

Stamens 4 or 5, more or less of the same length, protrude from the flower; staminal column papillate. Tectum of pollen striate-reticulate.

8.44 *Pelargonium auritum* (*L.*) *Willd.*, Species Plantarum 3: 644 (1800).
LECTOTYPE: Commelijn, Horti Medici Amstelaedamensis 2: 121, t. 61; original plate in Moninckx collection in Amsterdam (Commelijn 1706, Wijnands 1983).

A geophyte 60-260 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 12--40(-70) mm long and 8--35 mm in diameter. **Leaves** green, petiolate; lamina elliptic to lanceolate, 20--130 x 10--50 mm, simple, auriculate or irregularly deeply pinnatifid to bipinnatisect, segments 12--20 x 4--8 mm, adaxially and abaxially hirsute with long appressed hairs; petiole 10--90 mm long and 1--3 mm in diameter, rigid, prostrate to patent-erect, hirsute with stiff and curly appressed hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles with apices free, 8--30(-45) mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 15--180 mm long, 1,5--3 mm in diameter, branched, bearing 2--4(-6) pseudo-umbelllets with 5--14(-26) flowers each; peduncles 20--110 mm long, 1--2 mm in diameter, green, densely covered with appressed curly hairs interspersed with patent soft hairs and long glandular hairs; bracts subulate, 4--10 x 1--2 mm, abaxially hirsute with distally appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 8--20 mm long, reddish brown, densely hirsute with appressed curly hairs interspersed with long glandular hairs. **Sepals** 5, lanceolate, apices acute, 6--10 mm long, 1,2--3 mm wide, posterior one erect, others recurved, reddish brown to green with margins white, indumentum abaxially as on hypanthium. **Petals** 5, ligulate, dark purple black or white to pale pink, patent during anthesis; posterior two 8--17 x 1,5--3,5 mm, bases cuneate, apices rounded; anterior three 7--15 x 1--3 mm, bases attenuate, apices rounded. **Stamens:** staminal column 1,5--5 mm long, white, papillate; perfect stamens 5, protruding from the flower, posterior one 5--13 mm long, lateral two 6--13,5 mm long, anterior two 6--14 mm long, free filaments pink; staminodes 2--7 mm long; anthers red, 1,5--2 mm long, pollen orange. **Gynoecium:** ovary 3--5,5 mm long; style 1,5--4 mm long, red; stigma branches 1--2,5 mm long, wine-red. **Fruit:** bases of mericarps 5--8 mm long, with or without glandular hairs, tails 20--32 mm long (Figures 8.44.1 & 8.45.1).

Diagnostic features and affinities

P. auritum is characterized by the five ligulate petals and the long protruding stamens. The five fertile stamens are almost of the same length and the staminal column is

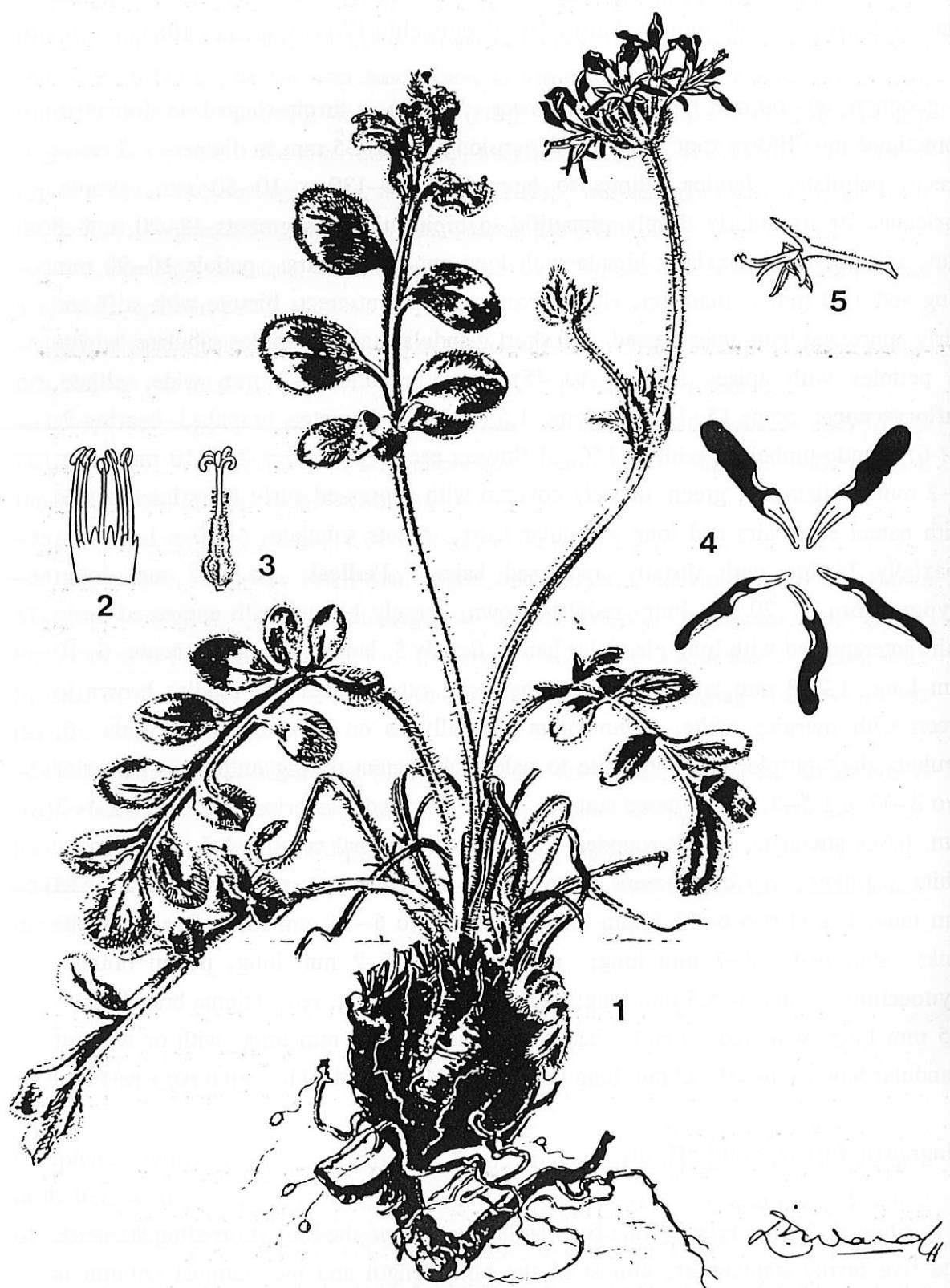


Figure 8.44.1 *Pelargonium auritum* var. *auritum*. 1, flowering plant $\times 1$; 2, androecium $\times 2$; 3, gynoecium $\times 3$; 4, petals $\times 3$; 5, flower without petals $\times 1$.

papillate. In this respect *P. auritum* resembles *P. parvipetalum*, *P. bubonifolium* and all the two-petalled species of section *Hoarea*.

The leaves, which are densely hirsute with appressed hairs, exhibit a considerable variation in the shape of the laminae. Simple, auriculate or deeply pinnatifid to bipinnatisect leaves occur in the same population, and even a single plant may exhibit several of these variations. The epithet *auritum* refers to the sometimes tripartite or auriculate leaves.

Harvey (1860) enumerated two varieties of this species because of the difference in the flower colour. Van der Walt & Vorster (1980) agreed with a subspecific division of the species, but they changed it to subspecies. This they did because of the correlation between the morphological differences and the geographical distribution. They query the validity of the localities of plants with purple-black flowers collected as far east as Addo in the eastern Cape (*Drège s.n., sub. P. melananthum* (P, G, S, SAM) and *Ecklon & Zeyher 489* (S, SAM)). According to them plants with purple-black flowers are restricted to the western Cape and plants with white flowers to the eastern Cape. Recently Professor B-E van Wyk collected a plant with purple-black flowers at Reed Valley near Port Elizabeth. This convinced me to re-evaluate Van der Walt & Vorster's decision to change the subspecific division to subspecies. Because the distribution areas of the two taxa overlap in the eastern Cape I reinstate the varieties as subspecific division of the species.

Key to the varieties

- 1a. Petals dark purple black var. *auritum*.
- 1b. Petals white to pale pink var. *carneum*.

var. *auritum*

Geranium auritum L.: 679 (1753); Burm. f.: 47, n. 61 (1759); L.: 1141 (1759); Burm. f.: 19 (1768); Murray: 615 (1784); Cav.: 236 (1787); Murray: 652 (1798). ICONOTYPE: Commelijn, Horti Medici Amstelaedamensis 2: 121, t. 61; original plate in Moninckx collection in Amsterdam. (Commelijn 1706, Wijnands 1983).

Pelargonium auritum (L.) Willd.: 644 (1800); Pers.: 226 (1806); DC.: 651 (1824); Spreng.: 51 (1826); G. Don: 726 (1831); Steud.: 677 (1840); Steud.: 283 (1841); Wijnands: 106 (1983).

Pelargonium auritum (L.) Willd. subsp. *auritum* Van der Walt & Vorster: 285 (1980).

Geranium prolificum L. var. *auritum* (L.) L.: 949 (1763); L.: 433 (1767); L.: 512 (1774).

Geranium hirsutum Burm. f.: 50, n. 68 (1759); Burm. f.: 19 (1768); Cav.: 247, t. 101, f. 2 (1787); Thunb.: 114 (1800); Thunb.: 519 (1823). TYPE - Cape: "Cap. Bon. Spei" (G, lecto!).

Pelargonium hirsutum (Burm. f.) Ait.: 417 (1789); Willd.: 645 (1800); Pers.: 226 (1806); Ait. f.: 161 (1812); DC.: 652 (1824); Spreng.: 52 (1826); G. Don: 727 (1831); Steud.: 678 (1840); Steud.: 286 (1841); Adamson & Salter: 513 (1950); non Loudon: 570 (1829).

Hoarea hirsuta (Burm. f.) Sweet: 76 (1826c).

Geraniospermum hirsutum (Burm. f.) Kuntze: 95 (1891).

Geranium lobatum Burm. f. var *hirsutum* (Burm. f.) L.: 950 (1763).

Geranium prolificum L.: 454 (1770); Murray: 615 (1784); Murray: 653 (1798); non L.: 949 (1763). TYPE: LINN 858.33 (lecto!, designated here).

Pelargonium melananthon Jacq.: 188 (1791b); Jacq.: 8, t. 514 (1792); Willd.: 648 (1800); Pers.: 227 (1806); Ait. f.: 164 (1812); Link: 186 (1822); DC.: 653 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 272 (1832); Steud.: 287 (1841). TYPE - "Ex Promontorio bonaë Spei" (W, holo!).

Geranium melananthum (Jacq.) Andr.: t. 209 (1802a); Poir.: 747 (1812).

Hoarea melanantha (Jacq.) Sweet: t. 73 (1821); Sweet: 76 (1826c); Eckl. & Zeyh.: 63 (1835).

Pelargonium hirsutum (Burm. f.) Ait. var *melananthum* (Jacq.) Harv.: 267 (1860); Knuth: 339 (1912); Van der Walt: 21, fig. (1977).

Pelargonium atrum L'Hérit.: t. 44 (1792); Willd.: 646 (1800); Pers.: 227 (1806); Ait. f.: 161 (1812); DC.: 653 (1824); Spreng.: 52 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 272 (1832); Steud.: 283 (1841). ICONOTYPE: L'Héritier, Geranologia: t. 44 (1792).

Geranium atrum (L'Hérit.) Poir.: 746 (1812).

Hoarea atra (L'Hérit.) Sweet: t. 72 (1821); Sweet: 76 (1826c); Eckl. & Zeyh.: 63 (1835).

