, with glandular hairs, tails 25--35 mm long. (Figure 8.10.1).

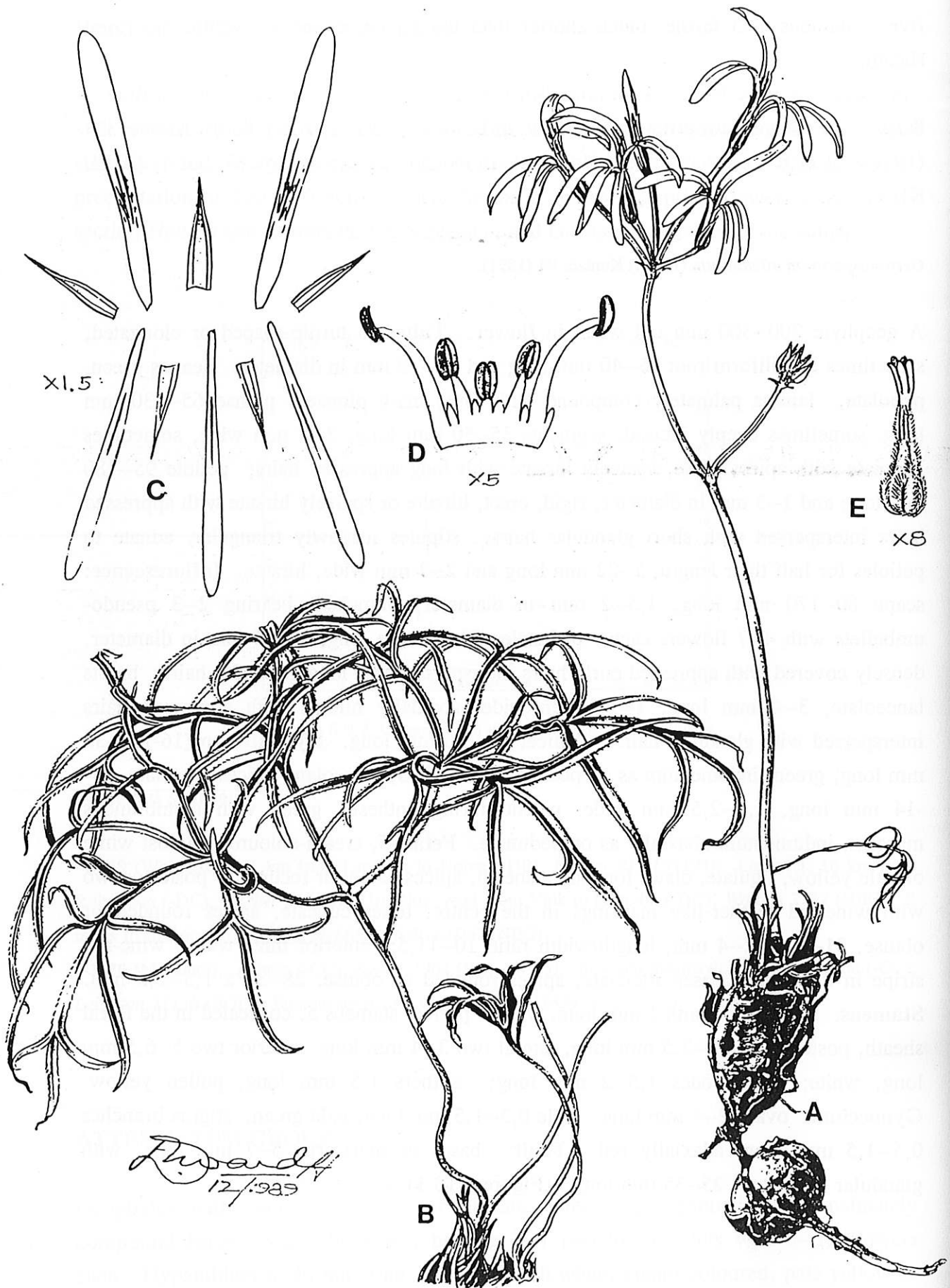


Figure 8.10.1 *Pelargonium attenuatum*. A, flowering plant x1; B, plant with leaves x1; C, petals and sepals x1,5; D, androecium x5; E, gynoecium x8.

Diagnostic features and affinities

P. attenuatum is a geophyte with palmately compound leaves with long, thin, upright petioles. It is characterized by the taper-pointed, almost awned sepals, and the very long, narrow petals, hence the epithet *attenuatum* (Harvey 1860). The floral structure of *P. attenuatum* resembles that of *P. angustipetalum* and *P. fergusoniae*. All three species have flowers with long ligulate petals and very short stamens, concealed in the floral sheath, and all of them have palmately compound leaves with long, thin petioles. The petioles of *P. fergusoniae* are spreading horizontally, whereas those of *P. attenuatum* and *P. angustipetalum* are erect. The petals of *P. fergusoniae* (posterior two 20--33 mm long) and those of *P. angustipetalum* (posterior two 21--26 mm long) are also shorter than those of *P. attenuatum* (posterior two 31--42 mm long).

Geographical distribution and ecology

Only a few collections of *P. attenuatum* are known and according to them this species has a small distribution area along the Olifantsrivier valley and the sandy plain to the west, in the vicinity of Graafwater (Figure 8.10.2). This area receives an annual rainfall of 200--300 mm mainly during the winter months. *P. attenuatum* grows in dry mountain fynbos in loose sandy soil and flowers in summer, from late November to January.

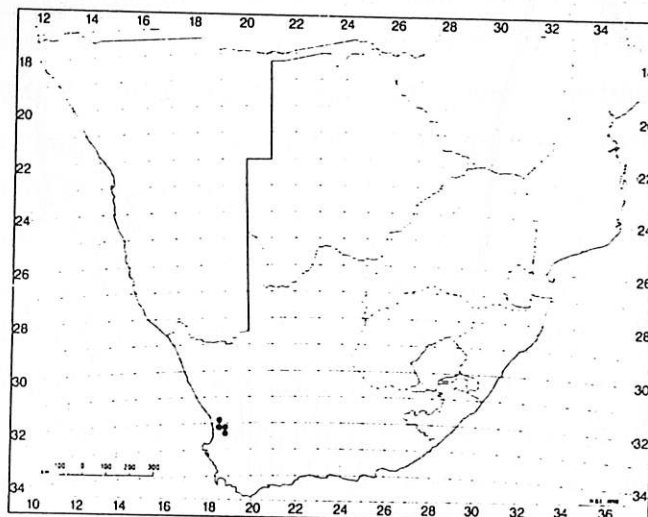


Figure 8.10.2 Geographical distribution of *P. attenuatum*.

Material studied

--3118 (Vanrhynsdorp): Sandkraal, along the Olifantsrivier, Clanwilliam (-DC), *Leipoldt 4324* (BOLx3).

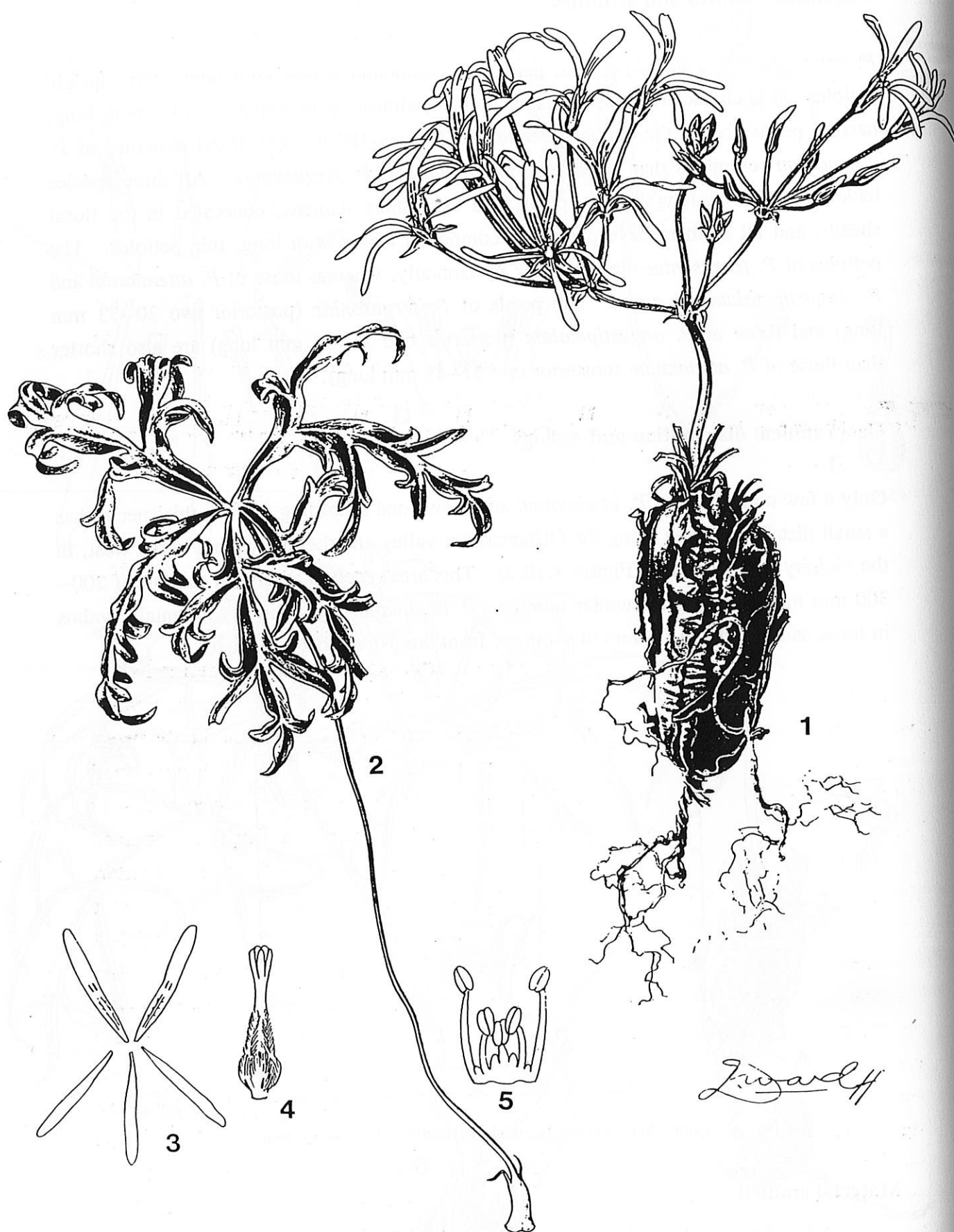


Figure 8.11.1 *Pelargonium angustipetalum*. 1, flowering plant x1; 2, leaf x1; 3, petals x1; 4, gynoecium x6; 5, androecium x3.

3218 (Clanwilliam): Uitkomst, Brandenburg (-BA), Zeyher 169 (BOL, K, S); Clanwilliam, village-ground (BB), Marais 328 (STEU); Melkboomfontein, between Citrusdal & Clanwilliam (-BD), Smit s.n. (STEU).

8.11 Pelargonium angustipetalum E.M. Marais, sp. nov. in sectione Hoarea, affine P. attenuatum.

Herba perennis acaulescens tuberosa. **Tuber:** subterraneum, napiforme vel oblongum, 30--35 mm longum, 15--20 mm in diam. **Folia** hysterantha, rosulata, viridia, petiolata; lamina palmatisecta, pinnae 50--90 mm longae, adaxiale et abaxiale hirsuta et breviter glandulosa; petiolus 80--260 mm longus, rigidus, erectus, setosus et breviter glandulosus; stipulae petiolo adnatae. **Inflorescentia:** scapus pseudoumbellis 2--7, utraque 4--12 floribus. **Pedicellum** ca. 0,5 mm longum. **Hypanthium** 21--35 mm longum, hirsutum et glandulosum. **Sepala** 5, lanceolata, 6--8 mm longa, 1,5--3 mm lata, patentia. **Petala** 5, cremea vel pallide flava, dua postica ligulata, subtiliter carmineo rubra, 21--26 mm longa, 2--3 mm lata, tria antica ligulata, 19--23 mm longa, 1--2 mm lata. **Stamina** fertilia 5, staminodia 5.

TYPE - Cape Province: "Between Wildepaardehoek and Komaggas, 3 km from Sannagas" *Drijfhout 1371* (STE, holo; K, PRE).

A deciduous geophyte with a regularly shaped subterranean tuber, 80--240 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root with a short flattened stem, covered with flaking dark brown periderms, 30--35 mm long and 15--20 mm in diameter. **Leaves** radical, hysteranthous, rosulate, green, petiolate; lamina palmately compound with 3--5 pinnae; pinnae 50--90 mm long, sometimes deeply incised, segments 20--40 mm long and 2--7 mm wide, apices acute, hirsute with appressed stiff hairs interspersed with very short glandular hairs; petiole 80--260 mm long and 1--1,5 mm in diameter, rigid, erect, setose with short appressed hairs interspersed with very short glandular hairs; stipules subulate, adnate to petioles for half their length, 10--15 mm long and 2--3 mm wide, hirsute. **Inflorescence:** scape 15--150 mm long and 1,5--2 mm in diameter, branched, bearing 2--7 pseudo-umbellets with 4--12 flowers each; peduncles 20--100 mm long, 1--1,5 mm in diameter, hirsute with short appressed stiff hairs interspersed with short glandular hairs; bracts lanceolate, apices acute, 2 mm long, 1 mm wide, abaxially densely hirsute with appressed hairs interspersed with short glandular hairs; flower buds, flowers and fruits erect. **Pedicel** ca. 0,5 mm long. **Hypanthium** 21--35 mm long, pale green to reddish brown, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acuminate, 6--8 mm long, 1,5--3 mm wide, posterior one erect, others patent, green with margins white, indumentum abaxially as on peduncle. **Petals** 5,

cream-coloured or pale yellow, claws forming a sheath, apices patent or recurved; posterior two ligulate with pink feather-like markings on the claws, bases cuneate, apices rounded, 21--26 x 2--3 mm, length/width ratio 7,5--9; anterior three ligulate, bases attenuate, apices rounded, 19--23 x 1--2 mm. **Stamens** 10, basally connate, staminal column 0,5--1 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 1,5--2 mm long, lateral two 2,5--4 mm long, anterior two 5--6 mm long, white; staminodes 1--2 mm long; anthers red, 1,5--2 mm long, pollen orange. **Gynoecium**: ovary superior, oblong-conical, 5-lobed, 2--3 mm long, densely sericeous; style filiform, 0,2--1,5 mm long, pale green; stigma with 5 recurved branches, 1--2 mm long, adaxially pink. **Fruit**: a schizocarp consisting of 5 mericarps, bases of mericarps 5 mm long, with glandular hairs, tails 21--26 mm long. (Figure 8.11.1).

Diagnostic features and affinities

P. angustipetalum is a geophyte with palmately compound leaves with long, thin, upright petioles. It is characterized by the cream-coloured or pale yellow flowers with long, narrow petals, hence the specific epithet *angustipetalum*. The very short stamens are concealed in the floral sheath. This floral structure is similar to that of *P. attenuatum* and *P. fergusoniae*. Comparing these three species, they all have pale yellow flowers with long ligulate petals and short stamens, and they all have palmately compound leaves with long, thin petioles. The petioles of *P. fergusoniae* are spreading horizontally, whereas those of *P. angustipetalum* and *P. attenuatum* are erect. The petals of *P. attenuatum* (posterior two 31--42 mm long) are much longer than those of *P. fergusoniae* (posterior two 20--33 mm long) and *P. angustipetalum* (posterior two 21--26 mm long). The indumentum on the peduncles and hypanthia of *P. angustipetalum* differs from the other two species. The peduncles of *P. angustipetalum* are covered with short appressed stiff hairs, whereas those of the other two species are covered with curly hairs.

Geographical distribution and ecology

P. angustipetalum has a small distribution area in Namaqualand, occurring from Kosies in the Richtersveld in the north to Kamieskroon in the south (Figure 8.11.2). This area has a very scant rainfall of 100--200 mm per annum, occurring during the winter. The summers are very hot and dry. Plants grow in deep sand in karroid vegetation and usually occur in partial sunlight under bushes. Flowering time is in summer, from November to December.

Material studied

--2917 (Springbok): Kosies, Richtersveld (-BA), Roux 265 (STEU); O'Kiep (-DB), Scully s.n. (K); Between Wildepaardehoek & Komaggas (-DC), Drijfhout 1371 (K, PRE, STE).

--3017 (Hondeklipbaai): 4,5 miles N of Kamieskroon on Springbok road (-BB), Hardy & Bayliss 1125 (PRE); 3 km E of Kamieskroon (-BB), Meve 236 (STEU).

Without exact locality: Namaland Minor, Scully 231 (BOL).