Pelargonium dioicum Ait. f.: 162 (1812); Sims: t. 2234 (1821); DC.: 653 (1824); Spreng.: 51 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 272 (1832); Steud.: 678 (1840); Steud.: 285 (1841). ICONOTYPE: Andrews, The Botanist's Repository 3: t. 209 (1802a).

Hoarea dioica (Ait. f.) Sweet: 76 (1826c); Eckl. & Zeyh.: 63 (1835).

Hoarea undulaeflora Sweet: t. 263 (1825). ICONOTYPE: Sweet, Geraniaceae 3: t. 263 (1825).

Pelargonium undulaeflorum (Sweet) G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 290 (1841).

Diagnostic features

P. auritum var. *auritum* can be easily identified by the dark purple-black flowers. The margins of the five ligulate petals are conspicuously undulate. Prominent glandular hairs are present on the bases of the mericarps. (Figure 8.44.1).

Geographical distribution and ecology

P. auritum var. *auritum* occurs in the south-western and southern Cape, from Clanwilliam in the north to Addo and Port Elizabeth in the east (Figure 8.44.2), an area receiving an annual rainfall of 200–600 mm, mainly in winter. It grows on hillsides or flat areas in grassveld, renosterveld or fynbos, on stony dry areas, in sand, sandy-loam or clay soils. Plants grow in partial shade or in direct sunlight, resulting in a large variation of plant sizes. Its occurrence varies from rare to fairly frequent and it flowers from September to January with the peak during October and November.

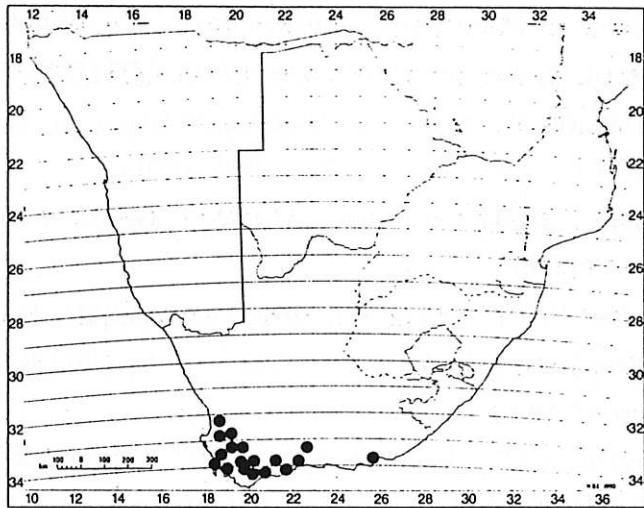


Figure 8.44.2 Geographical distribution of *P. auritum* var. *auritum*.

Material studied

-3218 (Clanwilliam): Modderfontein (-BA), *Leipoldt* 520 (SAM); Arbeidsgenot, between Citrusdal and Clanwilliam (-BD), *Marais* 314 (STEU); Piketberg (-DD), *Drège* 7489 (P, S).

-3219 (Wuppertal): Near Citrusdal (-CA), *Taylor* 1220 (BOL); Excelsior, Koue Bokkeveld (-CD), *Marais* 188 (STEU);

--3318 (Cape Town): Malmesbury, Diepkloof turnoff on N7 (-BC), *Marais* 255, 257 (STEU); Malmesbury, E of town (-BC), *Van der Walt* 1029 (STEU); Zwartland (-BD), *Ecklon & Zeyher* 488 (Sx2, SAM); Lion's Head (-CD), *Bolus* 9348 (BOL); *Dummer* 854 (E); *Ecklon* 602 (E, G, PRE, W, WU); *Ecklon* 609 (P); *Ecklon s.n.* (P); *Ecklon & Zeyher* 487 (Sx2, SAM); *Pappe* 34 (TCD); Table Mountain (-CD), *Ecklon & Zeyher* 486 (S); *Moss* 4195 (Z); *Pappe & Schwartz s.n.* (W); Near Cape Town (-CD), *Harvey s.n.* (TCD); Signal Hill (-CD), *Marloth* 333 (PRE); *Van der Walt* 482, 660 (STEU); Green Point Common (-CD), *Marloth* 1800 (PRE); Kloofnek (-CD), *Moss* 5737 (BM); Camps Bay (-CD), *Prior s.n.* (PRE); Camp Ground, Rondebosch (-CD), *Salter* 5671 (BOL); *Salter NBG48/36* (NBG); Sea Point (-CD), *Wolley Dod* 3678 (BOL); Wellington (-DB), *Cummings s.n.* (SAM); Vissershok (-DC), *Leighthon* 48 (BOL); Tygerberg Nature Reserve (-DC), *Loubser* 3460 (NBG); Langverwacht, Kuilsrivier (-DC), *Oliver* 4798 (STE); Stellenbosch flats (-DD), *Duthie* 152 (BOL, STE); *Duthie s.n.* (BOL).

--3319 (Worcester): Baviaanshoek turnoff (-AB), *Marais* 53 (STEU); Nuwe Kloof (-AC), *Drège s.n.* (E, G, MO, P, PRE, W); Kleinberg, Tulbagh (-AC), *Duthie s.n.* (BOL); Waterfall, Tulbagh (-AC), *Ecklon & Zeyher* 481 (S); Tulbagh (-AC), *Esterhuysen* 17489 (BOL); *Marloth* 9932 (PRE); *Pappe* 14 (TCD); Between Tulbagh & Malmesbury (-AC), *Mostert s.n.* (STEU); Ceres (-AD), *Cillié s.n.* (STEU); Between Prince Alfred Hamlet & Gydo (-AD), *Marais* 41 (STEU); Theronsberg Pass (-AD), *Marais* 138 (STEU); Buffelskraal (-BC), *Forrester* 120 (NBG); East of De Doorns (-BC), *Forrester* 231 (NBG); 3 km from N1 on Matroosberg - Montagu road (-BD), *Marais* 95, 96 (STEU); Wansbeck, S of Le Chasseur (-DC); Worcester district, *Cooper* 1632, 1723 (TCD, W).

--3320 (Montagu): Eleven O'Clock Mountain (-CD), *Wurtz* 462 (NBG).

--3321 (Ladismith): Garcia's Pass, Riversdale (-CC), *Ryder* 19988 (BOL).

--3322 (Oudtshoorn): Spitzkop, Meiring's Poort (-BC), *Thorne s.n.* (SAM); 3 km SW of Herold at Camferskloof (-CD), *Vlok* 1724 (STE).

--3325 (Port Elizabeth): Addo (-DA), *Drège* 1292 (P); *Drège s.n.* (G, S, SAM, TCD); *Ecklon & Zeyher* 489 (Sx2, SAM); Reed Valley to Sand flats road (-DB), *Van Wyk* 3305 (JRAU); Hugel, Port Elizabeth (-DC), *Brunnthaler* 675 (WU).

--3419 (Caledon): Onrusrivier (-AC), *Van Niekerk* 307 (PRE); Appelskraal, Riviersonderend Mountains (-BB), *Stokoe SAM63198* (SAM); Riviersonderend (-BB), *Zeyher* 2047 (S).

--3420 (Bredasdorp): Lemmetjiesdorp, Swellendam (-AB), *Wurtz* 462 (NBG); Appelskraal, Bredasdorp (-AC), *Stokoe* 9389 (BOL); Near Buffelsjacht (-BA), *Hurling & Niel s.n.* (BOL); Zuurbraak (-BA), *Penthaler* 2193 (W).

--3421 (Riversdale): Hills behind Albertinia (-BA), *Muir* 1269 (PRE).

--3422 (Mossel Bay): Pinedew farm, E of Wilderness (-BA), *Hugo* 1927 (STE).

var. carneum (Harv.) E.M. Marais, comb. nov.

TYPE - Cape Province: "Petrosis ad montes in 'Langekloof' (George). " Ecklon & Zeyher 482 (S, lecto!, designated here, S!, SAM!).

Pelargonium hirsutum var. *carneum* Harv.: 267 (1860); Knuth: 340 (1912). TYPE - Cape Province: "Petrosis ad montes in 'Langekloof' (George). " Ecklon & Zeyher 482 (S, lecto!, designated here, S!, SAM!).

Pelargonium auritum subsp. *carneum* (Harv.) J.J.A. van der Walt: 268 (1980).

Geranium ensatum Thunb.: 113 (1800); Thunb.: 515 (1823). TYPE - "Cap. bon Spei" Thunberg s.n. (UPS, holo!).

Pelargonium ensatum (Thunb.) DC.: 680 (1824); G. Don: 742 (1831); Steud.: 285 (1841); Harv.: 263 (1860); Knuth: 327 (1912).

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

Geraniospermum ensatum (Thunb.) Kuntze: 94 (1891).

Hoarea reticulata Sweet: t. 91 (1821); Sweet: 76 (1826c). ICONOTYPE: Sweet, Geraniaceae 1: t. 91 (1821).

Pelargonium reticulatum (Sweet) DC.: 649 (1824); Spreng.: 50 (1826); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 289 (1841); Knuth: 325 (1912).

Hoarea ovalifolia Sweet: t. 106 (1822); Sweet: 76 (1826c). ICONOTYPE: Sweet, Geraniaceae 2: t. 106 (1822).

Pelargonium ovalifolium (Sweet) DC.: 649 (1824) (excl. Andr.); Spreng.: 50 (1826) (excl. Andr.); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 288 (1841) (excl. Andr.).

Hoarea strigosa Eckl. & Zeyh.: 61 (1835). TYPE - Cape Province: ". . Clivis in "Krakakamma" (Uitenhage)". Ecklon & Zeyher 468 (S, holo!, S!).

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

Diagnostic features

P. auritum var. *carneum* has white petals with red to purplish veins. The margins of the petals are only slightly undulate to plane. The mericarps are without any glandular hairs. (Figure 8.45.1).