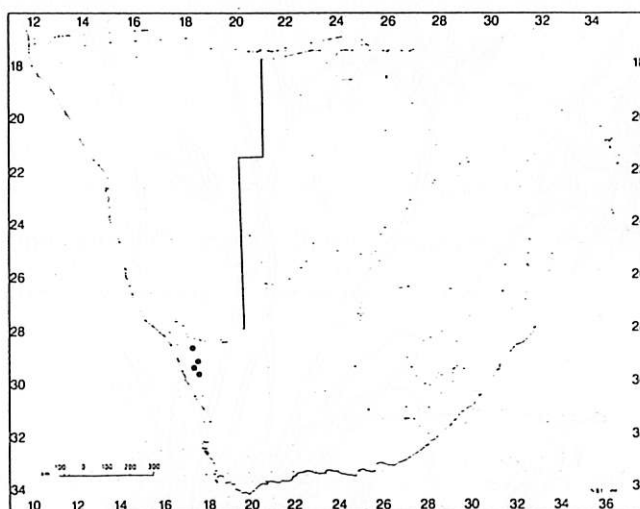


Figure 8.11.2 Geographical distribution of *P. angustipetalum*.

8.12 Pelargonium leptum L. Bol. in South African gardening and country life 22: 229, 232 (1932). TYPE - Cape Province: Near Durbanville, *Leipoldt s.n. sub BOL19185* (BOL, holo!, BOL!, Kx2!).

A geophyte 100--300 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root 50--90 mm long and 10--35 mm in diameter. **Leaves:** juvenile leaves simple, others irregularly pinnate to bipinnatisect, green, petiolate; laminae of simple leaves ovate, 20--40 x 8--20 mm; laminae of compound leaves trullate or triangular in outline, 70--210 x 70--190 mm, pinnae linear, 10--110 mm long, 1--4(-10) mm wide, apices acuminate, margins entire, adaxially and abaxially hirsute or sparsely hirsute with long stiff appressed hairs; petiole 25--210 mm long and 0,5--2 mm in diameter, rigid, erect, glabrous or sparsely hirsute with appressed hairs; stipules subulate, adnate to petioles for half their length, 10--50 mm long and 1--2 mm wide, hirsute or ciliate. **Inflorescence:** scape 50--150 mm long, 1,5--2,5 mm in diameter, branched, bearing 3--7 pseudo-umbellets with 6--12 flowers each; peduncles 55--110 mm long, 1--2 mm in diameter,

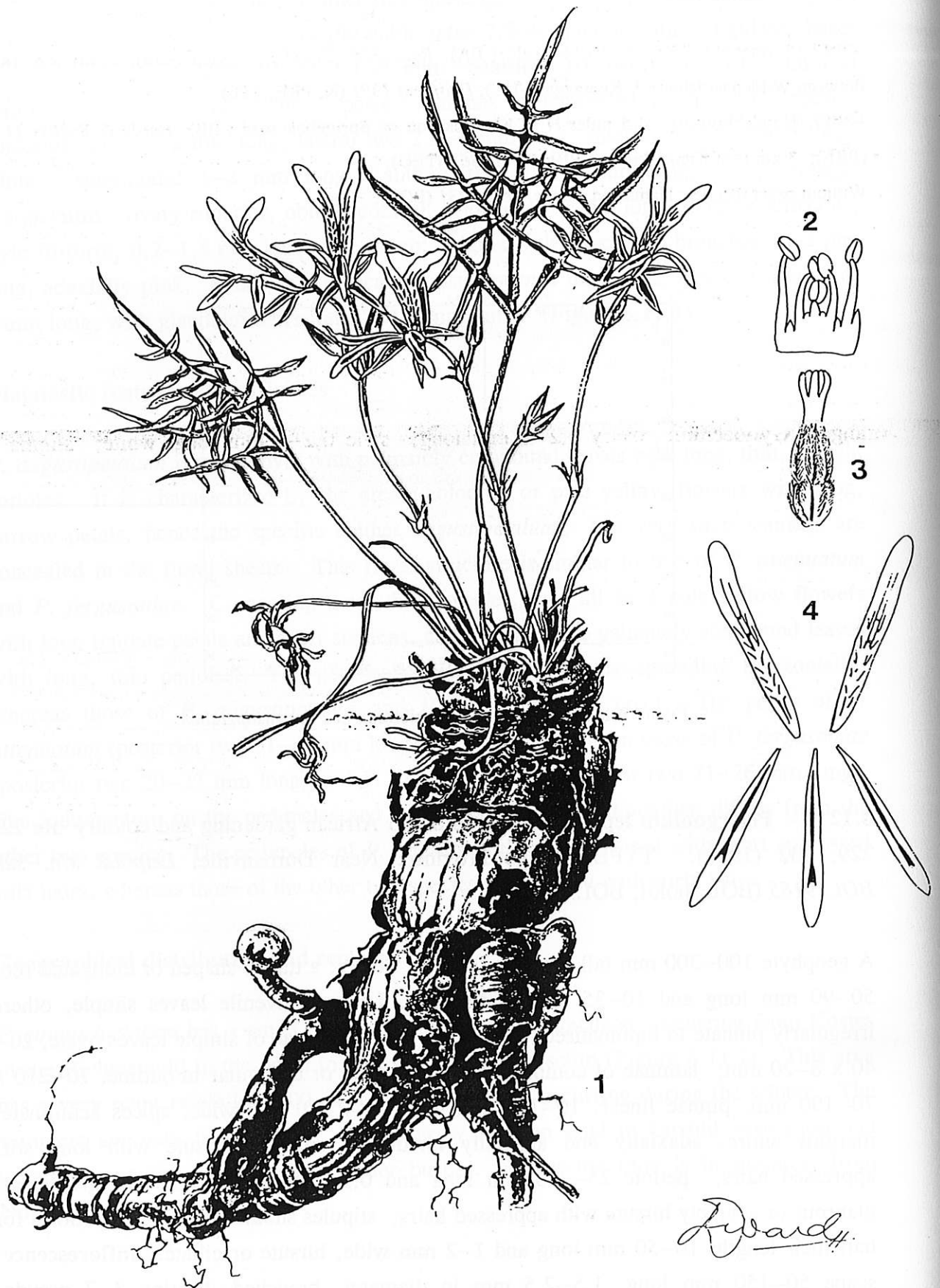


Figure 8.12.1 *Pelargonium leptum*. 1, flowering plant x1; 2, androecium x3; 3, gynoecium x5; 4, petals x1,5.

densely hirsute with appressed curly hairs interspersed with glandular hairs; bracts subulate, 3--5 mm long, 1--2 mm wide, adaxially and abaxially densely hirsute with long appressed hairs interspersed with glandular hairs. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 12--30 mm long, green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices attenuate, 9--13 mm long, 1--3 mm wide, recurved, green with margins white, indumentum abaxially as on peduncle. **Petals** 5, white, cream-coloured, pale yellow or pale pink, claws forming a sheath, apices patent or recurved; posterior two with wine-red feather-like markings, ligulate, bases cuneate, apices rounded or obtuse, 21--28 x 2--3 mm, length/width ratio 7--11; anterior three with a wine-red stripe in the centre, ligulate, bases attenuate, apices rounded or obtuse, 18--26 x 1,5--2 mm. **Stamens**: staminal column 0,8--2,5 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2--4 mm long, lateral two 2,5--5 mm long, anterior two 3,5--6,5 mm long, white; staminodes 1,5--3 mm long; anthers red, *ca.* 1,5 mm long, pollen orange. **Gynoecium**: ovary 2,2--3 mm long; style 0,2--1 mm long, white; stigma branches 0,5--1 mm long, adaxially pink. **Fruit**: bases of mericarps 4 mm long, without glandular hairs, tails 20--25 mm long. (Figure 8.12.1).

Diagnostic features and affinities

P. leptum is a geophyte with irregularly pinnate leaves with rigid upright petioles and laminae with a trullate or triangular outline. It is characterized by the long and narrow petals, hence the epithet *leptum*, meaning slender (Bolus 1932). The stamens are short and concealed in the floral sheath. This floral structure is similar to that of *P. attenuatum*, *P. fergusoniae* and *P. angustipetalum*. The leaves of the latter three species are palmately compound, whereas those of *P. leptum* are pinnately compound.

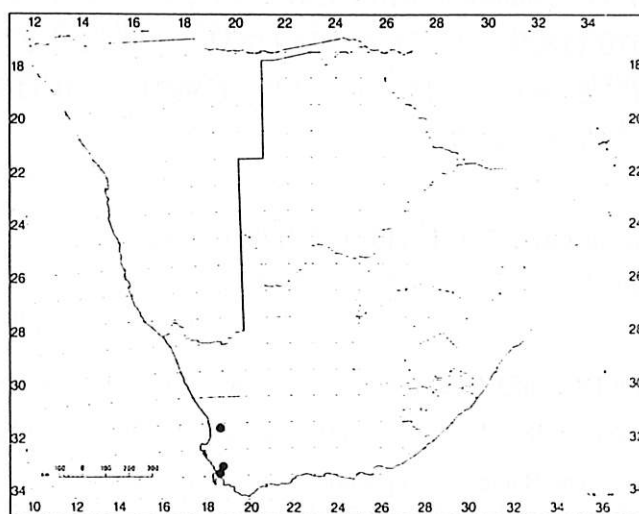


Figure 8.12.2 Geographical distribution of *P. leptum*.

Geographical distribution and ecology

P. leptum occurs in the vicinity of Kuilsrivier and Durbanville in the south and on Paardeberg between Paarl and Malmesbury to the north. Recently it was also collected along the Olifantsrivier near Clanwilliam, leaving an interruption of nearly 200 kilometers (Figure 8.12.2). The number of specimens used to compile this map is small, and one would like to ascribe this scattered pattern to the poor herbarium record available. On the other hand the annual rainfall may play a role in this distribution pattern because specimens were collected only in areas with an annual rainfall of 400--600 mm. The precipitation occurs mainly in winter. *P. ellaphieae* reveals a similar disjunct distribution pattern, from the Cape Peninsula in the south to the Olifantsrivier mountains and Cederberge in the north. *P. leptum* grows in sandy soil in mountain fynbos and flowers in summer from December to February, but in the garden flowers could be found as late as April.

Material studied

--3218 (Clanwilliam): Melkboomfontein, between Clanwilliam & Citrusdal (-BB), *Marais 209* (STEU).
 --3318 (Cape Town): Lemoenkloof, Paardeberg (-DB), *Marais s.n.* (STEU); SW corner of Paardeberg (-DB), *Salter & Leighton s.n.* (BOL); Near Durbanville (-DC), *Leipoldt s.n.* sub. *BOL19185* (BOLx2, Kx2); Langverwacht, above Kuilsrivier (-DC), *Oliver 4981* (STE, STEU); *Oliver 5797* (STE).

8.13 *Pelargonium viciifolium* DC., Prodrumus 1: 653 (1824) (as "*viciaefolium*"): substitute name for *G. pinnatum sensu* Cav.: 257, t. 115, f. 2 (1787); Spreng.: 52 (1826); Loudon: 570 (1829); G. Don: 728 (1831); Loudon: 272 (1832); Steud.: 291 (1841) (excl. ref. Sweet); Marais: 129 (1993). ICONOTYPE: Cavanilles, Dissertationes 4: t. 115, f. 2 (1787).

Geranium pinnatum sensu Cav.: 257, t. 115, f. 2 (1787); *sensu* Andr.: t. 311 (1803b). non L.: 677 (1753); L.: 1141 (1759).

Pelargonium foliolosum DC.: 653 (1824), substitute name for *G. pinnatum sensu* Andr.: t. 311 (1803b); G. Don: 728 (1831); Steud.: 286 (1841) (excl. ref. Eckl. & Zeyh.); Loudon: 272 (1832) (as "*foliosum*"). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 311 (1803b).

Hoarea foliolosa (DC.) Eckl. & Zeyh.: 64 (1835).

Pelargonium astragalifolium var. *foliosum* (DC.) Harv.: 268 (1860); Knuth: 345 (1912).

Dimacria astragalifolium sensu Sweet: t. 103 (1822); sensu Sweet: 76 (1826c).

Pelargonium astragalifolium var. *minor* Harv.: 268 (1860) (excl. ref. Eckl. & Zeyh.); Knuth: 345 (1912) (as "*minus*"). ICONOTYPE: Sweet, Geraniaceae 2: t. 103 (1822).

Misidentification

Pelargonium pinnatum sensu Harv.: 269 (1860) p.p.; *P. pinnatum* sensu Knuth: 346 (1912) p.p.

A geophyte 120--300 mm tall when in flower. **Tuber:** a turnip-shaped root, 25--40 mm long and 18--40 mm in diameter. **Leaves:** green, petiolate; lamina pinnate, (20-)50--120 mm long; pinnae ovate, acute, 4--12(-16) x 3--6(-10) mm, the terminal pinna usually larger than the other pinnae, adaxially and abaxially hirsute with appressed hairs interspersed with glandular hairs; petiole 23--100(-140) mm long and 1--2 mm in diameter; indumentum as on pinnae; stipules (9-)15--30(-40) mm long and ca. 1 mm wide, hirsute. **Inflorescence:** scape 40--200 mm long, 1,5--2 mm in diameter, branched, bearing 2--5 pseudo-umbellets with 7--19 flowers each; peduncles 50--180 mm long, 1--2 mm in diameter, densely hirsute with distally appressed curly hairs interspersed with long soft patent hairs as well as short and long glandular hairs; bracts narrowly triangular, 3--5 mm long, adaxially sparsely hirsute and abaxially densely hirsute with distally appressed hairs interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** (15-)20--35(-38) mm long, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5--9 mm long, 1--3 mm wide, posterior one erect, others patent to recurved, indumentum abaxially hirsute with appressed hairs interspersed with glandular hairs. **Petals** 5, yellow to creamy yellow, claws forming a floral sheath of 10--12 mm long, apices patent during anthesis; posterior two with feather-like wine-red markings, ligulate, bases cuneate, apices rounded to emarginate, 14--22 x 2--4 mm; anterior three narrowly spatulate, bases attenuate, apices rounded, 11--19 x 2--3 mm. **Stamens:** staminal column 0,5--1,5 mm long, white; perfect stamens 5, concealed in floral sheath, posterior one 2--3 mm long, lateral two 3--4 mm long, anterior two 4,5--6 mm long, white; staminodes 2--3,5 mm long; anthers pink, ca. 1,5 mm long, pollen orange. **Gynoecium:** ovary 2,5--4,5 mm long; style 0,3--2 mm long, reddish pink; stigma branches 1,5--2,5 mm long, reddish pink. **Fruit:** bases of mericarps 5 mm long, with glandular hairs, tails 20--25 mm long (Figure 8.13.1).

Diagnostic features and affinities

P. viciifolium has yellow flowers with ligulate petals and wine-red feather-like markings on the two posterior petals. The length/width ratio of the posterior petals is usually

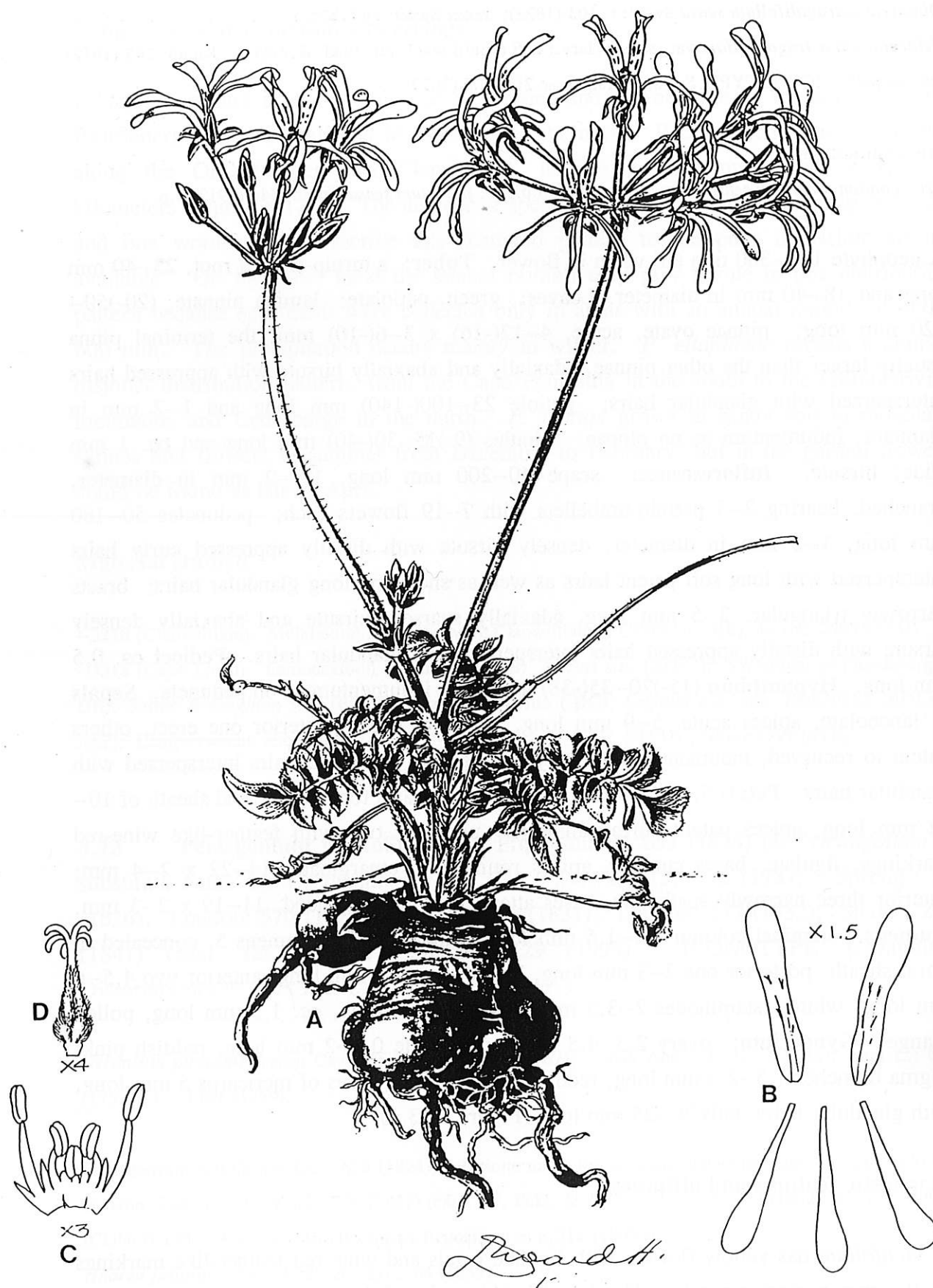


Figure 8.13.1 *Pelargonium viciifolium*. A, flowering plant x1; B, petals x1,5; C, androecium x3; D, gynoecium x4.

greater than five. The stigma branches are always longer than the style (*ca.* 1,5 times the length of the style), and the latter does not lengthen during anthesis or after fertilization. The stamens are short and hidden within the floral sheath. This, together with ligulate petals point to affinities with *P. longiflorum* and *P. leptum* (Marais 1993). The scape is branched, bearing two to five pseudo-umbellets with a relatively large number of flowers (7--19) each. The hypanthium is usually long, two to four times the length of the calyx.