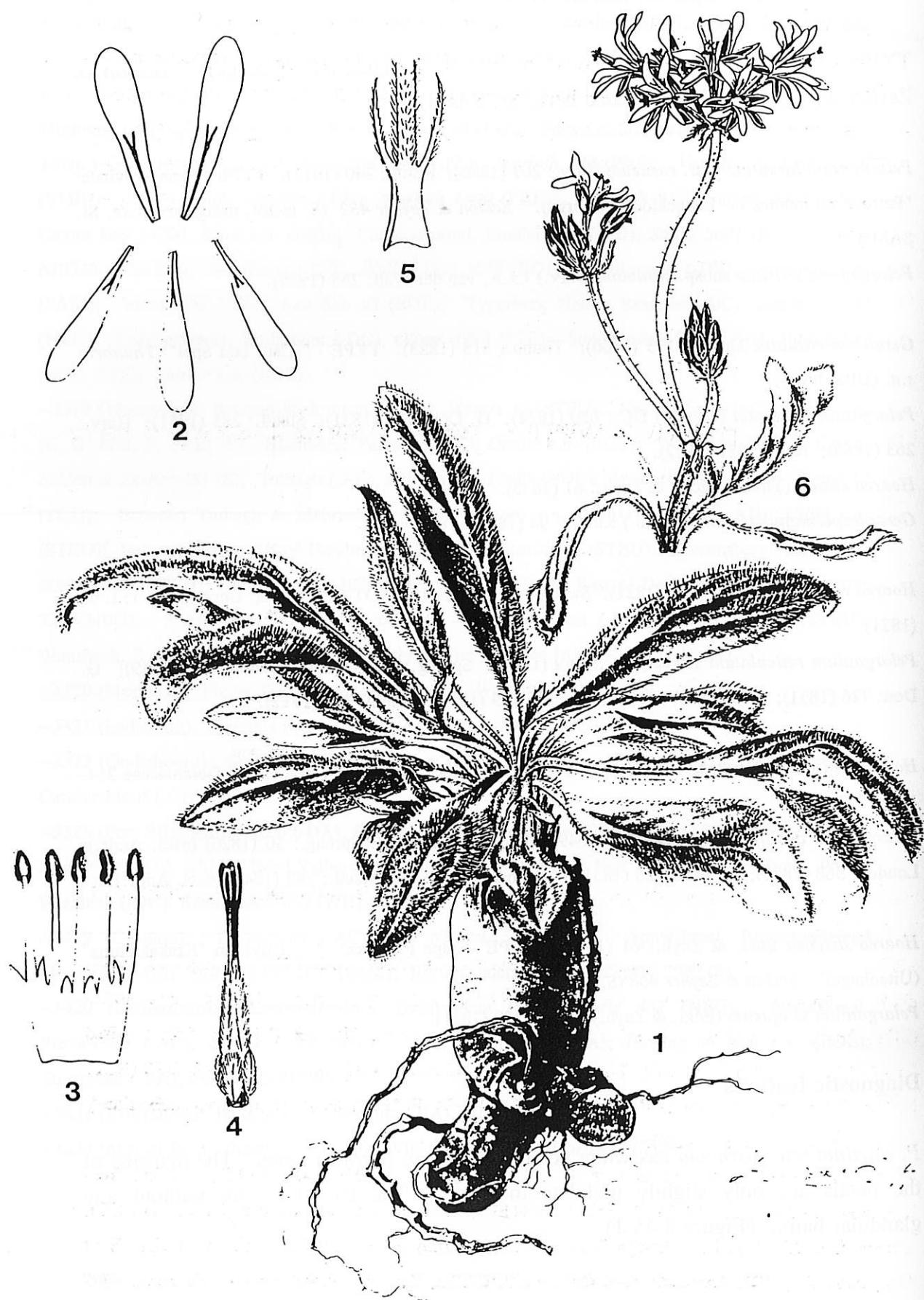


Figure 8.45.1 *Pelargonium auritum* var. *carneum*. 1, plant with leaves x1; 2, petals x6; 3, androecium x4; 4, gynoecium x6; 5, leaf base x2; 6, inflorescence x1.

Geographical distribution and ecology

P. auritum var. *carneum* occurs along the south-eastern coast, from Ruigte Vlei, west of Knysna to Uitenhage in the east. It is also quite common in the Langkloof (Figure 8.45.2). The distribution area receives an annual rainfall of 200--600 mm throughout the year. This variety occurs in short grass vegetation, open scrubveld or fynbos, on sand-dunes or dry stony ground in sand. The plants are locally abundant and flowering time is from October to February, with the peak in November and December.

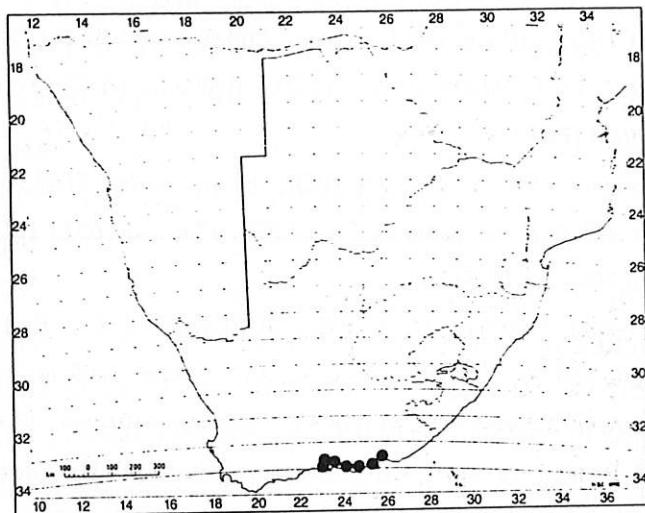


Figure 8.45.2 Geographical distribution of *P. auritum* var. *carneum*.

Material studied

--3322 (Oudtshoorn): Ruigte vlei, near Zwartrivier (-DD), *Fourcade* 1541 (BOL, BOL-FOURCADE, PRE, STE).

--3323 (Willowmore): Lang kloof, E of Avontuur (-CA), *Bolus* 2271 (BOL); Langkloof (-CA), *Ecklon & Zeyher* 467 (S, SAM); *Ecklon & Zeyher* 482 (Sx2, SAM); Haarlem (-CB), *Esterhuysen* 6937 (BOL, PRE); 50 km from Joubertina to Avontuur (-CB), *Marais* 159, 160 (STEU); Prince Alfred Pass (-CC), *Fischer* 362 (STEU); Louterwater (-DC), *Compton* 4517 (BOL); *Compton* 4518 (BOL, NBG); Hills near Joubertina (-DD); *Fourcade* 2380 (BOL-FOURCADE); 15 km from Joubertina (-DD); *Van der Walt s.n.* (STEU).

--3324 (Steytlerville): 9,3 miles NW of Kareedouw (-CC), *Acocks* 20041 (PRE); 27 km from Kareedouw to Joubertina (-CC), *Marais* 152 (STEU); 34 km from Kareedouw to Joubertina (-CC), *Marais* 155, 156 (STEU); Assegaaibosch (-CD), *Esterhuysen* 6729 (BOL); Krommerivier, E of Assegaaibosch (-CD), *Fourcade* 2348 (BOL-FOURCADE, K); Essenbosch (-CD), *Fourcade* 4899

(BOL-FOURCADE, STE); 20 km from Kareedouw to Humansdorp (-CD), *Marais 151* (STEU); Zuurkransberg, Kareedouw (-CD), *Rycroft 3017* (NBG); Uitvlugt, from Humansdorp to Groot Hoek (-DC), *Fourcade 3513a* (STE); Near Gamtoos River, Humansdorp (-DD), *Barker 6906* (NBG).

--3325 (Port Elizabeth): 29 km from Humansdorp to Port Elizabeth (-CC), *Marais 562* (GRA, PRE); Between Vanstadensberg & Bethelsdorp (-CD), *Drège 7490b* (P, S); *Drège 7491a* (G, K, MO, P, S, TCD, W); Krakakamma (-CD), *Ecklon & Zeyher 468* (Sx2); 10 miles from Port Elizabeth (-CD), *Holland 4081* (BOL); Parsons Vlei (-CD), *Long 877* (PRE); Kragga Kamma (-CD), *Long 892* (K, PRE); Willklip. Uitenhage (-CD), *MacOwan 2087* (MEL); E of Lady Slipper (-CD), *Van der Walt 868* (STEU); Uitenhage (-CD), *Zeyher 436* (K); Villa Paul Mare, Uitenhage (-DB), *Zeyher 2041* (G, P, PRE, S, W); Port Elizabeth (-DC), *Cook s.n.* (BOL); *Drège s.n.* (SAM); *Drège s.n.* (CGE, E, G, P, S, W); *Ecklon & Zeyher 483* (S, SAM); *Gruiden 374* (GRA); *Holland 57* (TCD); *West 212* (BOL, GRA); Zwartskops (-DC), *Hall s.n.* (BOL, NBG); Linkside Golf-links (-DC), *Laubscher s.n.* (STEU); Walmer Golf-links (-DC), *Olivier 1928* (STEU); Redhouse (-DC), *Paterson 292* (BOL); Newton Park (-DC), *Sidey 3084* (PRE).

--3422 (Mossel Bay): Belvedere (-BB), *Duthie 816* (BOL, STE); *Gillett 2180* (BOL); *Hutchinson 1317* (BOL); *Szyszlowicz 478* (Z); Goukamma Pass (-BB), *Fourcade 6513* (BOL-FOURCADE); Buffelsvermaak (-BB), *Hugo 2023* (PRE, STE).

--3423 (Knysna): Nekkies (-AA), *Fourcade 4152* (BOL-FOURCADE, STE); E of Robberg, Knysna (-AA), *Fourcade 6305* (BOL-FOURCADE); Knysna (-AA), *Penthal 2199* (W); *Schlechter 5909* (BOL, Z); Knysna Heads (-AA), *Schonland 3548* (GRA); Leerdaalsdriftrivier, W of Plettenberg Bay (-AB), *Hugo 2094* (PRE); Plettenberg Bay (-AB), *Lavranos 20926* (STEU); *Rogers 26825* (PRE); *Rogers 27944* (Z); *Taylor 4324* (MO, NBG); Keurbooms (-AB), *Steyn 700* (NBG).

--3424 (Humansdorp): Witelsbosch (-AA), *Fourcade 1541* (Z); 20 km from Humansdorp to Joubertina (-BA), *Van der Walt s.n.* (STEU); Seekoeirivier (-BB), *Dixon 161* (STE).

8.46 Pelargonium bubonifolium (Andr.) Pers., Synopsis plantarum 2: 227 (1806); Ait. f.: 163 (1812); DC.: 652 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 727 (1831); Loudon: 271 (1832); Steud.: 677 (1840); Steud.: 284 (1841); Harv.: 270 (1860); Knuth: 347 (1912). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 328 (1803b).

Geranium bubonifolium Andr.: t. 328 (1803b); Poir.: 758 (1812). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 328 (1803b).

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

Geraniopsispermum bubonifolium (Andr.) Kuntze: 94 (1891).

Hoarea congesta Sweet: t. 302 (1826b). ICONOTYPE: Sweet, Geraniaceae 4: t. 302 (1826b).

Pelargonium congestum (Sweet) G. Don: 727 (1831); Loudon: 271 (1832).

Pelargonium namaquense Knuth: 342 (1912); Van der Walt & Vorster: 103, fig. (1988). TYPE - Cape Province: Near Klipfontein, Namaqualand. *Bolus* 448 (B+, holo, Z, lecto!, designated here, BM!, BOL!, E!, Gx2!, K!, NH!, P!, PRE!, SAM!, UPS!, W!, Z!).

A geophyte 100--230 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root, 15--40(-60) mm long and 10--25(-40) mm in diameter. **Leaves** green, petiolate; lamina elliptic, 30--140 mm long and 10--40 mm wide, pinnately compound, irregularly pinnatisect to bipinnatisect; pinnae lobate to laciniate, 20--32 x 10--15 mm, adaxially and abaxially hirsute with long appressed stiff hairs; petiole (20-)30--90 mm long and 1--2 mm in diameter, rigid, erect, hirsute with appressed curly hairs interspersed with appressed stiff hairs and short glandular hairs; stipules subulate, adnate to petioles with apices free, 5--10 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 10--20 mm long, 2 mm in diameter, branched, bearing 2--5 pseudo-umbelllets with (5-)8--13(-17) flowers each; peduncles 50--150(-230) mm long, 1,5--2 mm in diameter, green, densely covered with appressed curly hairs interspersed with long glandular hairs; bracts subulate, 3--4 x 1 mm, abaxially hirsute with distally appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 10--17(-20) mm long, reddish brown, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6--8,5 mm long, 1--4,5 mm wide, recurved, green, indumentum abaxially as on peduncle. **Petals** 5, white, lilac or pale pink, patent during anthesis; posterior two with dark red feather-like markings, spatulate, bases cuneate, apices rounded or retuse, reflexed at less than 90° during anthesis, 10--16 x 2--4,5 mm; anterior three ligulate to spatulate, bases attenuate, apices rounded, 8--13 x 1,5--3 mm. **Stamens:** staminal column 1--3,5 mm long, white, papillate; perfect stamens 5, protruding from the flower, posterior one 6--8 mm long, lateral two 6,5--10,5 mm long, anterior two 7--10,5 mm long, white; staminodes 2--4,5 mm long; anthers pink, 1,5--2 mm long, pollen orange. **Gynoecium:** ovary 2,5--5 mm long; style 1--3 mm long, pale green; stigma branches 1,5--2,5 mm long, adaxially wine-red. **Fruit:** bases of mericarps 5--6 mm long, with glandular hairs, tails 24--30 mm long. (Figure 8.46.1).

Diagnostic features and affinities

P. bubonifolium is a geophyte with small tubers and irregularly pinnate to bipinnatisect erect leaves. The white or pink petals are larger than the sepals. The five fertile stamens are almost of the same length and are longer than the sepals and

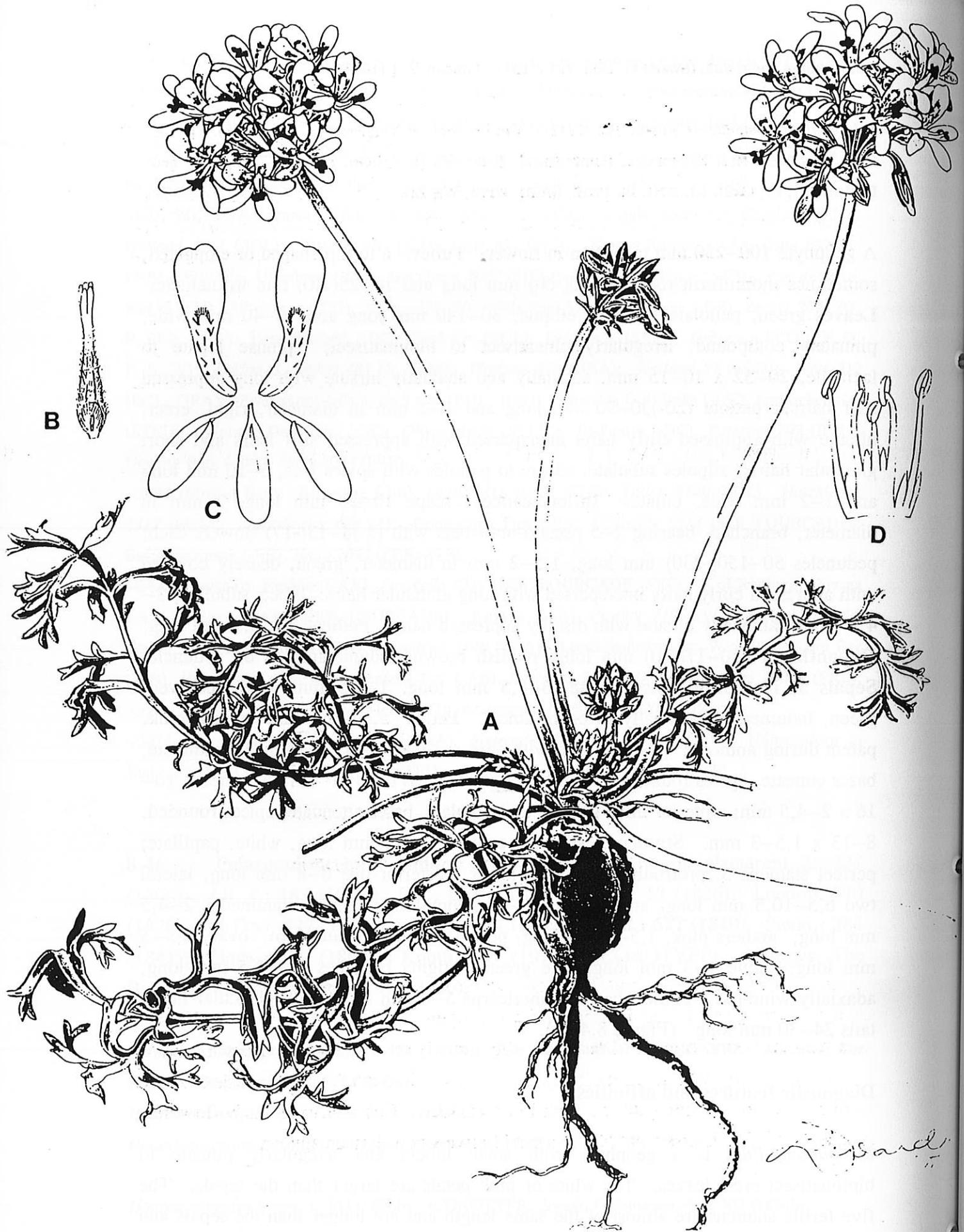


Figure 8.46.1 *Pelargonium bubonifolium*. A, flowering plant x1; B, gynoecium x4; C, petals x2; D, androecium x3.

protrude from the flower. The staminal column is papillate, in which respect *P. bubonifolium* resembles *P. auritum*, *P. parvipetalum* and all the two-petalled species of section *Hoarea*. The indumentum of the leaves, peduncles, hypanthia and sepals of *P. bubonifolium* is very similar to that of *P. parvipetalum*. There is also a resemblance in the morphology of the leaves of these two species. Both species have similar pinnate to bipinnatisect leaves and both of them occur in Namaqualand. The petals of *P. bubonifolium* are longer than the sepals and those of *P. parvipetalum* are shorter than the sepals.

The epithet *bubonifolium* refers to the resemblance between the leaves of this species and those of the genus *Bubon* L., a synonym for *Athamanta* L., which are carrot-like plants of the Apiaceae.

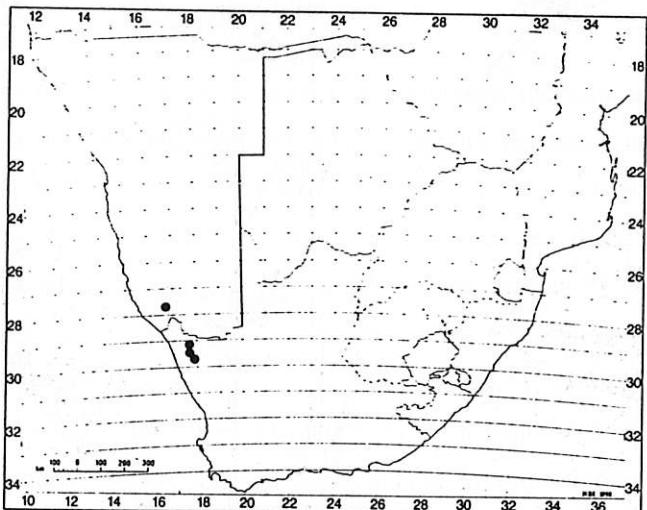


Figure 8.46.2 Geographical distribution of *P. bubonifolium*.

Geographical distribution and ecology

P. bubonifolium is known from Witputs in the extreme southern part of Namibia, and from Steinkopf and Okiep in Namaqualand (Figure 8.46.2). This is a semi-desert area with an annual rainfall of less than 100 mm. It grows in stony places in clay in low succulent vegetation, where it appears to be locally abundant. Flowering time is from August to October with the peak in September. This is also an early-flowering species of section *Hoarea* and leaves are still alive when flowers appear.

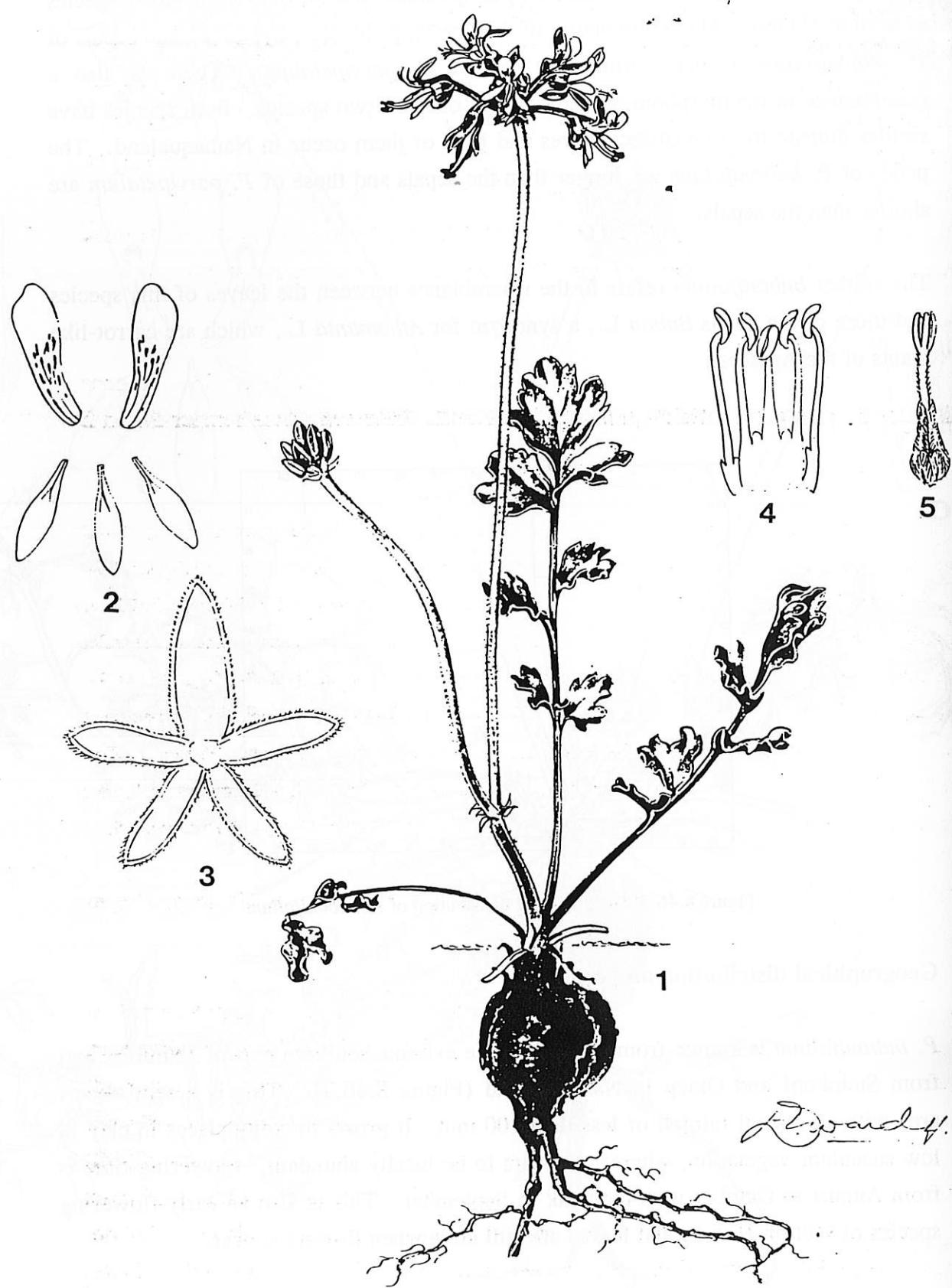


Figure 8.47.1 *Pelargonium parvipetalum*. 1, flowering plant $\times 1$; 2, petals $\times 3$; 3, sepals $\times 3$; 4, androecium $\times 3$; 5, gynoecium $\times 4$.

Material studied

--2716 (Witputs): S of Witputs (-DA), *Lavrano & Pehleman 21693* (STEU).

-2917 (Springbok): Near Klipfontein, Namaqualand (-BA), *Bolus 448* (BM, BOL, E, Gx2, K, NH, P, PRE, SAM, UPS, W, Zx2); *Hall 840* (NBG); *Herre 12177* (STE); Between Klipfontein and Kookfontein (-BA), *Bolus 6530* (BOL, K); Gunhill, Steinkopf (-BA), *Drijfhout 2970* (STEU); *Ward-Hilhorst 264a* (NBG); 8 km W of Steinkopf (-BA), *Drijfhout 2971* (STEU); 4,8 km W of Steinkopf (-BA), *Goldblatt 2774* (MO); 2 km NE of Rabas (-BA), *Van Berkel* (NBG); 7 km from Steinkopf to Port Nolloth (-BA), *Perry 3180* (NBG); *Van Jaarsveld 4230* (STEU); Steinkopf (-BC), *Acocks 19534* (K); *Lewis 5500* (NBG); *Williamson 3731* (NBG); Near Okiep (-DB), *Morris s.n.* (BOL).