P. viciifolium has similarly pinnate leaves than *P. pinnatum* and *P. trifoliolatum*. However, the floral structures of the three species differ. Both *P. pinnatum* and *P. viciifolium* have short stamens and feather-like markings on the posterior petals, whereas *P. trifoliolatum* has longer stamens and very prominent blotches on the posterior petals (Marais 1993). *P. pinnatum* has spatulate petals, whereas the petals of *P. viciifolium* are ligulate.

Geographical distribution and ecology

P. viciifolium occurs on the south-western Cape coastal plain, including the northern part of the Cape Peninsula, between the 33° and 34° latitudes and between the 18° and 19° longitudes (Figure 8.13.2). The area receives an annual rainfall of 200--400 mm mainly during winter. It occurs on hill sides in grassveld or renosterveld on shale and flowers from October to January with the peak during November and December. Flowers appear after the leaves have died, but dried leaf remnants are usually still present.

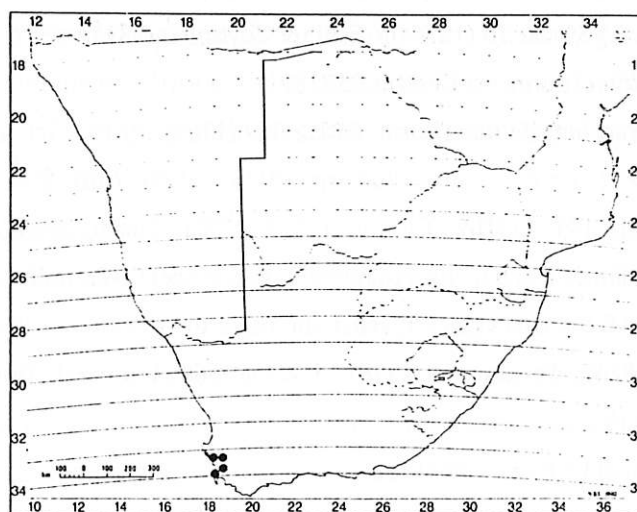


Figure 8.13.2 Geographical distribution of *P. viciifolium*.

Material studied

--3318 (Cape Town): Near Hopefield (-AB), *Leipoldt s.n.*, 20931 (BOL); 2,5 miles NW of Darling (-AD), *Acocks 20690* (K, PRE); Farm Goudmyn, Moorreesburg (-BA), *Marais 165* (STEU); Farm Neulfontein, Moorreesburg (-BA), *Marais 321* (STEU); Between Malmesbury & Hopefield (-BC), *Pillans 6281* (BOL, K); Mamre Hills (-CB), *Hall 166* (NBG); Lion's Head (-CD), *Marloth 386* (PRE); *Schonberg s.n.* (PRE, sub. Galpinn 4855); Lion's Back (-CD), *Worsdell s.n.* (K); Signal Hill (-CD), *Schlechter 45* (G, P, PRE, Z); *Van der Walt 479* (STEU); Van Schoorsdrif, Philadelphia, at Kalbaskraal turnoff (-DA), *Marais 21* (STEU); Swellengift, near Philadelphia (-DA), *Marais 134* (STEU); Wellington (-DB), *Thompson 32* (PRE); Kanonberg, overlooking Bottelary road (-DC), *Acocks 1118* (S); Durbanville (-DC), *Lindeberg s.n.* (S); Koelenhof, Stellenbosch (-DD), *Baker s.n.* (BOL); Between Bottelary and Stellenbosch (-DD), *Bolus s.n.* (BOL); Fisantekraal (-DD), *Marais 13* (STEU); Helshoogte Pass, near Ida's Valley Dam (-DD), *Oliver 5508* (PRE, STE).

8.14 *Pelargonium longifolium* (Burm. f.) Jacq., *Collectanea* 4: 192 (1791b); Jacq.: 9 (1795); Willd.: 641 (1800); Pers.: 226 (1806); DC.: 649 (1824); Spreng.: 50 (1826); Loudon: 568 (1829); G. Don: 725 (1831); Loudon: 271 (1832); Steud.: 678 (1840); Steud.: 287 (1841); Harv.: 261 (1860) p.p.; Szyszyl.: 8 (1888); Knuth: 322 (1912) p.p.; Adamson & Salter: 514 (1950); Van der Walt: 25, fig. (1977) p.p. TYPE: Cape - "Cap. Bon. Spei" (G!, lecto, designated here).

Geranium longifolium Burm. f.: 50, n. 67 (1759); Burm. f.: 19 (1768); Cav.: 235, t. 102, f. 1 (1787). TYPE: Cape - "Cap. Bon. Spei" (G!, lecto., designated here).

Hoarea longifolia (Burm. f.) Sweet: 76 (1826c); Eckl. & Zeyh.: 60 (1835).

Geranospermum longifolium (Burm. f.) Kuntze: 95 (1891).

Geranium prolificum L. var. *longifolium* (Burm. f.) L.: 949 (1763).

Pelargonium ciliatum Jacq.: 195 (1791b); Jacq.: 9, t. 519 (1792); Steud.: 284 (1841); non L'Hérit.: t. 7 (1792); nec Pers.: 226 (1806). TYPE - "Ex Promontorio bonae Spei" (W!, holo.).

Pelargonium auriculatum Willd.: 643 (1800); substitute name for *P. ciliatum* Jacq.: 195 (1791b); Pers.: 226 (1806); DC.: 651 (1824); Spreng.: 51 (1826); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 283 (1841).

Geranium auriculatum (Willd.) Poir.: 745 (1812).

Hoarea auriculata (Willd.) Sweet: 76 (1826c).

Dimacria auriculata (Willd.) Sweet: t. 395 (1828).

Geranium heterophyllum Andr.: C. ic (1805b); non Thunb.: 113 (1800). ICONOTYPE: Andrews, Geraniums: C. ic (1805b).

Pelargonium heterophyllum (Andr.) Loudon: 272 (1832); non Jacq.: 197 (1791b).

Dimacria andrewsii Sweet: 77 (1826c): substitute name for *G. heterophyllum* Andr.: C. ic (1805b).

Pelargonium andrewsii (Sweet) G. Don: 729 (1831); Steud.: 678 (1840); Schweickerdt: t. 9455 (1936).

Dimacria lanceaefolia Sweet: t. 387 (1828). ICONOTYPE: Sweet, Geraniaceae 4: t. 387 (1828).

Pelargonium lanceofolium (Sweet) G. Don: 729 (1831); *P. lanceolatum* (by mistake) Steud.: 287 (1841).

Hoarea lancifolia Eckl. & Zeyh.: 61 (1835). TYPE: Cape Province, "...Inter frutices in latere montis 'Tafelberg' orientem spectante, prope 'Clasenbosch'..." *Ecklon & Zeyher 463* (S!, lecto, designated here, P!).

Pelargonium lancifolium (Eckl. & Zeyh.) Steud.: 287 (1841).

Hoarea bipinnatifida Eckl. & Zeyh.: 62 (1835). TYPE: Cape Province, "...Lapidosis ad montium latera in 'Hottentotsholland', Stellenbosch." *Ecklon & Zeyher 476* (S!, lecto, designated here, Lx3!, MO!, S!, SAM!).

Pelargonium bipinnatifidum (Eckl. & Zeyh.) Steud.: 284 (1841).

Misidentification

Pelargonium longifolium sensu Jacq.: t. 518 (1792) = *P. proliferum* (Burm. f.) Steud.

A geophyte 80--240 mm tall when in flower. **Tuber:** a small turnip-shaped, elongated or sometimes moniliform root 10--25(-40) mm long and 10--25 mm in diameter. **Leaves** vary from simple to irregularly pinnately or bipinnately incised, green, petiolate; lamina of simple leaves lanceolate or elliptic, base attenuate, apex acute, margin entire, 40--120 x 8--18 mm, lamina of compound leaves 40--120 mm long, pinnae 8--30 mm long, lacinate, segments 1--2 mm wide, glabrous to sparsely hirsute with appressed hairs; petiole 30--90 mm long and 1--1,5 mm in diameter, rigid, erect, glabrous or hirsute with appressed hairs; stipules subulate, adnate to petioles for two thirds of their length, 12--33 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape (10-)35--170 mm long, branched, bearing 2--4 pseudo-umbellets with 3--9 flowers each; peduncles 10--70 mm long, 1 mm in diameter, hirsute with appressed curly hairs interspersed with long glandular hairs; bracts subulate, 4--10 mm long, 1--1,5 mm wide, abaxially densely hirsute with appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 8--22 mm long, green, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5--12 mm long, 1--3,5 mm wide, posterior one erect, others recurved, green to pale reddish brown, indumentum abaxially as on peduncle. **Petals** 5, white, cream-coloured, yellow, pink or

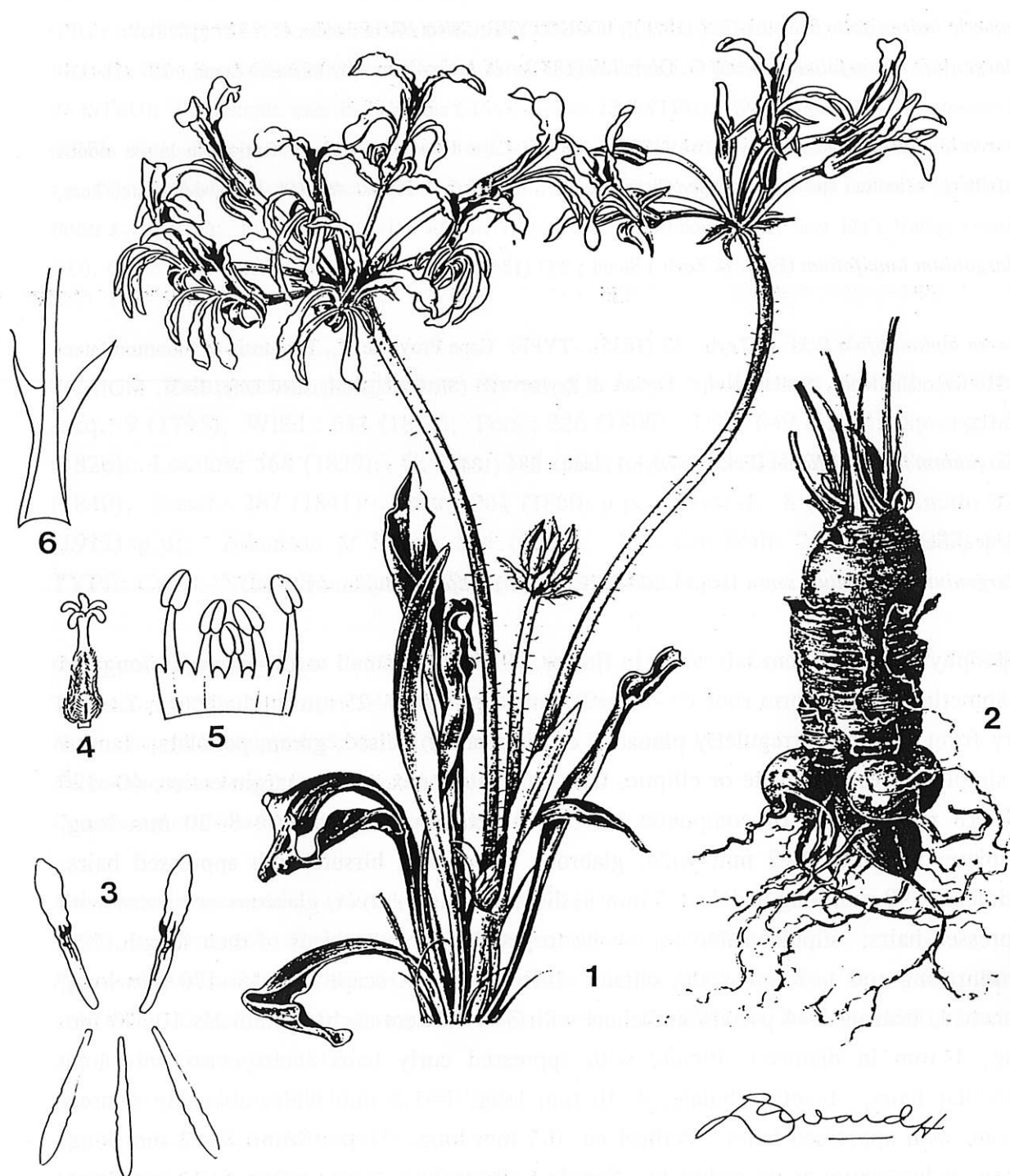


Figure 8.14.1 *Pelargonium longifolium*. 1, flowering plant x1; 2, tuber x1; 3, petals x1; 4, gynoecium x4; 5, androecium x4; 6, leaf base x1.

salmon-pink, claws forming a sheath with the apices patent during anthesis; posterior two with conspicuous wine-red blotches in the centre, seldom with only feather-like markings, linear-spathulate, bases narrowly cuneate, apices rounded, margins undulate, 15--23 x 2--4 mm; anterior three with a crimson line on the claw, linear-spathulate, bases attenuate, apices rounded, margins undulate, 14--21 x 1,8--3,5 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2--3 mm long, lateral two 2,5--4 mm long, anterior two 3,5--4,5 mm long, white; staminodes 1,5--2 mm long; anthers dark pink, 1--1,5 mm long, pollen orange. **Gynoecium:** ovary 1,8--3,5 mm long; style 0,1--0,5 mm long, dark pink; stigma branches 0,5--1 mm long, dark pink. **Fruit:** bases of mericarps 4,5--7 mm long, without glandular hairs, tails 27--33 mm long. (Figure 8.14.1).

Diagnostic features and affinities

P. longifolium is characterized by the white, cream-coloured, yellow or pink flowers with conspicuous wine-red blotches on the posterior petals and its very short stamens. The claws of the linear-spathulate petals with undulate margins form a floral sheath in which the stamens are concealed. Another striking feature of *P. longifolium* is the great diversity in the shape of the leaves, not only in one population, but also on one plant. It varies from simple lanceolate leaves to pinnately compound or bipinnatisect leaves with linear segments. The specific epithet *longifolium* refers to the long lanceolate leaves of some individuals of this species. The kind of leaf variation in *P. longifolium* is common within section *Hoarea* and *P. proliferum* exhibits similar leaf incisions. Although this is a cause for misinterpretation, the two species can be distinguished by the size and form of the petals and the markings on the posterior petals. *P. proliferum* has smaller petals with feather-like markings, whereas *P. longifolium* has long, narrowly spathulate petals with prominent honey-guides. In the latter the margins of the petals are undulate, which is not the case with *P. proliferum*. The narrowly spathulate petals with undulate margins and prominent dark blotches on the posterior petals resemble those of *P. trifoliolatum* and *P. heterophyllum*, but the structure of the androecium of *P. longifolium* differs from that of the above mentioned species. *P. longifolium* shows rather resemblance to *P. undulatum*, a species with long and narrow petals with undulate margins and with a similar structure of the androecium.