8.47 *Pelargonium parvipetalum* E.M. Marais, sp. nov. in sectione *Hoarea* distincta propter petala minima, *P. leipoldtii* Knuth affine sed petala semper 5 non 2 ad 5.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napiforme, interdum moniliforme, 15--40 mm longum, 10--25 mm in diam. Folia hysterantha, rosulata, viridia, petiolata; lamina elliptica, 25--95(-140) mm longa, irregulariter pinnatisecta vel bipinnata, pinnae lobatae vel laciniatae, adaxiale et abaxiale hirsuta; petiolus 15--60(-90) mm longus, rigidus, erectus, dense hirsutus, sparsim glandulosus; stipulae petiolo adnatae. Inflorescentia: scapus pseudoumbellis (2-)3--5(-6), utraque 7--14(-18) floribus. Pedicellum ca. 0,5 mm longum. Hypanthium 8--16 mm longum, dense hirsutum et glandulosum. Sepala 5, lanceolata, 6--10 mm longa, 2--4,5 mm lata, recurvata. Petala 5, alba, sepalis breviora, spathulata, dua postica leviter curvata, 5--8,5 mm longa, 1,5--3 mm lata, subtiliter carmineo-rubra picta, tria antica 4,5--8 mm longa, 1,5--2 mm lata. Stamina fertilia 5, staminodia 5.

TYPE - Cape Province: Gamoep, Farm Vaalkoei, 3 km south of Gamoep, *Bruyns 1519* (STE, holo, BOL, K, MO, PRE).

A geophyte 80--250(-280) mm tall when in flower. Tuber: a turnip-shaped or elongated, sometimes moniliform root, 15--40 mm long and 10--25 mm in diameter. Leaves green, petiolate; lamina elliptic, 25--95(-140) mm long, pinnately compound, irregularly pinnatisect to bipinnatisect; pinnae lobate to lacinate, 10--30 x 6--20 mm, adaxially and abaxially hirsute with long appressed stiff hairs; petiole 15--60(-90) mm long and 1--2 mm in diameter, rigid, erect, hirsute with appressed stiff hairs interspersed with bristle-like hairs and very short glandular hairs; stipules subulate, adnate to petioles with apices free, 10--22 mm long and ca. 1 mm wide, ciliate. Inflorescence: scape 20--160(-200) mm long, branched, bearing (2-)3--5(-6) pseudo-

umbellets with 7--14(-18) flowers each; peduncles 40--120 mm long, 1--3 mm in diameter, green, densely covered with appressed curly hairs interspersed with long glandular hairs; bracts subulate, 2--5 x 1 mm, abaxially hirsute with distally appressed hairs. Pedicel ca. 0,5 mm long. Hypanthium 8--16 mm long, reddish brown, densely hirsute with appressed hairs interspersed with long glandular hairs. Sepals 5, lanceolate, apices acute, 6--10 mm long, 2--4,5 mm wide, recurved, green, indumentum abaxially as on hypanthium. Petals 5, white, patent during anthesis; posterior two with dark red feather-like markings, ligulate to spathulate, bases cuneate, apices obtuse, rounded or emarginate, recurved during anthesis, 5--8,5 x 1,5--3 mm; anterior three spathulate, bases attenuate, apices rounded, 4,5--8 x 1,5--2 mm. Stamens: staminal column 2--4 mm long, white, papillate; perfect stamens 5, protruding from the flower, posterior one 7--9 mm long, lateral two 8--10 mm long, anterior two 8--10 mm long, white; staminodes 3--5 mm long; anthers dark red, ca. 2 mm long, pollen orange. Gynoecium: ovary 3,5--6 mm long; style 1,5--5 mm long, pale green; stigma branches 1--3 mm long, adaxially wine-red. Fruit: bases of mericarps ca. 5 mm long, with glandular hairs, tails 18--32 mm long. (Figure 8.47.1).

Diagnostic features and affinities

P. parvipetalum is a geophyte with small tubers and irregularly pinnate to bipinnatisect erect leaves. The flowers are inconspicuous because of the very small, white petals, and this motivated the choice for the specific epithet. The sepals are larger than the petals, but recurved so that the protruding stamens with their rather large, dark red anthers (ca. 2 mm long) and the long wine-red recurved stigma branches become the prominent features of the flower. The five fertile stamens are almost of the same length and the staminal column is papillate. In this respect *P. parvipetalum* resembles *P. auritum*, *P. bubonifolium* and all the two-petalled species of section *Hoarea*. Because of the very small petals, *P. parvipetalum* resembles closely to *P. leipoldtii*. Both have very small, white petals; *P. parvipetalum* always have five petals, whereas in *P. leipoldtii* the number of petals varies from two to five (Marais 1989a). The leaves of the two species also differ. *P. parvipetalum* has elliptic, pinnate to bipinnatisect leaves, whereas those of *P. leipoldtii* are trifoliolate with a trullate outline.

The indumentum of the leaves, peduncles, hypanthia and sepals of *P. parvipetalum* is very similar to that of *P. bubonifolium*. There is also a resemblance between the morphology of the leaves of these two species. Both species have similar pinnate to

bipinnatisect leaves and both of them occur in Namaqualand. The petals of *P. bubonifolium* are longer than the sepals, whereas those of *P. parvipetalum* are shorter than the sepals.

Geographical distribution and ecology

P. parvipetalum occurs from Gamoep in the north, the Platbakkies area east of Kamiesberge and as far south as Pakhuis Pass (Figure 8.47.2). This area receives an annual rainfall 100–200 mm, mainly in winter. It grows in sandy soil and quartzite patches in short succulent Karoo, in mountain renosterveld (veld type 43, Acocks 1988), marginal western mountain Karoo (veld type 28, Acocks 1988) or in arid fynbos. The occurrence of this species varies from rare to fairly frequent and it is heavily grazed by sheep. *P. parvipetalum* is one of the early-flowering species of section *Hoarea* and the peak of the flowering time is in September when leaves are still present.

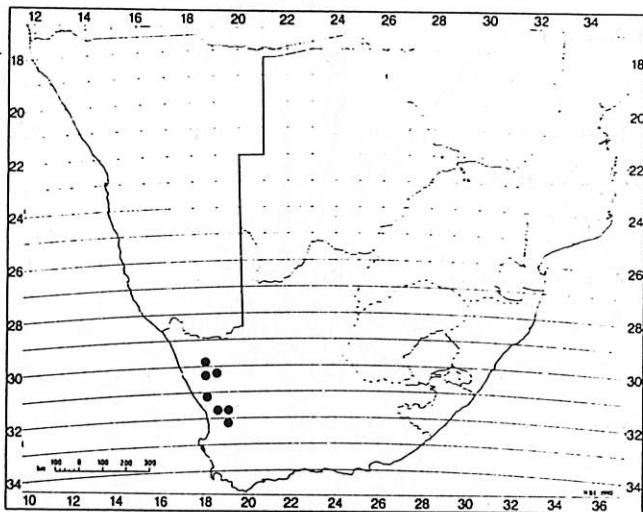


Figure 8.47.2 Geographical distribution of *P. parvipetalum*.

Material studied

- 2918 (Gamoep): Vaalkoei, 3 km S of Gamoep (-CD), Bruyns 1519 (BOL, K, MO, PRE, STE).
- 3018 (Kamiesberg): Between Bloudraai and Witwater (-AC), Le Roux & Ramsey 681 (STE); Between Bloudraai and Paulshoek (-AD), Stirton 9242 (PRE, STE); Garing (-BA), Lloyd 325 (STE); Vaalputs, near Platbakkies (-BC), Le Roux s.n. (STEU); Banke, near Platbakkies (-BD), Oliver 9855 (STEU).

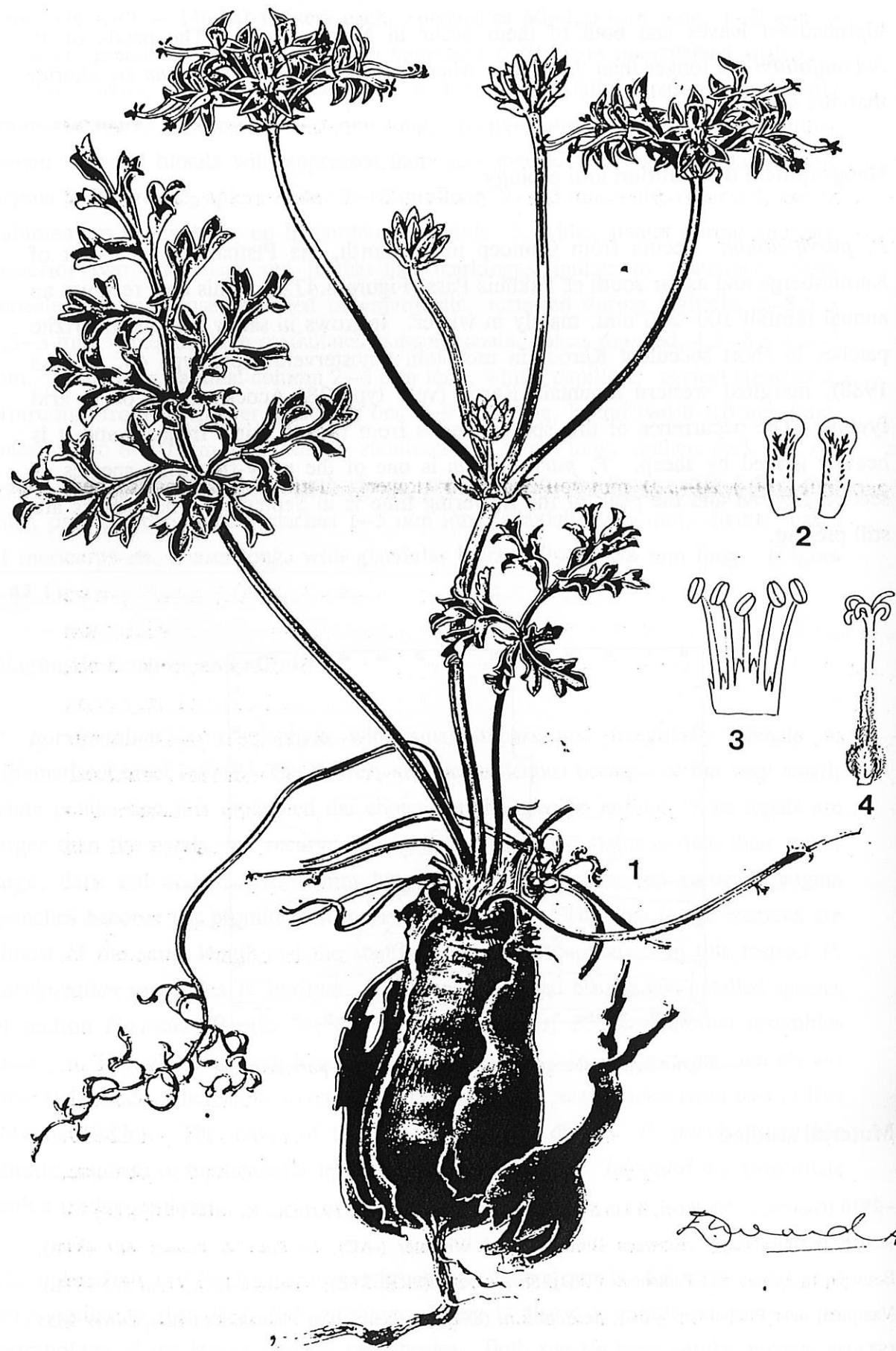


Figure 8.48.1 *Pelargonium leipoldtii*. 1, flowering plant $\times 1$; 2, petals $\times 3$; 3, androecium $\times 2$; 4, gynoecium $\times 3$.