Harvey (1860) recognized four different varieties within *P. longifolium* and Knuth (1912) added another two to the list. The literature as well as the herbarium specimens cited by both authors represent a mixture of illustrations and specimens of different taxa, most of which I regard as well defined species on their own.

Geographical distribution and ecology

P. longifolium occurs in the south-western Cape, from Citrusdal in the north to the Cape Peninsula in the south and Bredasdorp in the east (Figure 8.14.2), an area receiving an annual rainfall of 400--1000 mm mainly in winter. Populations are usually very localized and occur in sandy places in fynbos. Most of them consist of relatively large numbers of plants. *P. longifolium* flowers from October to December, while the leaves are still present.

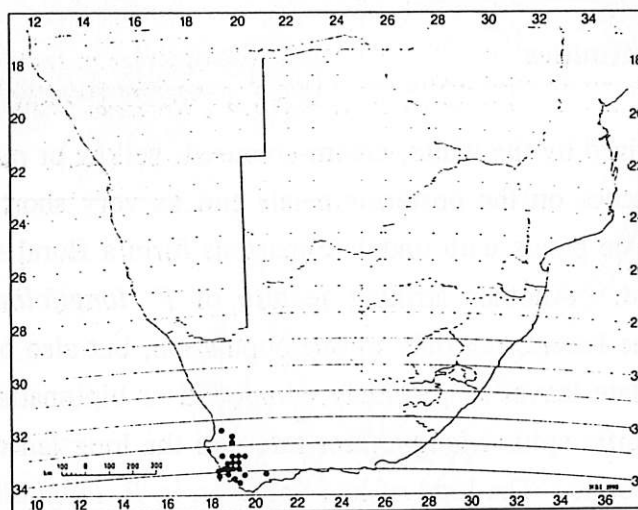


Figure 8.14.2 Geographical distribution of *P. longifolium*.

Material studied

- 3218 (Clanwilliam): Piketberg Mountain (-DC), Zinn *s.n.* (SAM).
- 3219 (Wuppertal): Elandskloof (-CA), Compton 16776 (NBG); Lewis 1171 (SAM); Citrusdal, 20 miles along the Ceres road (-CA), Hardy 1928 (PRE); Waterval, Porterville (-CC), Edwards 31 (BOL).
- 3318 (Cape Town): Groot Post, Near Malmesbury (-BC), Salter 6462 (BM, K); Cape Town (-CD), De Castellan *s.n.* (P); Lion's Head (-CD), Ecklon *s.n.* (P); Table Mountain (-CD), Ecklon & Zeyher 462 (Sx2, SAM); Ecklon & Zeyher 474 (S); Esterhuysen 22411 (BOL); Claasensbosch (-CD), Ecklon & Zeyher 463 (P, S); Mowbray (-CD), Marloth 478 (PRE); Marloth 1614 (PRE, Z); Slopes near Platteklip (-CD), Marloth 8778a (PRE); Paarl (-DB), Alexander *s.n.* (BM); Esterhuysen 9696 (BOL); Paarlberg (-DB), Drège 7494a (CGE, E, Gx2, Kx2, L, MO, Px2, Sx2, Wx2); Tygerberg (-DC), Ecklon & Zeyher 459 (SAM); Canonberg, district Stellenbosch (-DC), Krauss 38 (G); Kraaifontein (-DC), Salter 1768 (BM); Salter 6490 (BOL); Beecroft farm, Kraaifontein (-DC), Wilman 962 (BOL, PRE); Red Hill (-DC), Wolley Dod 1911 (BOL); Between Bottelary & Stellenbosch (-DD), Bolus *s.n.* (BOL); Stellenbosch (-DD),

Duthie s.n. (BOL); *Garside 101* (K); Jan Marais Nature Reserve, Stellenbosch (-DD), *Marais 57* (STEU); *Soerns s.n.* (STE); Waterfalls, Jonkershoek (-DD), *Oliver 5473* (PRE, STE); Groot Drakenstein (-DD), *Rogers 17988* (Z); *Salter 5009* (BOL); *Salter 6495* (BOL, K); Dennegeur, Stellenbosch (-DD), *Smith 4873* (PRE); Stellenbosch Mountain (-DD), *Van der Walt 669, s.n. (STEU 1252)* (STEU).

--3319 (Worcester): *Liefde* (-AC), *Drège 9519* (P, S); Tulbagh, Waterfall & Winterhoek (-AC), *Ecklon & Zeyher 464* (MO, P, Sx2, SAM); *Ecklon & Zeyher 475* (S); Tulbagh (-AC), *Esterhuysen 17488* (BOL); *Pappe 15* (PRE, TCD); *Stanford s.n.* (BOL); Ceres road (-AC), *Schlechter 9090* (BM, BOL, Gx2, GRA, K, Z); Witzenberg (-AC), *Zeyher 175* (G, P); Tulbaghkloof (-AC), *Zeyher 173a* (PRE); 3 km N of Ceres (-AD), *Cillie s.n.* (STEU); Schurftberg (-AD), *Esterhuysen 21871* (BOL); Flats NW of Prince Alfred Hamlet (-AD), *Oliver 5511a* (STE); Matroosberg (-BC), *Phillips 1954* (SAM); Du Toitskloof (-CA), *Drège 7494c* (P); Ruigtevlei, Slanghoek (-CA), *Walters 1555, 2041* (NBG); Shooting Range, Worcester (-CB), *Bayer 2628* (NBG); Worcester Airfield (-CB), *Bayer 2632* (NBG); *Marais 342* (STEU); Between Worcester & Brandvlei (-CB), *Bolus 5130* (BOL, K); Botha (-CB), *Compton 18687* (NBG); Worcester (-CB), *Fine 943* (PRE); *Hall 169* (NBG); Near Edelweiss Garage, Worcester (-CB), *Forrester 251* (NBG); Brandvlei Prison (-CB), *Forrester 515* (NBG); Near Rawsonville (-CB), *Forrester 2088* (NBG); Brandvleidam (-CB), *Hugo 748* (STE); Eikeboom, Slanghoek road (-CB), *Van der Walt 1060* (STEU); Top of Franschoek Pass (-CC), *Albers s.n. (STEU 4108 & 4109)* (STEU); *Drijfhout 2637* (STEU); *Marais 404* (STEU); *Taylor 1490* (PRE); *Van der Walt 1598* (STEU); *Van Wyk 2042* (PRE); Franschoek (-CC), *Bolus 3029* (NBG); *Drège 7494b* (P); *Phillips 1062* (SAM); *Wall s.n.* (S); Groot Drakenstein (-CC), *Compton 4831* (NBG); Wemmershoek (-CC), *Esterhuysen 17717, 31372* (BOL); *Salter 6499* (BOL, K); *Salter 6500* (BOL, K); Moordkuil, along Doornrivier (-CD), *Drège 1285* (P); Between Worcester & Villiersdorp (-CD), *Leipoldt s.n.* (BOL).

--3418 (Simonstown): Bergfliet farm (-AB), *Purcell 241* (SAM); Simon's Bay (-AB), *Wright s.n.* (PRE); Sandy flat near Gordon's Bay (-BB), *Albers s.n.* (STEU); Mountain slopes above Gordon's Bay (-BB), *Bayliss 4087A* (NBG); Gordon's Bay (-BB), *Davis s.n.* (SAM); Hottentotsholland (-BB), *Ecklon & Zeyher 476* (Lx3, MO, Sx2, SAM); *Ecklon & Zeyher 478* (MO, S, SAM); Sir Lowry's Pass (-BB), *Guthrie 2784* (NBG); Between Gordon's Bay & Strand (-BB), *Snijman 577* (NBG).

--3419 (Caledon): Lower slopes of Hermanus Mountain (-AC), *Leighton 330* (BOL); Vogelgat (-AD), *Williams 3368, 3743* (NBG); Genadendal (-BA), *Verreaux s.n.* (G).

--3420 (Bredasdorp): Poort, Bredasdorp (-BA), *Compton 23208* (NBG).

Specimens without exact localities: Worcester district, *Cooper 1609* (TCD); *Cooper 1631* (BM, TCD, W); *Cooper 1639* (BM, K, W); *Cooper 1651* (K, TCD, W); *Cooper 1707* (BM, K, TCD, W, Z); *Cooper 1711* (K, TCD, W, Z); *Cooper 1715* (K, W); *Cooper 1724* (BM, G, K, PRE, TCD, W, Z).

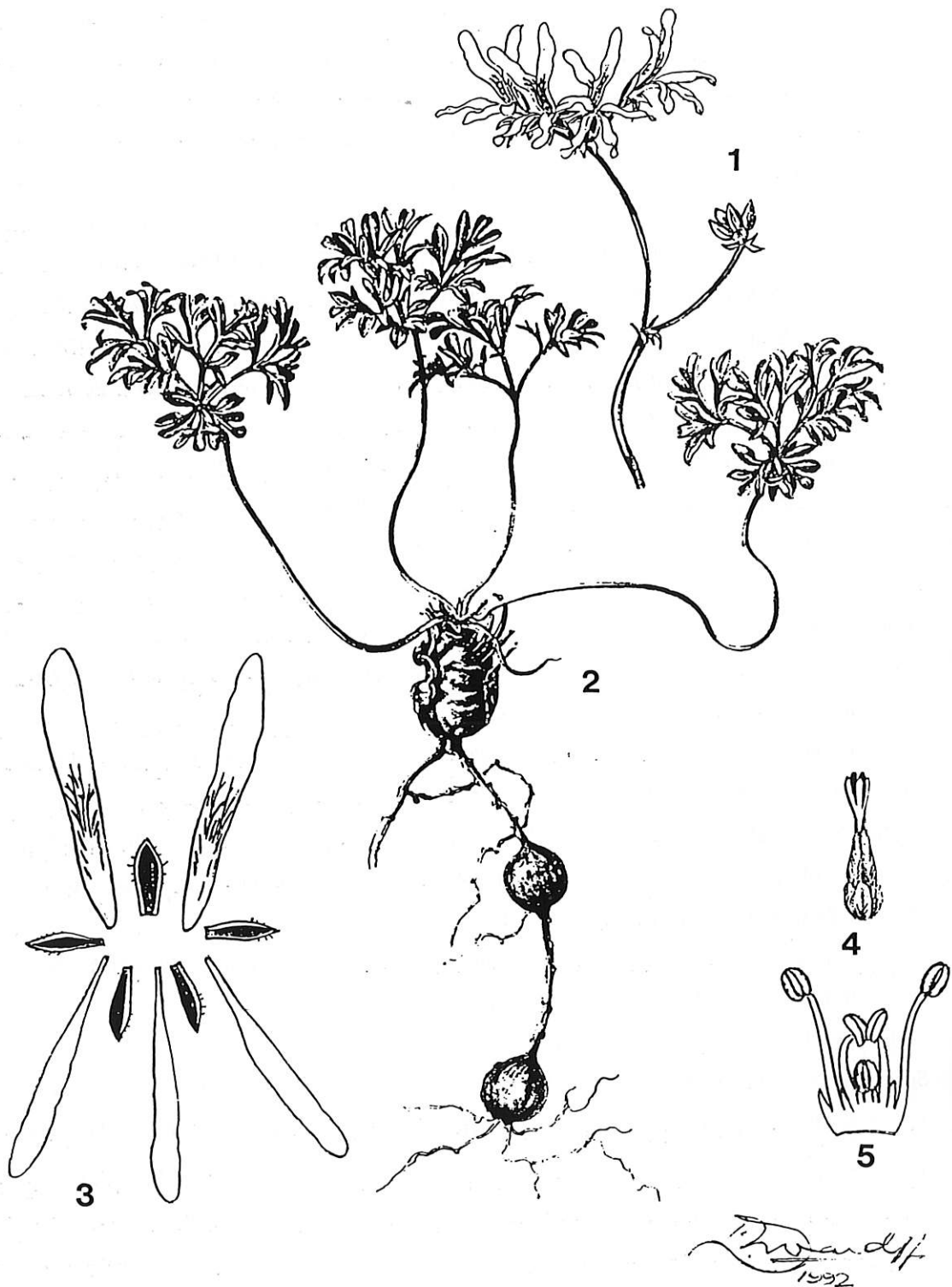


Figure 8.15.1 *Pelargonium fergusoniae*. 1, inflorescence x1; 2, plant with leaves x1; 3, petals x2; 4, gynoecium x5; 5, androecium x5.

8.15 **Pelargonium fergusoniae** L. Bol. in Kew Bulletin 1934: 258 (1934). TYPE - Cape Province: Near Riversdale, *Bolus & Ferguson BOL20512* (BOL, holo., K!).

A geophyte 120--220 mm tall when in flower. **Tuber:** a turnip-shaped, sometimes moniliform root 8--30 mm long and 8--15 mm in diameter. **Leaves** green, petiolate; lamina palmately compound with three main pinnae; pinnae 10--50 mm long, deeply incised, segments laciniate with apices acute, sparsely hirsute with long appressed hairs interspersed with very short glandular hairs; petiole 20--100 mm long and 0,5--1 mm in diameter, rigid, spreading horizontally from the growing point and bending vertically in the middle, glabrous or sparsely hirsute with appressed hairs interspersed with glandular hairs; stipules narrowly triangular, adnate to petioles for one third of their length, 3--6 mm long and *ca.* 1,5 mm wide, ciliate. **Inflorescence:** scape 20--100 mm long, 1--2 mm in diameter, branched, bearing 2--4 pseudo-umbellets with 3--8 flowers each; peduncles 40--120 mm long, 0,5--1 mm in diameter, sparsely hirsute with appressed curly hairs interspersed with glandular hairs; bracts lanceolate, 3--4 mm long, 1 mm wide, abaxially hirsute with appressed hairs. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** (15-)20--42 mm long, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6,5--11 mm long, 1--3 mm wide, posterior one erect, others reflexed, green or pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, white, pale pink or cream-coloured, ligulate, claws forming a sheath, apices patent or recurved; posterior two with wine-red feather-like markings, bases cuneate, apices rounded or obtuse, 20--33 x 2,5--3,5 mm, length/width ratio 6,5--8,5; anterior three usually without markings, bases attenuate, apices rounded or obtuse, 15--29 x 2--2,2 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 1,5--2 mm long, lateral two 2,5--3,5 mm long, anterior two 4,5--5 mm long, white; staminodes 1--3 mm long; anthers pink, 1,5 mm long, pollen yellow. **Gynoecium:** ovary 2--3 mm long; style 0,2--1 mm long, pink; stigma branches 1--1,5 mm long, dark pink. **Fruit:** bases of mericarps 5--6 mm long, without glandular hairs, tails 22--32 mm long. (Figure 8.15.1).

Diagnostic features and affinities

P. fergusoniae is a geophyte with palmately compound leaves with very long and thin petioles which spread horizontally from the growing point and bend vertically in the middle. This orientation of the petioles resembles that of *P. ternifolium* and *P. reflexum*. The former has ternate leaves, whereas the leaves of *P. reflexum* are identical to those of *P. fergusoniae*. The floral structure of *P. fergusoniae* resembles that of *P. attenuatum*. Both species have flowers with long ligulate petals and very short stamens, concealed in

the floral sheath. Although the leaves of *P. fergusoniae* and *P. reflexum* are identical, the two species differ in respect to the floral structure. The former has long ligulate petals (posterior two 20--33 mm long) with the length/width ratio greater than 6,5 and those of *P. reflexum* are spatulate and of medium length (posterior two 10--18 mm long) with the length/width ratio smaller than 5,5.

P. fergusoniae is named after E. Ferguson, who accompanied L. Bolus on a trip when they collected this species.

Geographical distribution and ecology

P. fergusoniae is common in the southern Cape Province. It occurs from Hex River Valley in the north to Bredasdorp in the south and from Worcester and Caledon in the west to Riversdale in the east (Figure 8.15.2). This area receives an annual rainfall of 200--400 mm mainly during the winter months. *P. fergusoniae* grows in fynbos in loose sandy soil and flowers in summer, from late November to January.

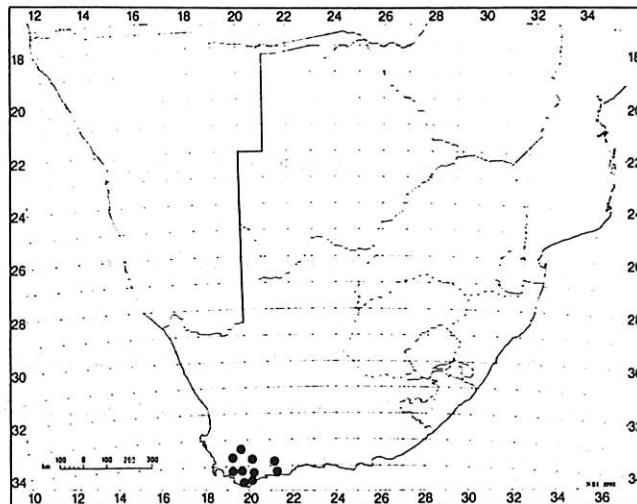


Figure 8.15.2 Geographical distribution of *P. fergusoniae*.

Material studied

--3319 (Worcester): Orchard, Hex River Valley (-BC), *Esterhuysen 10933* (BOLx2); Worcester West township (-CB), *Bayer 5647* (STE); Near Worcester (-CB), *Leipoldt s.n.* (BOL).

--3320 (Montagu): 16 km from Nougaspoort (-CA); *Fischer 231* (STEU); 13 km E of Bonnievale (-CC), *Bayer 1711* (NBGx2).

--3321 (Ladismith): Springfontein, Little Karoo (-CC), *Bolus s.n.* (BOL); Garcia's Pass (-CC), *Ryder 19986* (BOL, K).

--3419 (Caledon): 7 miles NE of Boontjieskraal (-AB), *Salter 6180* (BOL); *Salter NBG1743/36* (NBG); Near Greyton (-BA), *Bayer 2339* (NBG, STEU); 15 km from Bredasdorp to Heuningrug (-DB), *Fischer 287* (STEU); Heuningrug, SW of Bredasdorp (-DB), *Meve 261186/396* (STEU).

--3420 (Bredasdorp): 10 km E of Brakfontein (-AA), *Fischer 304* (STEU); 2 km SW of Swellendam (-AB), *Bayer 2513* (NBG, STEU); Between Bredasdorp & Malgas (-AD), *Lewis 2792* (SAM); Die Poort, Bredasdorp (-CA), *Acocks 23113* (PRE); 6 miles from Bredasdorp to Elim (-CA), *Esterhuysen 19171* (BOLx2, K); Bredasdorp-Poort (-CA), *Esterhuysen 19562* (BOL).

--3421 (Riversdale): Near Riversdale (-AB), *Bolus & Ferguson BOL20512* (K, BOL).

8.16 *Pelargonium undulatum* (Andr.) Pers., *Synopsis plantarum* 2: 226 (1806); *Ait. f.*: 160 (1812); *DC.*: 650 (1824); *Spreng.*: 50 (1826); *Loudon*: 568 (1829); *G. Don*: 729 (1831); *Loudon*: 271, 272 (1832); *Steud.*: 290 (1841). **ICONOTYPE**: Andrews, *The Botanist's Repository* 5: t. 292 (1803b).

Geranium undulatum Andr.: t. 292 (1803b); *Poir.*: 757 (1812). **ICONOTYPE**: Andrews, *The Botanist's Repository* 5: t. 292 (1803b).

Dimacria undulata (Andr.) Sweet: 77 (1826c).

Pelargonium ovatifolium Steud.: 680 (1840): substitute name for *G. undulatum* Andr.: t. 292 (1803b).

Geranium undulatum var. *minor* Andr.: t. 317 (1803b). **ICONOTYPE**: Andrews, *The Botanist's Repository* 5: t. 317 (1803b).

Pelargonium virgineum Pers.: 226 (1806): substitute name for *Geranium undulatum* var. *minor* Andr.: t. 317 (1803b); *DC.*: 650 (1824); *Spreng.*: 50 (1826); *Loudon*: 568 (1829); *G. Don*: 729 (1831); *Loudon*: 271, 272 (1832); *Steud.*: 680 (1840); *Steud.*: 291 (1841).

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

Dimacria virginea (Pers.) Sweet: 77 (1826c).

Pelargonium longifolium (Burm. f.) *Jacq.* var. *virgineum* (Pers.) *Harv.*: 262 (1860); *Knuth*: 322 (1912).

Pelargonium hirsutum *Loudon*: 570 (1829); substitute name for *Geranium undulatum* var. *minor* Andr.: t. 317 (1803b); *Loudon*: 272 (1832); non (Burm. f.) *Ait.*: 417 (1789).

A geophyte 90--240 mm tall when in flower. **Tuber**: a turnip-shaped or elongated root 20--110 mm long and 15--30 mm in diameter, older plants forming fleshy root branches as well as stem branches. **Leaves**: juvenile leaves simple, others trifoliolate, pinnate or irregularly pinnate or bipinnatisect, green, petiolate; laminae of simple leaves ovate, 20--50 x 8--20 mm; laminae of compound leaves elliptic in outline, 50--120 x 40--100 mm,

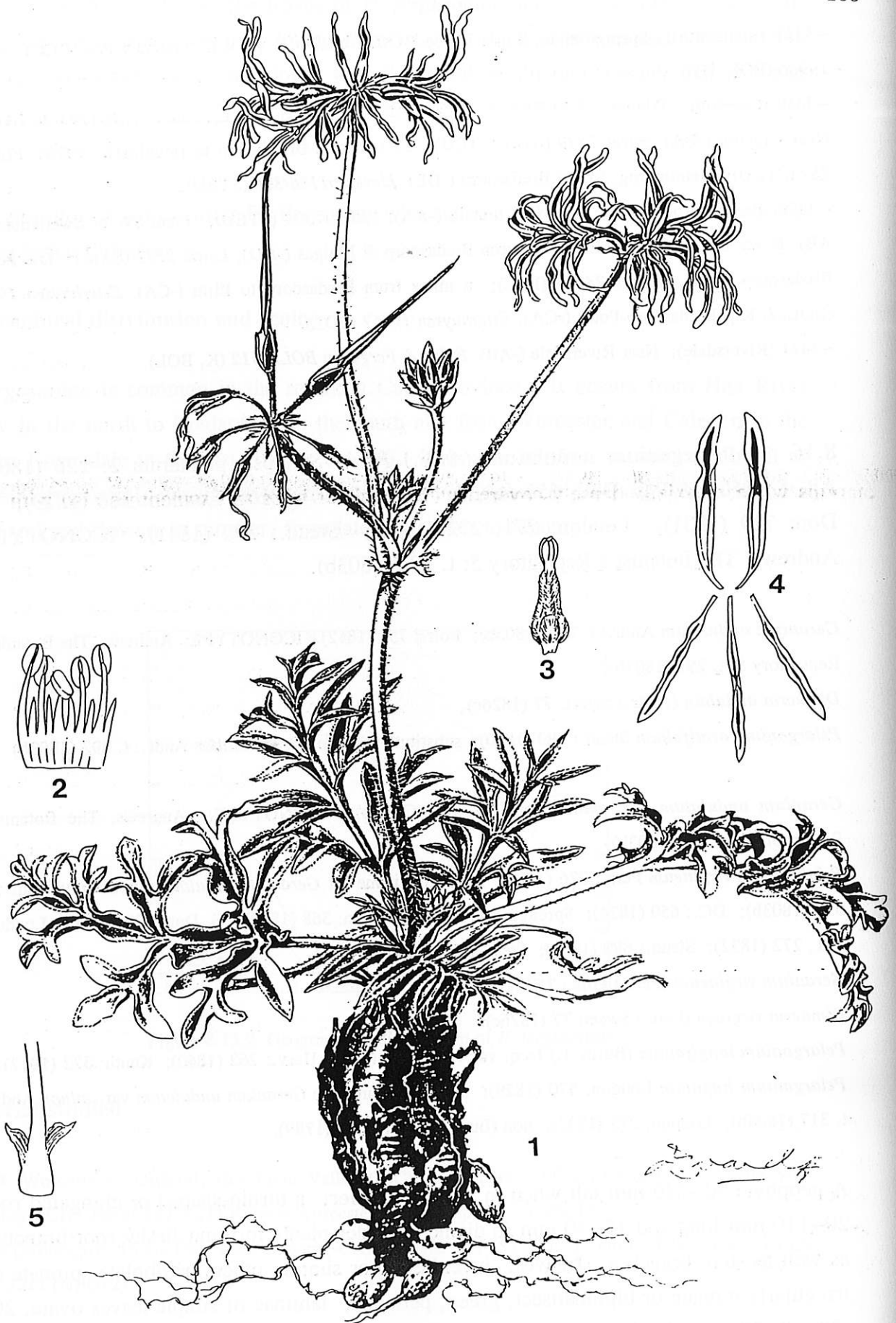


Figure 8.16.1 *Pelargonium undulatum*. 1, flowering plant x1; 2, androecium x3; 3, gynoecium x4; 4, petals x1,5; 5, leaf base x1.

pinnae ovate or linear to lacinate, 20--60 mm long, (1-)3--7 mm wide, apices acuminate, margins entire, adaxially glabrous, ciliate, abaxially hirsute with long stiff appressed hairs; petiole 25--50 mm long and 1--2,5 mm in diameter, rigid, erect, setose with appressed bristle-like hairs interspersed with short glandular hairs; stipules triangular or narrowly triangular, adnate to petioles for half their length, 7--15 mm long and 2--3 mm wide, hirsute or ciliate, apices sometimes laterally curved. **Inflorescence:** scape 30--170 mm long, 1--3 mm in diameter, branched, bearing 2--5 pseudo-umbellets with 3--8(-13) flowers each; peduncles 20--80 mm long, 1--2 mm in diameter, covered with glandular hairs interspersed with very long soft patent hairs; bracts lanceolate, 3--5 mm long, 1--2 mm wide, adaxially and abaxially hirsute with appressed hairs interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 6--12(-25) mm long, green to reddish brown, densely covered with glandular hairs. **Sepals** 5, lanceolate to triangular, apices acute, 5--8 mm long, 1--4 mm wide, patent during anthesis, green to reddish brown with margins white, abaxially densely covered with glandular hairs and sometimes also with appressed hairs at the apices. **Petals** 5, white, cream-coloured, yellow or pale pink, ligulate, margins undulate, claws forming a sheath, apices patent or recurved; posterior two with a wine-red stripe or blotch in the centre, bases cuneate, apices rounded or obtuse, 16--25 x 1,2--3 mm, length/width ratio 6--16; anterior three with a wine-red stripe in the centre, bases attenuate, apices rounded or obtuse, 13--19 x 1--1,5 mm. **Stamens:** staminal column 1--2,5 mm long, white; perfect stamens 5, concealed in the floral sheath, posterior one 2,5--4 mm long, lateral two 3,5--4,5 mm long, anterior two 4--5 mm long, white; staminodes 2--3,5 mm long; anthers green or red, 1--1,5 mm long, pollen orange. **Gynoecium:** ovary 2,5--3,5 mm long; style 0,2--0,5 mm long, green or red; stigma branches 1--1,5 mm long, adaxially pink. **Fruit:** bases of mericarps 5--7 mm long, with glandular hairs, tails 27--35 mm long. (Figure 8.16.1).

Diagnostic features and affinities

P. undulatum is a geophyte with pinnately compound leaves and rigid upright petioles. This leaf structure is very similar to that of *P. leptum*, but the laminae of *P. undulatum* are elliptic in outline, whereas those of *P. leptum* are trullate or triangular. *P. undulatum* is characterized by the long and narrow petals with undulate margins, hence the specific epithet. The stamens are short and concealed in the floral sheath. This floral structure is similar to that of *P. leptum*, *P. attenuatum*, *P. fergusoniae* and *P. angustipetalum*. However, none of them have undulate petals. Both *P. undulatum* and *P. leptum* have pinnatisect leaves, whereas the leaves of the other three species are palmatisect.

Geographical distribution and ecology

P. undulatum occurs in the vicinity of Worcester, Karoo Poort, the Hex River Valley and as far east as Seweweekspoort (Figure 8.16.2). The annual rainfall of this area varies between 200–400 mm, and occurs mainly during the winter months. *P. undulatum* grows in sandy soil or on shale in low karroid vegetation. Populations are usually small. It is one of the early flowering species of section *Hoarea* and flowers can be found as early as August, although the peak of the flowering time is from September to October.

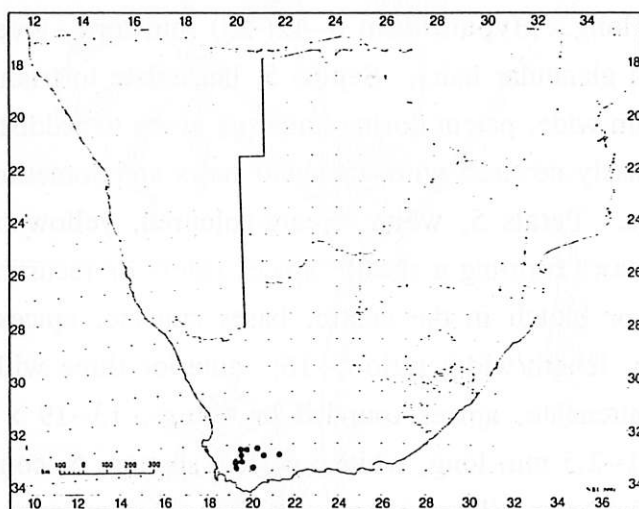


Figure 8.16.2 Geographical distribution of *P. undulatum*.

Material studied

--3319 (Worcester): Karoo Poort (-BA), *Bayer 3597* (NBGx2); *Dymond NBG1923/33* (BOL); *Hall NBG752/50* (BOL); 4 km N of Karoo Poort (-BA), *Lavranos & Pehlemann 17470* (STEU); Karoo Poort, at turnoff to Touwsrivier (-BA), *Muller 4041a* (STEU); Between Hottentotskloof & Sutherland (-BB), *Leipoldt s.n.* (BOL); Hottentotskloof, Ceres (-BC), *Compton 12061* (NBG); Verlorenvlei, Ceres (-BC), *Levyns 1002* (BOL); Orchard (-BC), *Rogers 16523* (K, P, Z); Hex River Valley (-BC), *Wolley Dod 4045* (BOL); W of Langerug, Worcester (-CB), *Bayer 2610* (NBG); Reiersrus, Aan de Doorns (-CB), *Walters 2555* (NBG); Lemoenpoort (-CD), *Perry 1231* (NBG); Draaivlei, Doornrivier (-CD), *Walters 329* (NBG); Sandberg hills, on road from Worcester to Scherpenheuvel (-DA), *Forrester 248* (NBG).

--3320 (Montagu): Tweedside (-AB), *Barker 7478* (NBGx2); *Barker & Lewis 20601* (BOL); *Lewis NBG2789/32* (BOL); Patatsrivier, Ceres Karoo (-AB), *Lavranos & Pehlemann 18803* (STEU); Witteberge (-BC), *Oliver s.n.* (STEU); Corena, between Bonnievale & Drew (-CC), *Forrester & Vosa 183* (NBG).

--3321 (Ladismith): S entrance to Seweweekspoort (-AD), *Levyns 2436* (BOL); N end of Seweweekspoort, 4 km to the E, near Besemfontein (-AD), *Marais 331* (STEU); *Van der Walt 1111*

(STEU); Near N entrance to Seweweekspoort (-AD), *Mauve, Reid, Wikner 126* (STE); Waterkloof, Ladismith (-AD), *Van der Walt 1593* (STEU).

8.17 *Pelargonium longiflorum* Jacq., *Collectanea* 4: 194 (1791b); Jacq.: 9, t. 521 (1792); Willd.: 642 (1800); Pers.: 226 (1806); DC.: 649 (1824); Spreng.: 50 (1826); Loudon: 568 (1829); G. Don: 725 (1831); Loudon: 271 (1832); Steud.: 287 (1841).
TYPE - "Ex Promontorio bonae Spei" (W, holo.).

Geranium longiflorum (Jacq.) Poir.: 745 (1812).

Hoarea longiflora (Jacq.) Sweet: 76 (1826c).

Pelargonium longifolium (Burm. f.) Jacq. var. *longiflorum* (Jacq.) Harv.: 262 (1860); Knuth: 323 (1912); Pole-Evans: t. 335 (1929).

Pelargonium depressum Jacq.: 193 (1791b); Jacq.: 9, t. 520 (1792); Loudon: 271 (1832). TYPE - "Ex Promontorio bonae Spei" (W, holo.).

Dimacria depressa (Jacq.) Sweet: t. 290 (1826a).

Hoarea depressa (Jacq.) Sweet: 76 (1826c).

Geranium longiflorum (Jacq.) Poir. var. *depressum* (Jacq.) Poir.: 745 (1812).

Pelargonium longiflorum Jacq. var. *depressum* (Jacq.) Loudon: 271 (1832).

Geranium angustifolium Thunb.: 113 (1800); Thunb.: 514 (1823). TYPE: "Cap. bon Spei" *Thunberg s.n.* (UPS, holo.).

Pelargonium angustifolium (Thunb.) DC.: 680 (1824); G. Don: 742 (1831); Steud.: 677 (1840); Steud.: 283 (1841); Harv.: 262 (1860); Knuth: 326 (1912).

Hoarea angustifolia (Thunb.) Eckl. & Zeyh.: 61 (1835).

Geranospermum angustifolium (Thunb.) Kuntze: 94 (1891).