- 3118 (Vanhynsdorp): 7 km E of Nuwerus on the Kliprand road (-AB), *Thompson* 2839 (STE); Sandkraal, Vanhynsdorp (-DA), *Acocks* 14822 (PRE); *Barker* 5651 (NBG); Flats west of Matsikamma (-DB), *Oliver* 4991 (PRE, STE).
- 3119 (Calvinia): Lokenburg (-CA), *Acocks* 17722 (K, PRE, Z); *Leistner* 315 (PRE); *Leistner* 454 (K); Mensieskraal, Nieuwoudtville (-CB), *Markötter s.n.* (STE).
- 3219 (Wuppertal): Near Pakhuis (-AA), *Leipoldt* 20760 (BOL); Perdefontein on Nardouw Pass road to Calvinia (-AA), *Marais* 327 (STEU).

8.48 *Pelargonium leipoldtii* Knuth in Pflanzenreich 4, 129: 342 (1912); Van der Walt & Vorster: 91, fig. (1981). TYPE - Cape Province: . . "Nieuwoudtville", *Leipoldt* s.n. sub BOL 9396 (BOL holo!; K!).

A geophyte (60-)120--320 mm tall when in flower. **Tuber:** a turnip-shaped, sometimes moniliform root, 15--50 mm long and 12--25 mm in diameter. **Leaves** grey-green, petiolate; lamina trullate in outline, trifoliolate with the terminal leaflet larger than the other two, (30-)60--110(-180) x (20-)40--120(-200) mm; pinnae irregularly pinnately lobed to incised, adaxially and abaxially hirsute with short appressed stiff hairs; petiole 45--140 mm long and 1--3 mm in diameter, rigid, erect, hirsute with appressed stiff hairs interspersed with bristle-like hairs and very short glandular hairs; stipules subulate, adnate to petioles with apices free, (4-)10--15 mm long and ca. 1 mm wide, ciliate. **Inflorescence:** scape 35--250 mm long, branched, bearing 2--7(-10) pseudo-umbelllets with (3-)6--12(-14) flowers each; peduncles 35--160 mm long, 1--3 mm in diameter, green, densely hirsute with short appressed stiff hairs interspersed with short glandular hairs; bracts subulate, 2--5 x 1--1,5 mm, abaxially densely hirsute with distally appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 7--12(-14) mm long, green to reddish brown, densely hirsute with appressed stiff hairs interspersed with long glandular hairs. **Sepals** 5, lanceolate, apices acute, recurved during anthesis, 5,5--9 mm long, 2--4 mm wide, green, indumentum abaxially as on hypanthium. **Petals** 2 in posterior position (seldom more), white with wine-red feather-like markings, ligulate to spatulate, 4,5--6 x 1,2--1,8 mm, bases cuneate, apices rounded or emarginate, recurved during anthesis, margins undulate. **Stamens:** staminal column 2--4,5 mm long, white, papillate; perfect stamens 5, protruding from the flower, posterior one 4,5--8 mm long, lateral two 5,5--9 mm long, anterior two 6--9,2 mm long, white; staminodes 2,5--5,5 mm long; anthers dark red, ca. 2 mm long, pollen orange. **Gynoecium:** ovary 3--6 mm long; style 0,5--3 mm long, pale green; stigma branches 1--2 mm long, adaxially

wine-red. **Fruit:** bases of mericarps 4–6 mm long, with glandular hairs, tails 29–31 mm long. (Figure 8.48.1).

Diagnostic features and affinities

P. leipoldtii is a geophyte with small tubers and large trifoliolate erect leaves. The leaf segments are irregularly pinnatilobed to incised. The flowers are inconspicuous with only two (rarely more) small, white petals with wine-red markings. The sepals are larger than the petals, but recurved so that the protruding stamens with its rather large, dark red anthers (*ca.* 2 mm long) and the long wine-red recurved stigma branches become the prominent features of the flower. The five fertile stamens are almost of the same length and the staminal column is papillate. In this respect *P. leipoldtii* resembles *P. auritum*, *P. bubonifolium*, *P. parvipetalum* and all the other two-petalled species of section *Hoarea*. Because of the very small petals, *P. leipoldtii* is closely related to *P. parvipetalum*. Both have very small, white petals; *P. parvipetalum* always has five petals, whereas *P. leipoldtii* has two, seldom more. The petals of *P. leipoldtii* are also very similar to those of *P. asarifolium* and *P. ellaphieae*. In all three species the petals have undulate margins. *P. leipoldtii* has white petals with red markings, whereas the other two species have wine-red flowers.

P. leipoldtii commemorates the famous South African author and poet Dr C.L. Leipoldt (1880–1947), who had a great interest in plants and collected many species new to science.

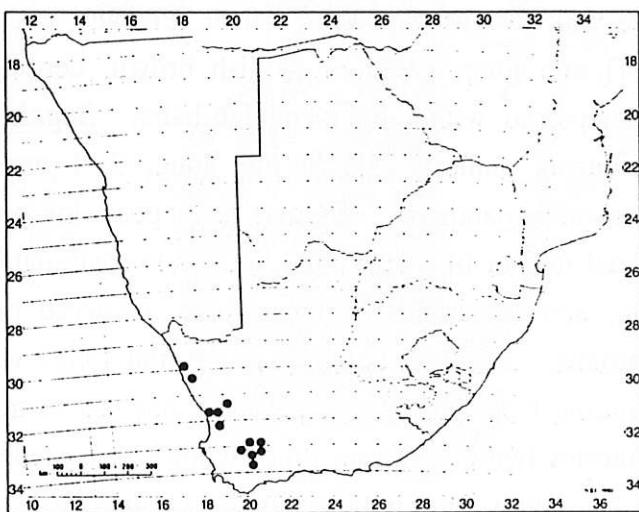


Figure 8.48.2 Geographical distribution of *P. leipoldtii*.

Geographical distribution and ecology

P. leipoldtii has a rather large distribution area if compared with other two-petalled species of section *Hoarea*. It also has the most northern distribution of this group and occurs along the western escarpment of the Cape Province from Komaggas near Springbok in the north, around Vanrhynsdorp and Clanwilliam, and as far south-east as Moordenaarshoogte south-east of Touwsrivier (Figure 8.48.2). This area receives an annual rainfall of 100--200 mm, mainly in winter. It grows on dry outcrops in sandy soil but also in clay in succulent vegetation. The occurrence of this species varies from rare to fairly frequent and usually in the shelter of shrublets. *P. leipoldtii* flowers in spring from August to November with the peak in October. In this respect it also differs from the other two-petalled species which flower during the hot summer months from December to April.

Material studied

- 2917 (Springbok): 40 km NE of Riethuis, on road to Komaggas (-CD), *Drijfhout* 2821 (STEU).
- 3017 (Hondeklipbaai): Walle Kraal (-BC), *Pillans* 17959, 18524 (BOL).
- 3118 (Vanhynsdorp): 15 km from Lutzville on road to Strandfontein (-CB), *Marais* 316 (STEU); Windhoekberg (-DA), *Leipoldt* 4094 (BOL); 1 km W of Vanrhynsdorp (-DA), *Van Zyl s.n.* (STEU); Vleikraal, 8 km E of Klawer (-DA), *Walters* 2 (STEU).
- 3119 (Calvinia): Nieuwoudtville (-AC), *Herre s.n.* (BOL); *Leipoldt s.n. sub BOL* 9396 (BOL, K).
- 3218 (Clanwilliam): Clanwilliam Pass (-BB), *Alice & Godman* 575 (BM); Clanwilliam (-BB), *Bolus* 8950 (BOL, K); *Leipoldt s.n. sub SAM* 48326 (SAM); *Van Niekerk s.n.* (STEU); Clanwilliam dam, E bank (-BB), *Marais* 207, 403 (STEU); Nuwevlei, on gravelled road between Clanwilliam & Klawer (-BB), *Marais* 317 (STEU).
- 3220 (Sutherland): On top of Thyshoogte (-CC), *Marais* 220, 221, 222, 223 (STEU); 38 km N of Matjiesfontein (-DC), *Hall* 1424/50 (NBG).
- 3319 (Worcester): 4 km N of Karoo Poort (-BA), *Lavrano & Pehlemann* 17482 (STEU); Karoo Poort, 2 km on Sutherland road (-BA), *Marais* 215, 216 (STEU); Karoo Poort (-BA), *Marloth* 9165 (PRE); 25 km N of Karoo Poort (-BB), *Hall* 5098 (NBG); Ceres Karoo, turnoff to Rooifontein (-BB), *Hiemstra & Hardick* 185 (NBG).
- 3320 (Montagu): Between Touwsrivier and Montagu, 1 km from railway crossing (-AC), *Marais* 100, 101, 102 (STEU); Between Touwsrivier and Montagu, 5 km from railway crossing (-AC), *Marais* 104 (STEU); Between Touwsrivier and Montagu, 2 km from Bloutingen (-AC), *Muller* 4036 (STEU); 2 km S of Lettaskraal (-AD), *Muller* 4038 (STEU); White Hill (-BA), *Marais* 98 (STEU); Moordenaarshoogte (-CB), *Marais* 109 (STEU).



Figure 8.49.1 *Pelargonium ellaphieae*. A, flowering plant $\times 1$; B, plant with leaves $\times 1$; C, flower without petals $\times 2$; D, petals $\times 4$; E, gynoecium $\times 4$; F, androecium $\times 4$; G, mericarp $\times 2$.

8.49 *Pelargonium ellaphieae* E.M. Marais in Marais *et al.*, Journal of South African Botany 47: 573 (1981); substitute name for *P. marginatum* Knuth: 350 (1912); Van der Walt & Vorster: 57, fig. (1981); Marais: t. 1987 (1989b). TYPE - Cape Province: "Am fusse des Muizenberg," *Bolus* 8054 (Z lecto!; BOL!, GRA!, K!, NH!, PRE!).

Pelargonium marginatum Knuth: 350 (1912); Adamson & Salter: 512 (1950); non (Cav.) Link (1822). TYPE - Cape Province: "Am fusse des Muizenberg," *Bolus* 8054 (Z lecto!; BOL!, GRA!, K!, NH!, PRE!).

A geophyte 100--300 mm high when in flower. **Tuber:** turnip-shaped or elongated root, 30--130 mm long and 8--20 mm in diameter. **Leaves** mostly simple, occasionally compound with 2 or more lateral pinnae at base of lamina, bright green, petiolate; lamina (or median pinna) lanceolate or sometimes elliptic, base cuneate, apex acute, margin entire, 35--65(-115) mm long and 10--15(-20) mm wide, mainly abaxially sericeous, margins sometimes with dense, white, adpressed bristles, bristles prominent when leaves are dried; small lateral pinnae elliptic, 6--20 mm long and 3--10 mm wide; petiole 15--35(-100) mm long, rigid, erect, pilose; stipules subulate, adnate to petioles for more than half their length, ca. 15 mm long and 1,5 mm wide, membranous, hirsute. **Inflorescence:** scape 40--180 mm long, branched, bearing 2--5 pseudo-umbelllets with 6--15 flowers each; peduncles 25--190 mm long, hirsute and densely covered with glandular hairs; bracts narrowly triangular, apex attenuate, 4--9 mm long, abaxially hirsute. **Pedicel** ca. 0,5 mm long. **Hypanthium** 9--15 mm long, wine-red, indumentum as on peduncle. **Sepals** 5, posterior one triangular, remaining 4 lanceolate, apices acute, 7--10 mm long and 1,5--4 mm wide, posterior one erect, others reflexed, wine-red with conspicuously white margins, indumentum abaxially as on peduncle. **Petals** 2 in posterior position, rarely 3, dark wine-red, spatulate to elliptic, 7--11 mm long (almost the same length as the sepals), 2--3 mm wide, bases cuneate, apices rounded, reflexed at ca. 90°, margins undulate. **Stamens** staminal column 4--6,5 mm long, papillate; perfect stamens 5, protruding from the flower, posterior one 7--11 mm long, lateral two 8--12 mm long, anterior two 8,5--12 long, wine-red; staminodes 4,5--7 mm long; anthers dark red, 1,5--2 mm long, pollen orange. **Gynoecium:** ovary 3,5--5 mm long; style 1,5--5 mm long, with 5 rows of ordinary and glandular hairs, red; stigma branches ca. 1 mm long, wine-red. **Fruit:** bases of mericarps 6--8 mm long, with glandular hairs, tail up to 37 mm long. (Figure 8.49.1).