Geranium spathulatum Andr.: t. 152 (1801b); Poir.: 757 (1812). ICONOTYPE: Andrews, *The Botanist's Repository* 3: t. 152 (1801b).

Pelargonium spathulatum (Andr.) Pers.: 226 (1806); Ait. f.: 160 (1812); DC.: 650 (1824); Spreng.: 51 (1826); Loudon: 568 (1829); G. Don: 729 (1831); Loudon: 271, 272 (1832); Steud.: 679 (1840); Steud.: 290 (1841); Harv.: 264 (1860); Knuth: 325 (1912).

Dimacria spathulata (Andr.) Sweet: 77 (1826c).

Geranospermum spathulatum (Andr.) Kuntze: 95 (1891).

Geranium spathulatum var. *curvifolium* Andr.: t. 282 (1803a). ICONOTYPE: Andrews, *The Botanist's Repository* 4: t. 282 (1803a).

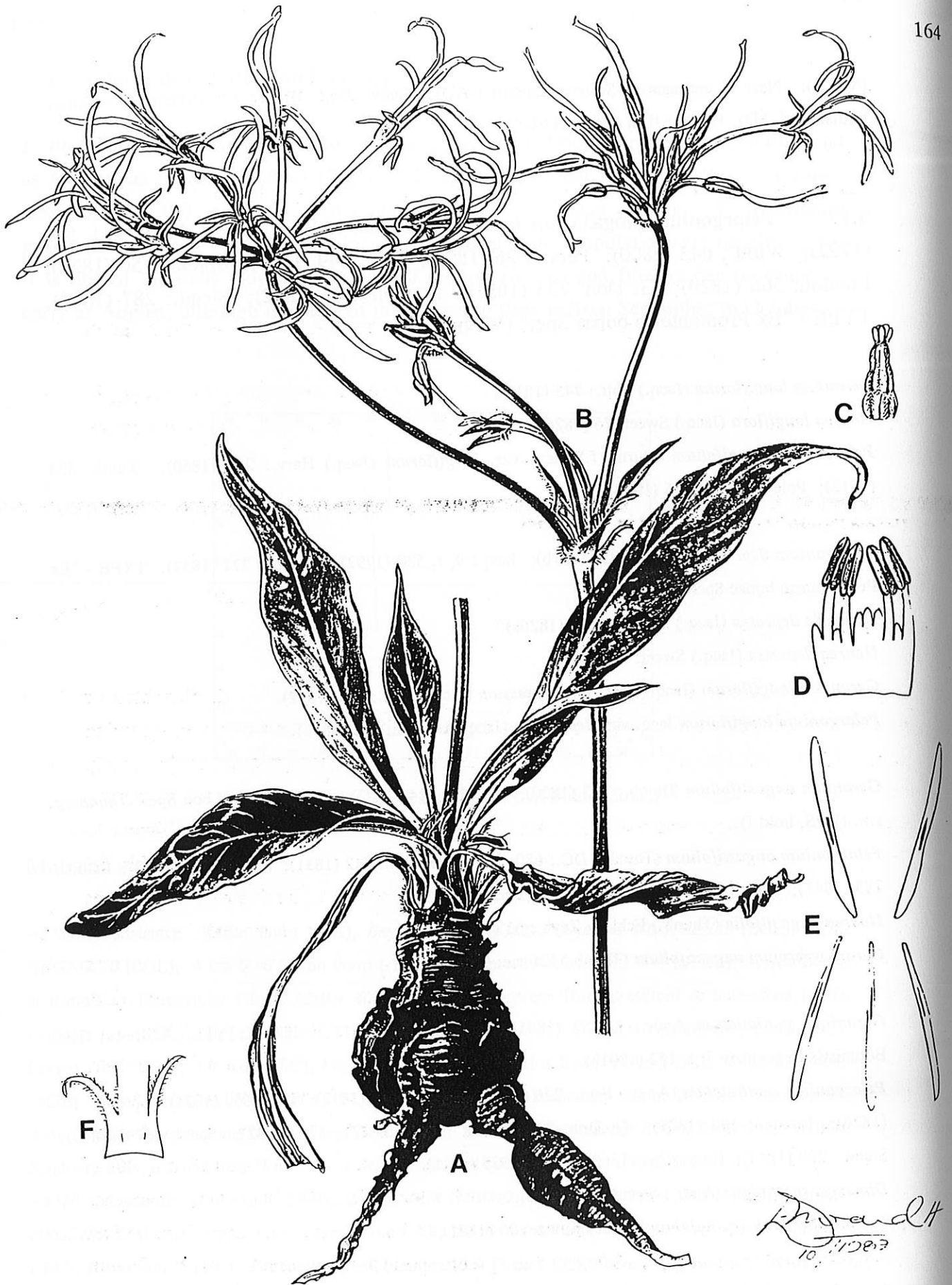


Figure 8.17.1 *Pelargonium longiflorum*. A, plant with leaves x1; B, inflorescence x1; C, gynoecium x5; D, androecium x5; E, petals x1; F, leaf base x2.

Pelargonium spathulatum (Andr.) Pers. var. *curvifolium* (Andr.) Knuth: 325 (1912).

Geranium spathulatum Andr. var. *affine* Poir.: 757 (1812). (Type as for *Geranium spathulatum* var. *curvifolium* Andr.)

Pelargonium spathulatum (Andr.) Pers. var. *affine* (Poir.) Loudon: 568 (1829); Loudon: 272 (1832).

Hoarea affine (Poir.) Sweet: 77 (1826c).

Pelargonium affine (Poir.) G. Don: 729 (1831); Steud.: 283 (1841).

Geranium lineare Andr.: t. 193 (1801b); Poir.: 758 (1812). ICONOTYPE: Andrews, The Botanist's Repository 3: t. 193 (1801b).

Pelargonium lineare (Andr.) Pers.: 228 (1806); Ait. f.: 160 (1812); DC.: 650 (1824); Spreng.: 50 (1826); Loudon: 568 (1829); G. Don: 729 (1831); Loudon: 271, 272 (1832); Steud.: 678 (1840); Steud.: 287 (1841).

Dimacria linearis (Andr.) Sweet: 77 (1826c).

Hoarea linearis (Andr.) Eckl. & Zeyh.: 62 (1835).

Dimacria rumicifolia Sweet: t. 318 (1826b). ICONOTYPE: Sweet, Geraniaceae 4: t. 318 (1826b).

Pelargonium rumicifolium (Sweet) Loudon: 272 (1832); Steud.: 289 (1841).

A geophyte 130--300 mm tall when in flower. **Tuber:** a turnip-shaped, elongated or sometimes moniliform root, older plants sometimes with more than one stem-growing point, 15--50 mm long and 10--30 mm in diameter. **Leaves** green, simple, rarely auriculate, petiolate; lamina lanceolate, base attenuate, apex acuminate, margin entire, 40--160 x 5--25 mm, indumentum adaxially varies from glabrous or sparsely hirsute to densely hirsute with long appressed hairs, and abaxially from glabrous or sparsely hirsute to densely hirsute with long appressed hairs and with very short glandular hairs, margins sometimes ciliate with short or long hairs; petiole 20--110 mm long and 1--2 mm in diameter, rigid, erect, covered with long patent hairs; stipules subulate, adnate to petioles for half or two thirds of their length, 8--40 mm long and *ca.* 2 mm wide, hirsute. **Inflorescence:** scape 20--190 mm long, branched, bearing 2--6(-10) pseudo-umbellets with 4--15 flowers each; peduncles 20--130 mm long, 1--2 mm in diameter, green, hirsute with distally appressed curly hairs interspersed with glandular hairs and sometimes long patent hairs; bracts subulate, 4--11 mm long, 1--2 mm wide, adaxially and abaxially densely hirsute with distally appressed hairs. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** (10-)15--44 mm long, covered with long glandular hairs and sometimes interspersed with appressed curly hairs or patent hairs. **Sepals** 5, lanceolate, apices attenuate, 6--12 mm long, 1--3 mm wide, green, posterior one erect, others reflexed, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured, yellow, orange-pink or pale pink, claws forming a floral sheath, apices recurved during anthesis; posterior two

with wine-red feather-like markings, ligulate or narrowly spathulate, bases attenuate or narrowly cuneate, apices obtuse or rounded, 20--36 x 2--4 mm; anterior three with a wine-red stripe on the claws, ligulate or narrowly spathulate, bases attenuate, apices obtuse or rounded, 17,5--33 x 1--3 mm. **Stamens:** staminal column 1--2 mm long, white, smooth; perfect stamens 4--5, concealed within the floral sheath, posterior one 1,5--4 mm long, lateral two 2,5--5 mm long, anterior two 4--6 mm long, white; staminodes 1,5--2,5 mm long; anthers pink, posterior one sometimes lacking, when present usually smaller than the rest, (1-)1,5--2,5 mm long, pollen orange. **Gynoecium:** ovary 2--4 mm long; style 0,1--1 mm long, pale green; stigma branches 0,2--2 mm long, adaxially pale pink, abaxially pale green. **Fruit:** bases of mericarps 6--7 mm long, without glandular hairs, tails 31--33 mm long (Figure 8.17.1).

Diagnostic features and affinities

P. longiflorum, is as indicated by the specific epithet a species with very long flowers because of the very long and narrow petals. The four or five fertile stamens are very short and concealed in the floral sheath. This floral structure is similar to that of *P. attenuatum*, *P. angustipetalum*, *P. leptum*, *P. fergusoniae*, *P. undulatum* and *P. viciifolium*. All of these species have compound leaves whereas *P. longiflorum* has simple, lanceolate leaves.

The number of the fertile stamens in *P. longiflorum* varies between four and five. The posterior filament often lacks an anther and if the anther is present, it is usually smaller than the rest. A similar variation occurs in *P. echinatum* Curtis and *P. crassicaule* L'Hérit., both species of section *Cortusina* (DC.) Harv. (Marais 1981).

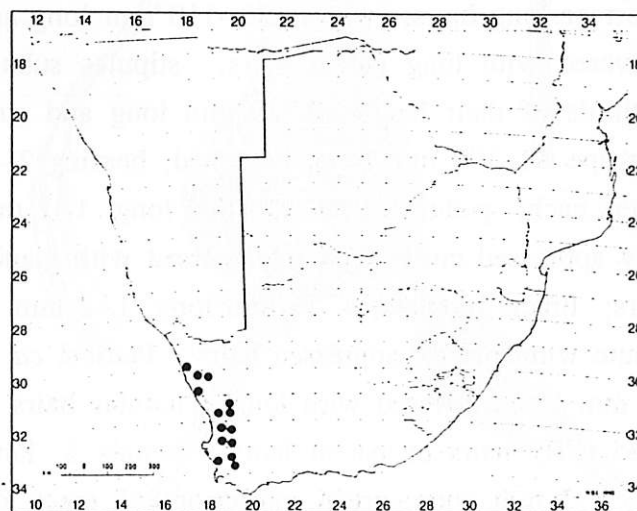


Figure 8.17.2 Geographical distribution of *P. longiflorum*.

Geographical distribution and ecology

P. longiflorum occurs along the west coast of the Cape Province, from Komaggas and Kamieskroon in the north to the vicinity of Darling in the south and Worcester in the east (Figure 8.17.2). This area is mainly a winter rainfall region, receiving an annual precipitation of 100--200 mm. Plants grow in mountain or arid fynbos, but are also found in strandveld vegetation, occurring in light shade under bushes or in direct sunlight. The occurrence of plants varies from single plants to large populations in sandy places, but also on stony clay hillsides. The peak of the flowering time is in October and November, but in some cases flowers were found as early as August or as late as March. At flowering time the leaves are usually still present.

Material studied

- 2917 (Springbok): Komaggas, farm Platvlei (-CD), *Le Roux* 2828 (STE).
- 3017 (Hondekliipbaai): 4,5 miles N of Kamieskroon (-BB), *Hardy & Bayliss* 1125 (PREx3); Kotzesrust, Namaqualand (-DD), *Acocks* 23399 (PREx2).
- 3018 (Kamiesberg): Krakkeelkraal (-AA), *Drège* 3240 (MO, P); Between Pedroskloof & Leliefontein (-AA), *Drège s.n.* (K, P, W); Leliefontein (-AC), *Adamson* 1565 (BOL, PRE); Kamiesberg (-AC), *Ecklon & Zeyher* 472 (G, K, MELx2, MO, Px2, PRE, Sx2, TCD, Wx2); *Zeyher* 73 (MEL); *Zeyher* 1244 (S).
- 3118 (Vanrhynsdorp): Windhoekberg near Klawer (-DA), *Leipoldt* 4093 (BOLx3, PRE); Vleikraal (-DA), *Schonken* 37 (STEU); *Walters* 3 (STEU); *Walters* 88 (PRE, STE).
- 3119 (Calvinia): Groenrivier & Onderbokkeveld (-AC), *Drège* 3238 (P); Groenrivier & Waterval (-AC), *Drège s.n.* (E, G, K, L, MO, P, S, W); Between Grasberg & Waterval (-AC), *Drège s.n.* (G, P); Nieuwoudtville (-AC), *Galpin* 11151 (K, PRE); Between Oorlogskloof & Papkuilsfontein (-AC), *Leipoldt* 3079 (BOL); Lokenburg (-CA), *Acocks* 18581 (K, PRE).
- 3218 (Clanwilliam): Ramskop (-BB), *Leipoldt* 517 (SAM); Melkboomfontein, on the banks of the Olifantsrivier (-BD), *Marais* 267 (STEU); Between Citrusdal & Clanwilliam (-BD), *Van der Walt* 1412 (STEU); Somergroen, S of Paleisheuwel (-DA), *Marais* 308 (STEU); Klipfontein, Driefontein & Bergvallei (-DA), *Zeyher* 173 (BM, G, Kx2, Px2, S, SAM, WU); Versveld Pass (-DC), *Drijfhout* 1813 (STEU); Rhinosterbosch, Piketberg (-DD), *Drège* 7495 (G, MEL, P).
- 3219 (Wuppertal): Pakhuis Pass (-AA), *Leipoldt* 519 (SAM); *Marais* 204b, 268 (STEU); 1 mile SW of Klein Pakhuis (-AA), *Nordenstam* 3431 (S); Algeria (-AC), *Le Maitre s.n.* (STEU); Dasklip road, 2 km on Grootfontein road (-CC), *Marais* 179, 182 (STEU).
- 3318 (Cape Town): Near Groot Post, Malmesbury (-BC), *Salter* 6462 (BOLx2); Groenkloof (-CB), *Zeyher s.n.* (P).

--3319 (Worcester): Tulbagh (-AC), *Esterhuysen 17487* (BOL); Farm De Heuvel, between Tulbagh & Ceres (-AC), *Jordaan 122* (STE); Nuwekloof Pass (-AC), *Marais 35* (STEU); Tulbaghkloof, Winterhoekberge, Vogelvlei (-AC), *Zeyher 173a* (G, W, Z); Worcester West (-CB), *Forrester s.n.* (NBG).

PROLIFERUM GROUP

Geophytes with heteroblastic leaf development. Lanceolate laminae vary from simple to pinnate or irregularly bipinnatisect. Scape branched, bearing 2--4 pseudo-umbellets with 2--7(-10) flowers each. Hypanthium short, 6--16 mm long. Flowers with white, yellow or pink, spatulate petals, with very large wine-red, nearly black markings; posterior petals 7--16 mm long. Stamens 5 fertile, much shorter than the sepals, concealed within the floral sheath. Tectum of pollen reticulate, luminae small.

8.18 *Pelargonium proliferum* (Burm. f.) Steud., Nomenclator botanicus, 2nd edn, 2: 289 (1841). TYPE - Cape: "Cap. Bon. Spei" (G, lecto.!, designated here).

Geranium proliferum Burm. f.: 51, n. 70 (1759); Burm. f.: 19 (1768); Cav.: 259, t. 120, f. 3 (1787); Thunb.: 116 (1800); Thunb.: 528 (1823). TYPE - Cape: "Cap. Bon. Spei" (G, lecto.!, designated here).

Geranium prolificum L. *proliferum* (Burm. f.) L.: 949 (1763).

Hoarea prolifera (Burm. f.) Eckl. & Zeyh.: 62 (1835).

Geranospermum proliferum (Burm. f.) Kuntze: 94 (1891).

Geranium ciliatum Cav.: 234, t. 118, f. 2 (1787); Thunb.: 113 (1800); Thunb.: 514 (1823); non Andr.: t. 247 (1802b). TYPE: *Thunberg s.n.* (MA, lecto.!, designated here).

Pelargonium ciliatum (Cav.) Pers.: 226 (1806); Spreng.: 50 (1826); non Jacq.: 195 (1791b); nec L'Hérit.: t. 7 (1792).

Pelargonium parnassioides DC.: 650 (1824); substitute name for *G. ciliatum* Cav.: 234, t. 118, f. 2 (1787); G. Don: 726 (1831); Steud.: 677 (1840); Steud.: 288 (1841).

Hoarea parnassioides (DC.) Eckl. & Zeyh.: 60 (1835).

Pelargonium longifolium (Burm. f.) Jacq. var. *parnassioides* (DC.) Knuth: 324 (1912).

Pelargonium tysonii Szyszyl.: 8 (1888); substitute name for *G. ciliatum* Cav.: 234, t. 118, f. 2 (1787); Knuth: 329 (1912); Leighton: t. 512 (1933).

Pelargonium barbatum Jacq.: 196 (1791b); Jacq.: 8, t. 513 (1792); Willd.: 648 (1800); Pers.: 227 (1806); Ait. f.: 164 (1812); DC.: 652 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 728 (1831); Loudon: 271 (1832); Steud.: 283 (1841); Harv.: 267 (1860); Knuth: 338 (1912).
TYPE - "Ex Promontorio bonei Spei" (W, holo!).

Geranium laciniatum Andr.: t. 131 (1801a); Poir.: 750 (1812). ICONOTYPE: Andrews, The Botanist's Repository 2: t. 131 (1801a).

Pelargonium laciniatum (Andr.) Pers.: 228 (1806); Link: 182 (1822); DC.: 651 (1824); Spreng.: 52 (1826); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 287 (1841).

Hoarea laciniata (Andr.) Sweet: 75 (1826c).

Pelargonium longifolium (Burm. f.) Jacq. var. *laciniatum* (Andr.) Harv.: 262 (1860) p.p.; Knuth: 324 (1912).

Geranium laciniatum var. *flore purpureo* Andr.: t. 204 (1802a). ICONOTYPE: Andrews, The Botanist's Repository 3: t. 204 (1802a).

Pelargonium purpurascens Pers.: 227 (1806); substitute name for *G. laciniatum* var. *flore purpureo* Andr.: t. 204 (1802a); DC.: 652 (1824); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 272 (1832); Steud.: 228 (1841).

Geranium purpurascens (Pers.) Poir.: 757 (1812).

Hoarea purpurascens (Pers.) Sweet: 75 (1826c); Eckl. & Zeyh.: 62 (1835).

Geranium laciniatum var. *bicolor* Andr.: t. 269 (1802b). ICONOTYPE: Andrews, The Botanist's Repository 4: t. 269 (1802b).

Pelargonium penniforme Pers.: 227 (1806); substitute name for *G. laciniatum* var. *bicolor* Andr.: t. 269 (1802b); DC.: 652 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 678 (1840); Steud.: 288 (1841); Harv.: 271 (1860).

Geranium penniforme (Pers.) Poir.: 757 (1812).

Hoarea penniformis (Pers.) Sweet: 75 (1826c); Eckl. & Zeyh.: 62 (1835).

Geranospermum penniforme (Pers.) Kuntze: 95 (1891).

Hoarea leana Sweet: t. 323 (1826b); Sweet: 75 (1826c). ICONOTYPE: Sweet, Geraniaceae 4: t. 323 (1826b).

Pelargonium leaenum (Sweet) G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 287 (1841).

A geophyte 130--320 mm tall when in flower. **Tuber:** a turnip-shaped, elongated or sometimes moniliform root 10--30 mm long and 8--25 mm in diameter. **Leaves** vary from simple to irregularly pinnately or bipinnately incised, green, petiolate; lamina of simple leaves lanceolate to ovate, base attenuate to cuneate, apex acute, margin



Figure 8.18.1 *Pelargonium proliferum*. 1, flowering plants x1; 2, androecium x4; 3, gynoecium x4; 4, petals x2; 5, hypanthium with sepals x2.

Proctor

entire, 15--80 x 6--20 mm, lamina of compound leaves 15--80 mm long, pinnae 8--30 mm long, lacinate, segments 1--2 mm wide, glabrous to sparsely hirsute with appressed hairs, margins ciliate; petiole 15--45 mm long and 0,5--2 mm in diameter, rigid, erect, glabrous or hirsute with appressed hairs; stipules subulate, adnate to petioles for half their length, 10--25 mm long and 1--2 mm wide, membranous, ciliate. **Inflorescence:** scape 70--230 mm long, branched, bearing 2--4 pseudo-umbellets with 2--7(-9) flowers each; peduncles 20--80 mm long, 0,5--1 mm in diameter, indumentum varies from densely hirsute with appressed curly hairs interspersed with long glandular hairs to only glandular; bracts subulate, 3--9 mm long, 1--2 mm wide, abaxially hirsute interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 6--12 mm long, green to reddish brown, densely covered with glandular hairs, sometimes also with appressed curly hairs. **Sepals** 5, posterior one usually triangular, others lanceolate, apices acute, 5--8,5 mm long, 1--4 mm wide, posterior one erect, others recurved; green to reddish brown with margins white, indumentum abaxially as on hypanthium,. **Petals** 5, white, cream-coloured, pale pink or pink, patent during anthesis, with apices recurved; posterior two usually with feather-like wine-red markings, sometimes with wine-red blotches in the centre, ligulate to spatulate, bases cuneate, apices rounded, truncate or emarginate, 8,5--15 x 2--4,2 mm; anterior three spatulate, bases attenuate, apices rounded, 8,5--14 x 1--3 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed within the floral sheath, posterior one 2--4 mm long, lateral two 2,5--5 mm long, anterior two 2,5--5 mm long, white; staminodes 1--3 mm long; anthers dark pink, 1,2--2 mm long, pollen orange. **Gynoecium:** ovary 1,5--3 mm long; style 0,1--1 mm long, pink; stigma branches 0,3--1,3 mm long, pink. **Fruit:** bases of mericarps 4,5--6 mm long, without glandular hairs, tails 24--28 mm long. (Figure 8.18.1).

Diagnostic features and affinities

P. proliferum is a geophyte with very small white, cream-coloured, pale pink or pink flowers and short stamens. This floral structure is similar to that of *P. caledonicum* and *P. pilosellifolium*. All three species have small flowers with short stamens which are concealed in the flower sheath. *P. proliferum* usually has feather-like markings on the petals, or sometimes a wine-red blotch in the centre of the petals, whereas the other two species are known for the conspicuous dark markings on all the petals, giving them a wine-red appearance. The leaves of *P. proliferum* show a great diversity in form and incisions and vary from simple to deeply incised, a similar variation as in *P. longifolium*, hence the confusion that exists between the two

species. *P. longifolium* has also short stamens, but the linear-spathulate petals are long (posterior ones 15--23 mm) with prominent blotches in the centre.

The specific epithet *proliferum*, that is producing offsets, refers to the branching scape, producing several peduncles, each with a many-flowered pseudo-umbellet (Burman 1759).

Geographical distribution and ecology

P. proliferum occurs in the south-western Cape. The majority of specimens were collected on the south-western escarpment, but collections from the western and southern coastal plains are also known. It occurs from Nieuwoudtville and the Matsikamma Mountains in the north to Bredasdorp in the south and Garcia's Pass in the east (Figure 8.18.2). This is mainly a winter rainfall area receiving an annual precipitation of 200--600 mm. The plants are common in fynbos on sandstone, but they also occur in renosterveld on shale. Flowers occur throughout the year but the peak of the flowering time is from October to December.

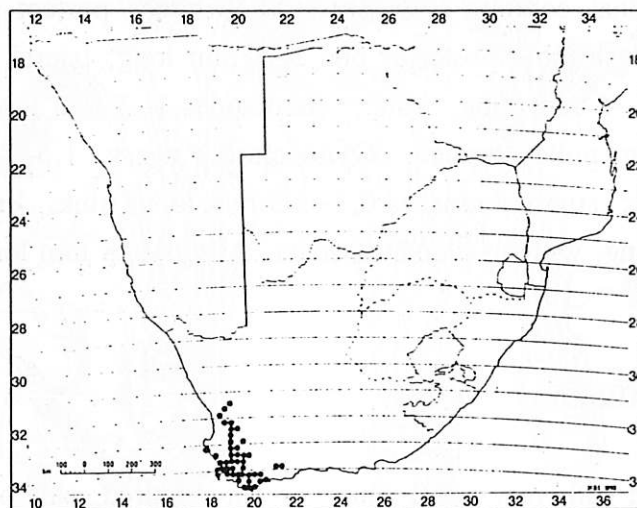


Figure 8.18.2 Geographical distribution of *P. proliferum*.

Material studied

--3118 (Vanrhynsdorp): Matsikammaberg, N of Die Vlei (-DB), *Snijman 960* (NBG); Giftberg (-DC), *Esterhuysen 21961* (BOL, K, PRE).

--3119 (Calvinia): Grasberg near Nieuwoudtville (-AC), *Lavranos & Bleck 20884* (STEU).

--3218 (Clanwilliam): Clanwilliam (-BB), *Edwards s.n.* (BOL).

--3219 (Wuppertal): Heuningvlei (-AA), *Esterhuysen 15015* (BOL); Pakhuis Pass (-AA), *Nordenstam 3446* (S, STE); Middelberg, Cederberge (-AC), *Compton 12735* (NBG); *Esterhuysen 7266* (BOL); *Kerfoot 6154* (NBG); Tafelberg, Cederberge (-AC), *Esterhuysen 18166* (BOL, PRE); Top of Uitkyk Pass, Cederberge (-AC); *Esterhuysen 18172* (BOL, K, NBG); Cederberge (-AC), *Thode A2147* (PRE); Between Ezelsbank & Dwarsrivier (-AD), *Drège s.n.* (K); Olifantsrivier, Matjiesfontein (-AD), *Sonder s.n.* (MEL); Kromrivierkloof, Cederberge (-CA), *Esterhuysen 18016* (BOL, PRE); Top of Dasklippas (-CC), *Marais 86* (STEU); *Van der Walt 1427, 1507* (STEU); Thee river, Olifantsrivier Mountains (-DC), *Esterhuysen 15310* (BOL, K).

--3317 (Saldanha): Dunes at Saldanha Bay (-BB), *Ecklon & Zehyer 477* (P, Sx2, SAM).

--3318 (Cape Town): Darling Flora Reserve (-AD), *Rycroft 1917* (NBG); Lion's Head (-CD), *Alexander s.n.* (TCD); *Compton 12556* (NBG); *Ecklon s.n.* (MEL, SAM); *Ecklon & Zehyer 466* (S, SAM); *Garside 1755* (K); *Lavranos 3781* (PRE); *Leighton 720* (BOL); *MacOwan 1811* (BM, G, K, P, UPS, Z); *Marloth 387* (PRE); Lion's Rump (-CD), *Pappe s.n.* (K); *Salter 6537* (BOL); Lion's Back (-CD), *Salter 6450* (BOL); Table Mountain (-CD), *Brain 5993* (SRGH); *Ecklon 599* (K, MO, W, Z); *Ecklon 601* (BM, E, G, K, MO, P, PRE, Wx3); *Ecklon s.n.* (P); *Ecklon & Zeyher 479* (Sx4, SAM); *Kitching s.n.* (K); *Tyson 2365* (NBG); Blinkwater, Camps Bay (-CD), *Cassidy 89* (NBG); Camps Bay (-CD), *Marloth 7705a* (PRE); Signal Hill (-CD), *Dümmer 848* (E); *Van der Walt 483, 659* (STEU); Kloofnek (-CD), *Marloth s.n.* (PRE); Slopes near Platteklip (-CD), *Marloth 8778b* (PRE); Green Point (-CD), *Pappe s.n.* (S); *Prior s.n.* (K, PRE, Z); Sea Point (-CD), *Wolley-Dod 3677* (BOL, K); Devil's Peak (-CD), *Szyszyłowics 1128* (Z); Kalabaskraal (-DA), *Bolus s.n.* (STE); Paarl (-DB), *Compton 17985* (BOL, NBG); *Drège s.n.* (P); *Prior s.n.* (K); Paarlberg (-DB), *Drège 7494a* (TCD); *Prior s.n.* (K, PRE, Z); Modderkloof, Paardeberg (-DB), *Fellingham 16* (PRE, STE); Kraaifontein (-DC), *Acocks 4345* (S); Annandale (-DC), *Rantanen s.n.* (Z); Between Paarl road and Muldersvlei (-DD), *Acocks 4398* (S); Bottelary road, 8 km from Stellenbosch (-DD), *Acocks 4359* (S); Stellenbosch flats (-DD), *Bos 46* (STE); *Duthie 442, s.n.* (BOL); *Eyles 6553* (SRGH); *Marais 369* (STEU); *Smith 4200A* (PRE); Jan Marais Nature Reserve, Stellenbosch (-DD), *Van der Walt 546* (STEU); Stellenboschberg (-DD), *Van der Walt s.n.* (STEU); Banhoek, Stellenbosch (-DD), *Martley s.n.* (BOL); *Vorster 2767* (STEU); Simonsberg, N slope (-DD), *Buys s.n.* (STEU); Jonkershoek (-DD), *Compton 15351* (NBG); *Garside 1172* (K); *Kruger 87* (STE); *Levyans 7350* (BOL); *Taylor 4381* (PRE, STE); *Taylor 5581* (K, PRE); *Van der Merwe 4231* (PRE, STE); *Walgate 1001* (BOL); Between Franschoek & Paarl (-DD), *Drège s.n.* (BOL, E, G, K, MEL, MO, OXF, P, S, W); Bergrivier near Paarl (-DD), *Drège s.n.* (L, P, W); Devil's Tooth, Groot Drakenstein (-DD), *Esterhuysen 24015* (BOL, K, PRE); Klein Welmoed, Eersterivier valley (-DD), *Pillans 9972* (BOL).

--3319 (Worcester): Between Driebos & Langvlei (-AA), *Van der Walt 1085, 1086* (STEU); Zuurvlaakte (-AA), *Van der Walt 1425* (STEU); Groot Winterhoek Forest Reserve (-AA), *Van der Walt s.n.* (STEU); Hansiesberg (-AB), *Henderson 2201* (NBG); Gydo (-AB), *Leipoldt s.n.* (BOL); *Muller 4037* (STEU); Agter-Witzenberg (-AB), *Marais 44* (STEU); Op Die Berg (-AB), *Marais 190* (STEU); Waterfall, Tulbagh (-AC), *Ecklon & Zeyher 458* (S); *Ecklon & Zeyher 464* (Lx2, Wx2);

3
 Kruger 905 (STE); Tulbagh (-AC), *Ecklon & Zeyher 475* (SAM); *Esterhuysen 16899* (BOL); Near Romansrivier (-AC), *Leighton 2195* (BOL); Steinthal (-AC), *Pappe 7* (TCD); Ceres road (-AC), *Schlechter 2118* (PRE); 10 km W of Kluitjieskraal (-AC), *Van der Walt 651* (STEU); Bergplaas (-AC), *Van der Walt 931* (STEU); Ceres (-AD); *Cillié s.n.* (STEU); 2 km N of Ceres (-AD), *Cillié s.n. sub. STEU 3368, 3461* (STEU); Prince Alfred Hamlet (-AD), *Oliver 5905* (PRE, STE); Orchard (-BC), *Esterhuysen 10934* (BOL); Sandfontein (-BD), *Esterhuysen 27202* (PRE); Stangenheuwel, Franschoek, Donkerhoek (-CA), *Drège s.n.* (CGE, E, G, K, P, PRE, S, TCD, W); Bainskloof (-CA), *Schlechter 9143* (BM, BOL, E, K, MO, P, PREx2, S, W, Z); *Schlechter 9193* (Gx3); Lategan Farm (-CA); *Walters 894* (NBG); Rawsonville (-CB), *Louw 3600* (PU); Worcester shooting Range (-CB), *Marais 341* (STEU); SE of Brandvleidam (-CB), *Van Zyl s.n.* (STEU); Chavonnes Station veld (-CB), *Walters 1710* (NBG); Wylersdrift, Goudini (-CB), *Walters 1887* (NBG); Groenvlei (-CB), *Walters 2557* (NBG); Drakenstein (-CC), *Leipoldt s.n.* (BOL); Franschoek (-CC), *Phillips 1062* (SAM); Wemmershoek (-CC), *Salter 6501* (BOL); 20 km from Villiersdorp to Franschoek (-CC), *Van Wyk 1958* (PRE); Naudesberg (-DA); *Barker 9128* (NBG); Sand Hills (-DA), *Van der Walt s.n.* (STEU); Between Franschoek & Zonder-einde River bridge (-DC), *Salter 4977* (BOL); Jonaskop (-DC), *Thompson 1433* (STE).

--3321 (Ladismith): Garcia's Pass (-CC), *Marais 166* (STEU); Langkloof, near Garcia's Pass (-CD), *McDonald 1096, 1097* (STEU).