Diagnostic features and affinities

A noteworthy feature of *P. ellaphieae* is the lanceolate leaves with prominent adpressed bristles on the margins of the dried laminae. The flowers, strongly scented, have only two petals and five fertile stamens. The petals and the protruding androecium are conspicuously dark wine-red. The floral structure and specially that of the protruding androecium is similar to that of the other two-petalled species of section *Hoarea*. It also shows affinities with *P. auritum*, *P. bubonifolium* and *P. parvipetalum*, all five-petalled species of section *Hoarea*. Although the flowers of the two-petalled species (previously known as section *Seymouria*, but now included in section *Hoarea*, Marais 1989a & b) are very similar, each one has a distinctive leaf form and can be easily identified.

Geographical distribution and ecology

Originally *P. ellaphieae* was only known from Muizenberg in the Cape Peninsula from where the last collection was made by T.M. Salter in 1941. Since 1963 *P. ellaphieae* was fortunately rediscovered and collected in bergfynbos near Piketberg, on Versveld Pass, Piekenierskloof Pass, between Piekenierskloof and Paleisheuwel, Elandskloof near Citrusdal, Pakhuis Pass and Ezelsbank (Figure 8.49.2). All these localities are about 150 km or more north of Muizenberg. Because of this larger distribution area, I would not regard *P. ellaphieae* as in danger of extinction in the Cape flora. Populations are usually very small which may be why it is so poorly collected and although it occurs in the Cape Peninsula, it was only described as a new species in 1912. This may also be the reason it has not been found in the Cape Peninsula in recent times, with the added possibility that land development has in fact destroyed every possible habitat. The habitat of *P. ellaphieae* in both distribution areas is fynbos and may be part of two relic populations in this veld type, and the reason that it has not been collected in the remaining west coast renosterveld in the heavily cultivated Swartland.

P. ellaphieae grows in sandy soil in bergfynbos. Both distribution areas receive an annual rainfall of 400 to 600 mm, which occurs mainly during winter. The summers are warm to hot and the winters are cool without frost. It flowers in midsummer, from November to February, usually after the leaves have dried. New leaves appear after the first winter rains and are covered with soft hairs. This indumentum is lost during senescence and at the time of flowering the dried leaves show only white, adpressed bristles on the leaf margins, one of the characters which Knuth (1912) used

when he gave this species the apt name of *P. marginatum*. This was an illegitimate name and therefore it was renamed after Ellaphie Ward-Hilhorst, the well-known botanical artist and illustrator of the Pelargoniums of southern Africa.

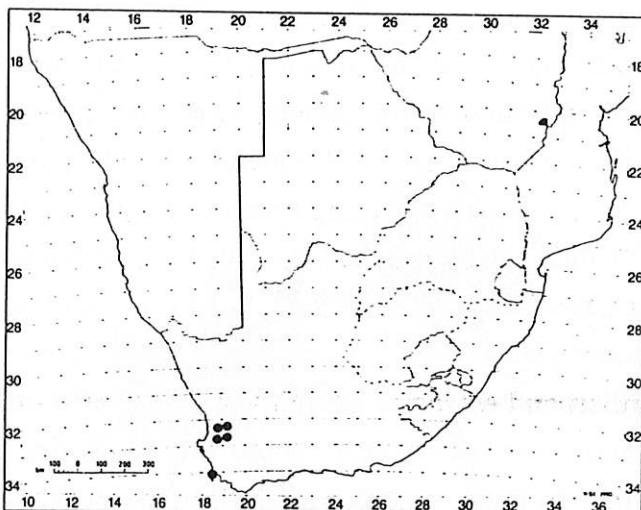


Figure 8.49.2 Geographical distribution of *P. ellaphieae*.

Material studied

--3218 (Clanwilliam): 23 km from Piekenierskloof on the Paleisheuwel road (-BD), *Marais 306* (STEU); Piekenierskloof Pass (-DB), *Marais 197* (STEU); 17 km from Piekenierskloof on the Paleisheuwel road (-DB), *Marais 305* (STEU); Piketberg Mountain (-DC), *Esterhuysen 35316* (BOL); Versveld Pass (-DC), *Nordenstam 3358* (S).

--3219 (Wuppertal): Pakhuis Pass (-AA), *Marais 193, 204a* (STEU); S of Eselbank (-AC), *Van der Walt 1520* (STEU); Elandskloof, near Citrusdal (-CA), *Hugo s.n.* (STEU); *Van der Walt 1411* (STEU); 3,5 km from Citrusdal to Ceres (-CA), *Marais 383* (STEU).

--3418 (Simonstown): Muizenberg (-AB), *Bolus 7959* (BOLx2, K); *Bolus 8054* (BOL, GRA, K, NH, PRE, Z); *Bolus s.n.* (BOL); Steenberge (-AB); *Ecklon & Zeyher 465* (S, SAM); Peck's Valley, E slopes of Muizenberg (-AB), *Pillans 3212* (BOL, PRE); Bergvliet Farm (-AB), *Purcell 242* (SAMx3); *Salter 6525* (BOLx2, K); Cape flats, W of Zeekoeivlei (-AB), *Salter 8706* (BOL); Retreat (-AB), *Wolley Dod 2232* (BOL).

8.50 *Pelargonium asarifolium* (*Sweet*) *Loudon*, An encyclopaedia of plants, 1st edn: 572 (1829); G. Don: 731 (1831); Loudon: 273 (1832); Steud.: 283 (1841); Harv.: 271 (1860); Knuth: 349 (1912); Van der Walt: 4, fig. (1977). ICONOTYPE: Sweet, Geraniaceae 3: t. 206 (1824).



Figure 8.50.1 *Pelargonium asarifolium*. 1, flowering plants $\times 1$; 2, plant with leaves $\times 1$; 3, flower without petals $\times 1$; 4, androecium $\times 3$; 5, gynoecium $\times 3$; 6, petals $\times 2.5$.

Seymouria asarifolia Sweet: t. 206 (1824); Sweet: 77 (1826c). ICONOTYPE: Sweet, Geraniaceae 3: t. 206 (1824).

Geraniospermum asarifolium (Sweet) Kuntze: 94 (1891).

A geophyte 130--230 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root 10--50(-70) mm long and 8--30 mm in diameter. **Leaves** simple, petiolate; lamina cordate, apex obtuse, margin entire, 25--65(-100) mm long and 15--65(-80) mm wide, adaxially bright green, glabrous, abaxially grey due to the matted cover of hairs (tomentose); petiole 15--90 mm long and 2--4 mm in diameter, rigid, prostrate or patent-erect, villous; stipules subulate, adnate to petioles with apices free, 8--12 mm long and *ca.* 2 mm wide, membranous, abaxially hirsute. **Inflorescence:** scape 30--110 mm long, 2--3 mm in diameter, branched, bearing 2--4(-10) pseudo-umbellets with 3--10(-12) flowers each; peduncles 30--100 mm long, 1--2 mm in diameter, reddish-green, villous interspersed with long glandular hairs; bracts subulate, 2,5--4 x 1 mm, abaxially villous. **Pedicel** *ca.* 0,5 mm long. **Hypanthium** 7--12 mm long, reddish brown, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5,5--9 mm long, 1--2,5 mm wide, recurved, wine-red with white margins, indumentum abaxially as on peduncle. **Petals** 2 in posterior position, rarely 3, dark wine-red, ligulate to spathulate, 8--14,5 x 1,5--4 mm, bases cuneate, apices obtuse, rounded or emarginate, reflexed from about the middle. **Stamens:** staminal column 3,5--8 mm long, wine-red, papillate; perfect stamens 5, protruding from the flower, posterior one 7--11,5 mm long, lateral two 7,5--12 mm long, anterior two 7,5--13 mm long, wine-red; staminodes 4,5--9 mm long; anthers dark red, 1,5--2 mm long, pollen orange. **Gynoecium:** ovary 3--6,5 mm long; style 1--4,5 mm long, wine-red; stigma branches 0,8--1,5 mm long, wine-red. **Fruit:** bases of mericarps 5--6 mm long, without glandular hairs, tails 21--30 mm long. (Figure 8.50.1).

Diagnostic features and affinities

P. asarifolium is a geophyte with small tubers and entire, cordate, prostrate leaves. A noteworthy feature of this species is the small wine-red flowers with only two reflexed petals. The sepals are shorter than the five fertile stamens and also recurved so that the stamens protrude from the flower. The staminal column is long, wine-red and papillate. The flowers of *P. asarifolium* are similar to those of *P. ellaphieae* but because each one has a distinctive leaf form and a different indumentum, they can easily be distinguished. The structure of the androecium of *P. asarifolium* resembles

that of all the two-petalled species of section *Hoarea* and that of *P. auritum*, *P. bubonifolium* and *P. parvipetalum*.

The specific epithet *asarifolium* refers to the resemblance between the leaves of this species and those of *Asarum*, a member of the family Aristolochiaceae.

Geographical distribution and ecology

P. asarifolium is confined to the south-western Cape. It occurs from Piketberg and Porterville in the north, along the western coastal plain as far south as Sir Lowry's Pass, but also in the Worcester area and as far east as Matroosberg (Figure 8.50.2). This area receives an annual rainfall of 400–600 mm mainly in winter. *P. asarifolium* grows on flats amongst small shrubs or on dry rocky slopes in sand or clay. Plants flower from November to May with the peak of the flowering time during the hot months of January to March.

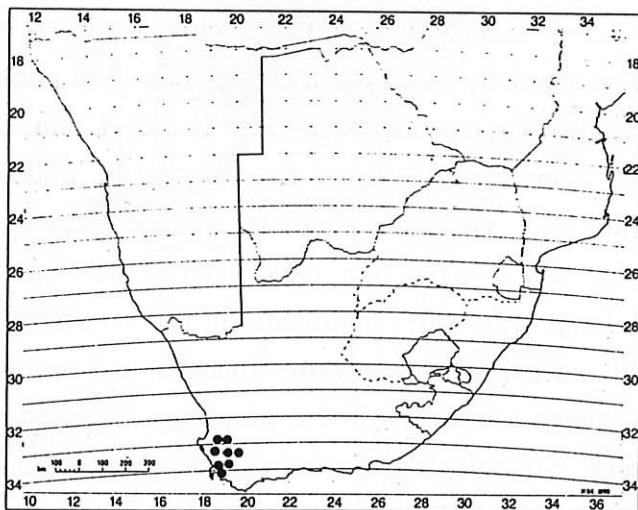


Figure 8.50.2 Geographical distribution of *P. asarifolium*.

Material studied

- 3218 (Clanwilliam): Piketberg (-DD), *Hugo s.n.* (STEU).
- 3219 (Wuppertal): Dasklip road, Porterville (-CC), *Marais 183, 293* (STEU).
- 3318 (Cape Town): Lucasfontein, Moorreesburg (-BA), *Marais 262* (STEU); Diepkloof turnoff on N7, Malmesbury (-BC), *Marais 258* (STEU); Malmesbury (-BC), *Wasserfall 765* (NBG); Klein Drakenstein (-DB) *Drège 1994* (P); Tygerberg (-DC), *Leighton 982* (BOL); Stellenbosch, flats and hill slopes (-DD), *Duthie 1076* (STEU); Stellenbosch, First River terrace (-DD), *Duthie s.n.* (BOL);

Stellenbosch flats (-DD), *Duthie s.n.* (BOL); *Marloth* 10339 (BOL); Near Stellenbosch (-DD), *Duthie s.n.* (BOL); Stellenbosch, Jan Marais Park (-DD), *Duthie s.n.* (BOL); *Ward-Hilhorst* 113a (NBG); Stellenbosch, Bothmaskop (-DD), *Duthie s.n.* (BOL); Stellenbosch, Paptegaaiberg (-DD), *Duthie s.n.* (BOL); Groot Drakenstein (-DD), *Marloth* 9444 (PRE); Eerste Rivier (-DD), *Zeyher* 341 (BOL).