--3418 (Simonstown): Victoria Drive, near Oudekraal (-AB), *Acocks 1082* (S); Wynberg Hill (-AB), *Bolus 17191* (BOL); Faure (-BA), *Bolus 22912* (BOL); *Oliver 5902* (STE, STEU); Gordon's Bay (-BB), *Bolus s.n.* (BOL); Hottentotsholland Mountains (-BB), *Ecklon & Zeyher 470* (G, K, Lx2, MEL, P, Sx2, SAM, W); Sir Lowry's Pass (-BB), *Hafström s.n.* (S); Helderberg (-BB), *Marais 290, 291* (STEU); Between Somerset-West, Sneekop & Landroskop (-BB), *Stokoe SAM53963* (SAM); Hottentotsholland (-BB), *Verreaux s.n.* (G); *Zeyher 83* (MEL).

--3419 (Caledon): Elgin (-AA), *Leighton 813* (BOL); *Lewis 1766* (SAM); Houw Hoek Pass (-AA), *Werdermann & Oberdieck 685* (PRE); Theewaterkloof Dam (-AB), *Perry 1218, 1219* (NBG); Stanford (-AD), *Schlechter 10428* (BM, G, Kx2, PRE, Z); Greyton (-BA), *Gillett 869* (BOL); Genadendal (-BA), *Van der Walt 1093* (STEU); Riviersonderend (-BB), *Esterhuysen 4313* (BOL, PRE); Dasberg, near Stormsvlei (-BB), *Stokoe SAM63202* (SAM); Skurfkop, Napier (-BD), *Jordaan 893* (STE); Ratelrivier flats (-DA), *Lewis 5246* (NBG); Groot Hagelkraal (-DA), *Oliver 6124* (PRE, STE); Elim (-DA), *Schlechter 7688* (PRE); 15 km from Bredasdorp to Heuningrug (-DB), *Fischer 285* (STEU).

--3420 (Bredasdorp): 5 km E of Brakfontein, Riviersonderend (-AA), *Fischer 302* (STEU); Knoblauch farm (-AA), *Fischer 311* (STEU); Bosheuwel (-AA), *Van Breda 519* (PRE); Swellendam (-AB), *Marloth 8461* (PRE); Halfway between Bredasdorp & Malgas (-AD); *Esterhuysen 4338* (BOL); De Hoop-Potberg Nature Reserve (-BC), *Burgers 1796* (PRE, STE); S of Hammerkop, Potberg Estates (-BC), *Thompson 1106* (STE); Potberg (-BC), *Van der Walt 1428* (STEU); Bredasdorp (-CA), *Bolus 20524* (BOL).

8.19 *Pelargonium pilosellifolium* (Eckl. & Zeyh.) Steud., Nomenclator botanicus, 2nd edn, 2: 288 (1841), (as "*pilosellaefolium*"). TYPE - Cape Province: ". . . In collibus apud villam 'Puspasvalley' prope 'Zwellendam', Ecklon & Zeyher 469 (S, lecto!, designated here, G!, K!, Lx3!, MEL!, MO!, OXF!, P!, S!, SAM!, Wx2!).

Hoarea pilosellaefolia Eckl. & Zeyh.: 61 (1835). TYPE - Cape Province: ". . . In collibus apud villam 'Puspasvalley' prope 'Zwellendam', Ecklon & Zeyher 469 (S, lecto!, designated here, G!, K!, Lx3!, MEL!, MO!, OXF!, P!, S!, SAM!, Wx2!).

A geophyte 150--320 mm tall when in flower. **Tuber:** a turnip-shaped, elongated or sometimes moniliform root 15--55 mm long and 10--30 mm in diameter. **Leaves** green or glaucous, petiolate; lamina usually simple, lanceolate, adaxially concave, base narrowly cuneate, apex acute, 30--100 x 13--23 mm; sometimes pinnatisect to pinnate, pinnae 8--25 mm long, 1--1,5 mm wide, usually glabrous, margins ciliate with long stiff appressed hairs; petiole 10--60 mm long and 2 mm in diameter, rigid, erect, hirsute with appressed hairs; stipules subulate, adnate to petioles for one third to half of their length, 15--25 mm long and 1--2 mm wide, membranous, ciliate. **Inflorescence:** scape 90--250 mm long, branched, bearing 2--3(-5) pseudo-umbellets with 5--7(-10) flowers each; peduncles 30--70 mm long, 1--1,5 mm in diameter, indumentum varies from densely hirsute with appressed curly hairs interspersed with long glandular hairs and long soft patent hairs to only glandular interspersed with long soft hairs; bracts subulate, 3--13 mm long, 1--2 mm wide, abaxially densely hirsute with long appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 8--13 mm long, reddish brown to wine-red, densely covered with long glandular hairs, sometimes also with appressed curly hairs. **Sepals** 5, posterior one usually triangular, others lanceolate, apices mucronate, 5,5--7,5 mm long, 1--4 mm wide, posterior one erect, others recurved, reddish brown or wine-red with margins white to pink, indumentum abaxially as on hypanthium,. **Petals** 5, white, pale pink or pink with conspicuous and extensive wine-red markings in the centre, leaving only a narrow pink margin, patent during anthesis; posterior two ligulate or narrowly spatulate, bases white, cuneate, apices rounded, truncate or emarginate, 8,5--12 x 2--3 mm; anterior three narrowly spatulate, bases attenuate, apices rounded, 9--13,5 x 1,2--2 mm. **Stamens:** staminal column 1--2,5 mm long, white; perfect stamens 5, concealed within the floral sheath, posterior one 3--4 mm long, lateral two 3,5--5 mm long, anterior two 3,5--5 mm long, white; staminodes 1,5--3 mm long; anthers dark pink, 1,5--1,8 mm long, pollen orange. **Gynoecium:** ovary 2--3,5 mm long; style 0,2--0,5 mm long,



Figure 8.19.1 *Pelargonium pilosellifolium*. 1, flowering plant x1; 2, petals x2; 3, gynoecium x5; 4, androecium x4.

dark pink; stigma branches 0,5--1 mm long, dark pink. **Fruit:** bases of mericarps 6 mm long, without glandular hairs, tails 28--32 mm long. (Figure 8.19.1).

Diagnostic features and affinities

P. pilosellifolium is a geophyte with small wine-red flowers and lanceolate, glaucous leaves. The leaves are usually glabrous but ciliate with long distally appressed hairs. The epithet *pilosellifolium*, derived from *pilosus*, that is hairy with distinct long ascending hairs, refers to the hairs on the margins of the leaves. The flowers are small with ligulate to narrowly spatulate petals with conspicuous wine-red markings, and the stamens are short and concealed in the floral sheath. This floral structure is similar to that of *P. proliferum* and *P. caledonicum*. The flower colour of *P. pilosellifolium* is similar to that of *P. caledonicum*, a species with deeply incised leaves, but differs from that of *P. proliferum* which has white to pink flowers with usually feather-like markings on the petals.

Geographical distribution and ecology

P. pilosellifolium occurs in the southern Cape, from Keeromsberg and Genadendal in the west to Avontuur in the east (Figure 8.19.2). To the west it is mainly a winter rainfall region, but to the east rain occurs throughout the year. The annual precipitation varies between 200 and 400 mm. *P. pilosellifolium* occurs in fynbos on sandstone or the shale-sandstone boundaries. It is also recorded from seasonally moist sandy flats. The peak of the flowering time is in October to December, but flowers may be found as late as February and March.

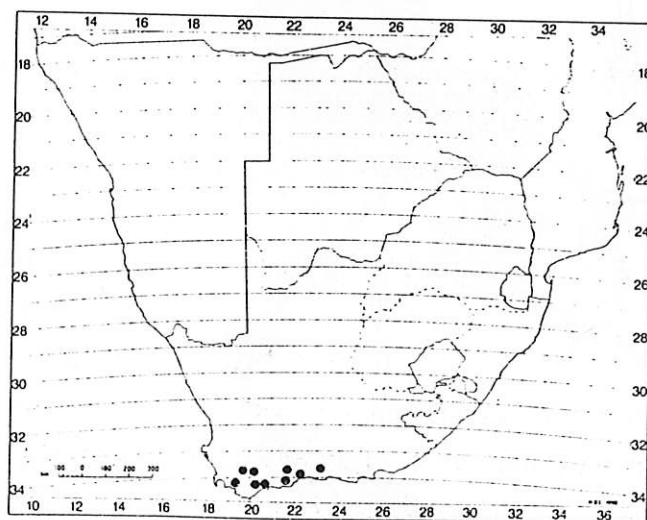


Figure 8.19.2 Geographical distribution of *P. pilosellifolium*.



Figure 8.20.1 *Pelargonium caledonicum*. 1, flowering plant x1; 2, petals x2; 3, androecium x4; 4, gynoecium x4; 5, leaf base x2.

Material studied

- 3319 (Worcester): Keeromsberg (-DA), *Marais 344* (STEU).
- 3320 (Montagu): NW of Brakleegte, Oubergpas (-CA), *Bayer 2661* (NBG); 13,5 km from Bonnievale to Drew (-CC), *Bayer 3269* (NBG).
- 3321 (Ladismith): Rooiberg, E of Boschrivier (-DA), *Thompson 3556* (STE).
- 3322 (Oudtshoorn): Robertson Pass (-CC), *Hops 4* (BOL); 20 km NW of George to Outeniqua Pass (-CD), *Schonken 201* (STEU).
- 3323 (Willowmore): Sondagsberg, Avontuur (-CA), *Fischer 354, 365* (STEU).
- 3419 (Caledon): Near Uitkyk, Genadendal (-AB), *Van der Walt 1105* (STEU).
- 3420 (Bredasdorp): Stormsvlei (-AA), *Fischer 293* (STEU); Voorhuis, W of Swellendam (-AB), *Bayer 2954* (NBG); Puspas Valley, Swellendam (-AB), *Ecklon & Zehyer 469* (G, K, Lx3, MEL, MO, OXF; P, Sx2, SAM, Wx2); National Bontebok Park (-AB), *Grobler 559* (STE); *Liebenberg 7210* (PRE); 30 km SW of Swellendam, on road to Bredasdorp (-AC), *Lavranos 20911* (STEU); Zuurbraak (-BA), *Thode A2300* (PRE); S tip of Potberg, farm Elandspad (-BC), *Burrows 1051* (NBG).
- 3421 (Riversdale): 4 miles W of Albertinia (-BA), *Acocks 23091* (K).

8.20 *Pelargonium caledonicum* L. *Bol.* in South African gardening and country life 22: 229, 232 (1932); Van der Walt & Vorster: 21, fig. (1981a). TYPE - Cape Province: ". . . on hillslopes between Caledon and the Hot Bath", *L. Bolus s.n. sub BOL19176* (BOL, lecto!, BOLx2!, Kx2!, PRE!)

A geophyte 130--210 mm tall when in flower. **Tuber:** a turnip-shaped, elongated or sometimes moniliform root 10--50 mm long and 8--25 mm in diameter. **Leaves** greyish green, petiolate; lamina varies from simple to pinnate or bipinnatisect, ovate to narrowly ovate in outline, 40--80 x 15--30 mm, pinnae 8--25 mm long, sometimes lacinate, segments adaxially concave, apices mucronate, 1--1,5 mm wide, densely hirsute with long stiff appressed hairs; petiole 40--85 mm long and 1--1,5 mm in diameter, rigid, erect, hirsute with appressed hairs; stipules subulate, adnate to petioles for half or two thirds of their length, 15--40 mm long and 1--1,5 mm wide, membranous, ciliate. **Inflorescence:** scape 25--120 mm long, branched, bearing 2--3 pseudo-umbellets with 2--7 flowers each; peduncles 25--70 mm long, 0,5--1 mm in diameter, densely hirsute with appressed curly hairs interspersed with long glandular hairs and long soft patent hairs; bracts subulate, 4--5 mm long, 1 mm wide, abaxially densely hirsute with appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 6--16 mm long, reddish brown to wine-red, hirsute with appressed hairs interspersed with

long glandular hairs. **Sepals** 5, posterior one usually triangular, others lanceolate, apices mucronate, 5--8 mm long, 1--3,2 mm wide, posterior one erect, others recurved, reddish brown or wine-red with margins white to pink, indumentum abaxially as on hypanthium,. **Petals** 5, pink or pale pink with conspicuous and extensive wine-red markings in the centre, sometimes leaving only a narrow pink margin, patent during anthesis; posterior two ligulate or narrowly spathulate, bases cuneate, apices rounded, truncate or emarginate, 7--16 x 2,2--4 mm; anterior three narrowly spathulate, bases attenuate, apices rounded, 7--15 x 1,5--2 mm. **Stamens:** staminal column 1--2 mm long, white; perfect stamens 5, concealed within the floral sheath, posterior one 1,5--4 mm long, lateral two 2--4,5 mm long, anterior two 2--5 mm long, white; staminodes 1,5--3 mm long; anthers dark pink, 1,2--2 mm long, pollen orange. **Gynoecium:** ovary 2--2,8 mm long; style 0,5 mm long, dark pink; stigma branches 0,8--1,5 mm long, dark pink. **Fruit:** bases of mericarps 5--7 mm long, without glandular hairs, tails 22--26 mm long. (Figure 8.20.1).

Diagnostic features and affinities

P. caledonicum is a small geophyte with pinnate to bipinnatisect leaves. Juvenile leaves are usually simple, but the older ones are deeply incised and both types are densely covered with appressed hairs, hence the greyish green colour. The flowers are small with ligulate to narrowly spathulate petals with conspicuous wine-red markings, and the stamens are short and concealed in the floral sheath. This floral structure is similar to that of *P. proliferum* and *P. pilosellifolium*.

Geographical distribution and ecology

So far *P. caledonicum* is only known from a small area around Caledon in the southwestern Cape (Figure 8.20.2), hence the specific epithet. It was first collected in 1930 and since then only a few collections were made, all within a radius of 50 km around Caledon. This is a winter rainfall area with an annual precipitation of 400--600 mm. *P. caledonicum* grows in fynbos, but it was also collected in renosterveld on shale. Occasional plants occur in direct sunlight and flower in summer from December to January when the leaves are dying back.

Material studied

--3419 (Caledon): Zwartberg near Caledon Baths (-AB), *Bolus s.n.* (BOL19176) (BOLx3, Kx2, PRE); *Bolus s.n.* (BOL19176, BOL19179) (BOL); Caledon Botanic Garden (-AB), *Fischer 254* (STEU); *Van*

der Walt s.n. (STEU); Shaw's Mountain Pass (-AD), *Grobbelaar 2230* (PRE); Drayton Siding (-BA), *Strauss 96* (NBG); Boesmanskloof E of Greyton (-BA), *Vorster s.n.* (STEU); 45 km from Caledon to Bredasdorp (-BC), *Fischer 268* (STEU).

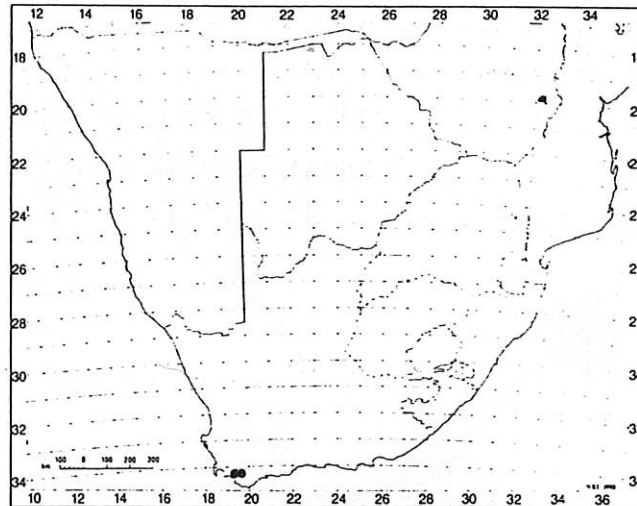


Figure 8.20.2 Geographical distribution of *P. caledonicum*.

HETEROPHYLLUM GROUP

Geophytes with simple, trilobate or trifoliolate or pinnate, ovate or trullate, leaves, with prostrate or erect petioles. Scape branched, bearing 2--6 pseudo-umbellets with 3--14(-20) flowers each. Hypanthium short, 9--19(-32) mm long. Flowers with white, cream-coloured, pale yellow or pink, ligulate petals with red lines or prominent dark blotches on the posterior two, posterior two petals slightly curved, margins undulate. Stamens 5 fertile, posterior one very short, lateral and anterior stamens more or less the same length as the sepals. Tectum of pollen striate.

8.21 *Pelargonium heterophyllum* Jacq., *Collectanea* 4: 197 (1791b); Jacq.: 9, t. 516 (1792); Willd.: 646 (1800); Pers.: 227 (1806); DC.: 651 (1824); Spreng.: 52 (1826); G. Don: 729 (1831); Steud.: 286 (1841); Harv.: 265 (1860); Knuth: 336 (1912). TYPE - "Ex Promontorio bonae Spei" (W, holo.!).

Geranium heterophyllum (Jacq.) Poir.: 746 (1812); non Thunb.: 113 (1800); nec Andr.: C. ic (1805b).

Geranospermum heterophyllum (Jacq.) Kuntze: 95 (1891).