--3319 (Worcester): Tulbach (-AC), *Bolus* 5487 (BOL); Head of Tulbagh valley (-AC), *Esterhuysen* 16900 (BOL); Between Nuwekloof and Elandskloof Mountain (-AC), *Drège s.n.* (G, K, W); Romansrivier, Wolseley (-AC), *Van der Walt* 573 (STEU); Waterfall, Tulbagh (-AC), *Van Wyk* 752 (STEU); Ovenstone's Farm, 10 miles from Ceres (-AD), *Barker* 8885 (NBG); Between Prince Alfred Hamlet and Gydo (-AD), *Fischer* 343 (STEU); Matroosberg (-BC), *Stokoe* NBG7922 (NBG); Bailey's Peak (-CA), *Esterhuysen* 22337 (BOL); *Esterhuysen* 22737 (BOL, K, PRE); Bainskloof (-CA), *Schlechter* 10256 (BOL); St. Sebastians Kloof (-CA), *Stokoe* SAM59410 (SAM); Eikeboom, on Slanghoek road (-CA), *Van der Walt* 1062 (STEU); Worcester Shooting Range (-CB), *Bayer* 2629 (NBG); Brandwacht Valley (-CB), *Esterhuysen* 20022 (BOL); Between Worcester Shooting Range and Rainbow Chicken Farm (-CB), *Forrester* 297 (NBG); Hartebeesrivier (-CB), *Walters* 1826 (NBG); Wemmershoek (-CC), *Esterhuysen* 17710 (BOL).

--3418 (Simonstown): Sir Lowry's Pass (-BB), *Stokoe* SAM60605 (SAM).

8.51 *Pelargonium dipetalum* L'Hérit., *Geranologia*: t. 43 (1792); Willd.: 642 (1800); Pers.: 226 (1806); Ait. f.: 159 (1812); DC.: 650 (1824); Spreng.: 51 (1826); Loudon: 572 (1829); Loudon: 273 (1832); Steud.: 285 (1841); Harv.: 271 (1860); Knuth: 350 (1912). ICONOTYPE: L'Héritier, *Geranologia*: t. 43 (1792).

Geranium dipetalum (L'Hérit.) Poir.: 744 (1812).

Geraniospermum dipetalum (L'Hérit.) Kuntze: 95 (1891).

Seymouria l'héritieri Sweet: t. 206 (1824): substitute name for *P. dipetalum*; Sweet: 77 (1826c).

Pelargonium l'héritieri (Sweet) G. Don: 731 (1831).

Hoarea erythrophylla Eckl. & Zeyh.: 60 (1835). TYPE - Cape Province: " Rivier Zonder Einde apud villam Knoblauch (Zwellendam). " Ecklon & Zeyher 457 (S, lecto!, designated here, S!, SAM!).

Pelargonium erythrophyllum (Eckl. & Zeyh.) Steud.: 285 (1841).

Pelargonium nivenii Harv.: 271 (1860); Knuth: 350 (1912). TYPE - Cape Province: " Elevated places in Sweetmilk Valley " *Niven s.n.* (S, holo!).

Geraniospermum nivenii (Harv.) Kuntze: 95 (1891).

A geophyte 90--350 mm tall when in flower. Tuber: a turnip-shaped or elongated, sometimes moniliform root 10--55 mm long and 10--25 mm in diameter. Leaves

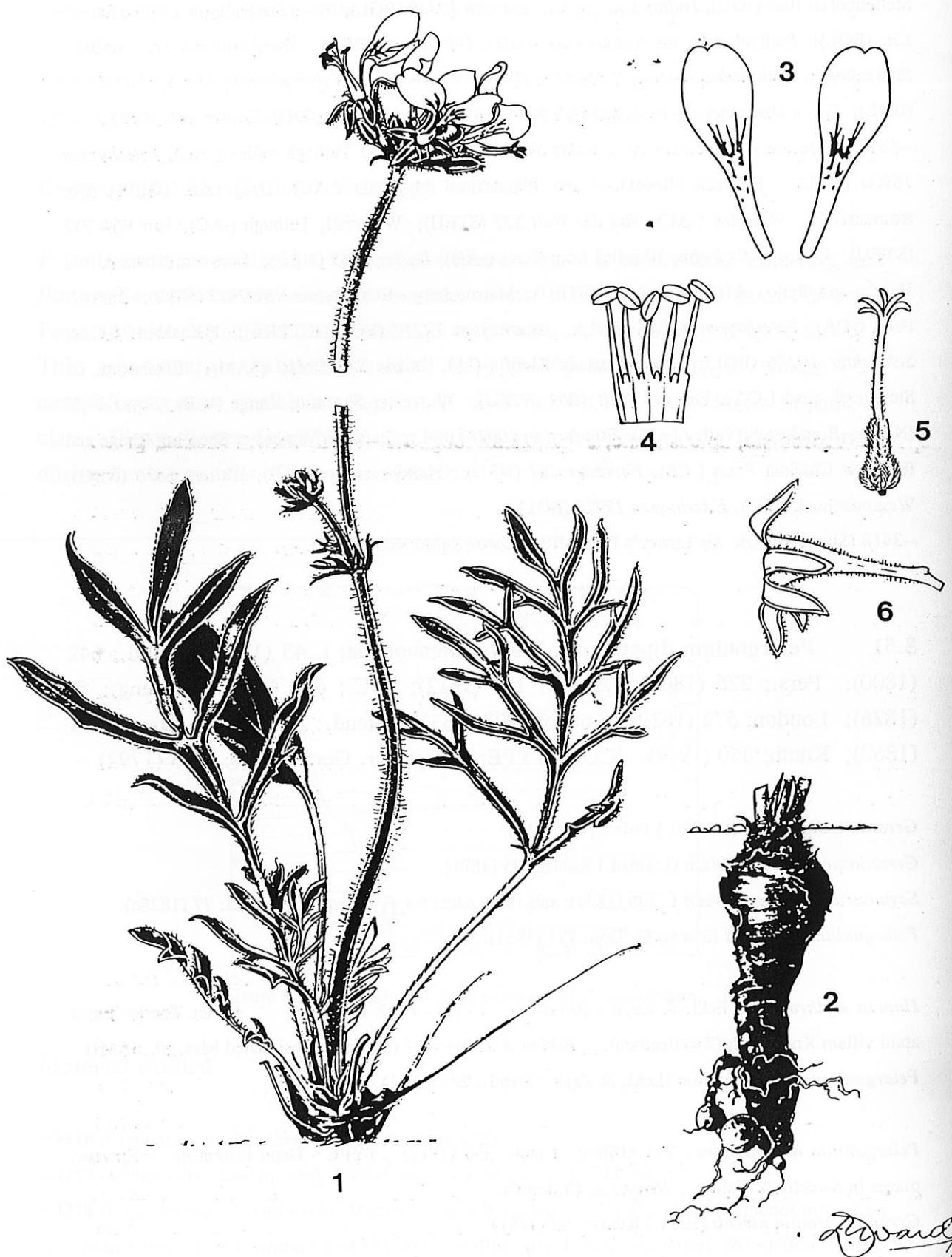


Figure 8.51.1 *Pelargonium dipetalum*. 1, flowering plant $\times 1$; 2, tuber $\times 1$; 3, petals $\times 2$; 4, androecium $\times 3$; 5, gynoecium $\times 3$; 6, hypanthium with sepals $\times 2$.

green, sometimes adaxially purple, petiolate; lamina elliptic, 20–120 mm long, varies from simple to irregularly pinnatisect to bipinnatisect; simple leaves 13–30 mm wide, apices acuminate, bases cuneate, margins entire; incised leaves with segments laciniate, segments 20–60 x 1–3 mm, adaxially and abaxially hirsute with long appressed hairs; petiole 30–200 mm long and 0,5–2 mm in diameter, rigid, erect, hirsute with appressed or patent hairs; stipules subulate, adnate to petioles for two thirds of their length, apices free, 12–37 mm long and 1–2 mm wide, ciliate. **Inflorescence:** scape 30–200 mm long, 1–4 mm in diameter, branched, bearing 2–3(–5) pseudo-umbelllets with (3)4–8(–12) flowers each; peduncles 25–150 mm long, 0,5–2 mm in diameter, green, covered with glandular hairs interspersed with bristle-like hairs; bracts subulate, 3–7 x 1–2 mm, abaxially hirsute with distally appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 7–18(–35–50) mm long, reddish brown, densely covered with glandular hairs interspersed with bristle-like hairs. **Sepals** 5, lanceolate, apices acute, 5–11,5 mm long, 1,2–4 mm wide, reflexed, green to reddish brown, indumentum abaxially as on peduncle. **Petals** 2 in posterior position, white, pale pink to bright pink, with dark red feather-like markings, obovate to spatulate, 12–19 x 3–7(–10) mm, bases cuneate, apices emarginate, recurved during anthesis. **Stamens:** staminal column 1,5–4,5 mm long, white to pale pink, papillate; perfect stamens 5, protruding from the flower, posterior one 6,5–11 mm long, lateral two 7,5–12 mm long, anterior two 7,5–12 mm long, free filaments wine-red; staminodes 2–5,5 mm long; anthers dark red, 1,5–2,5 mm long, pollen orange. **Gynoecium:** ovary 3–6 mm long; style 1,5–6 mm long, lengthens during anthesis, pink; stigma branches 1–3 mm long, adaxially wine-red. **Fruit:** bases of mericarps 5–8 mm long, without glandular hairs, tails 20–31 mm long. (Figure 8.51.1).

Diagnostic features and affinities

P. dipetalum, as indicated by the epithet, is one of the two-petaled species of section *Hoarea*. The petals of *P. dipetalum* are very similar to those of *P. ternifolium*, but because of their distinctive leaf shape, they can be easily distinguished. The former has five fertile stamens and the latter only four. The indumentum of these two species is also very similar. The structure of the androecium, that is the fertile stamens of almost the same length and the papillate staminal column, corresponds to that of all the other two-petaled species of section *Hoarea* and that of *P. auritum*, *P. bubonifolium* and *P. parvipetalum*. The length of the hypanthia (7–18 mm) in the majority of specimens of *P. dipetalum* coincides with that of all the species in this

group. However, three populations with exceptionally long hypanthia (35--50 mm) were found amongst the other populations.

The large variation in leaf form, from simple to irregularly pinnatisect and bipinnatisect is quite common in section *Hoarea* and occurs in *P. auritum* of this group, but also in *P. longifolium* and *P. proliferum*, both belonging to different floral structure groups.

Geographical distribution and ecology

P. dipetalum occurs along the southern coastal plain from Betty's Bay in the west to Keurboomsrivier in the east (Figure 8.51.2), an area with an annual rainfall of 200--600 mm. In the west the precipitation occurs mainly during the winter, whereas the eastern part receives rain throughout the year. It grows on foothills or flats on limestone ridges, on sandstone slopes or on shale, in short coastal fynbos or renosterveld. Plants occur in partial shade of shrublets or in direct sunlight. The frequency varies from rare to locally fairly common. Flowering time of this species is from February to April, but occasionally flowers are found as early as December and as late as May. Usually the leaves have died when the flowers appear, but leaf remnants may still be present.

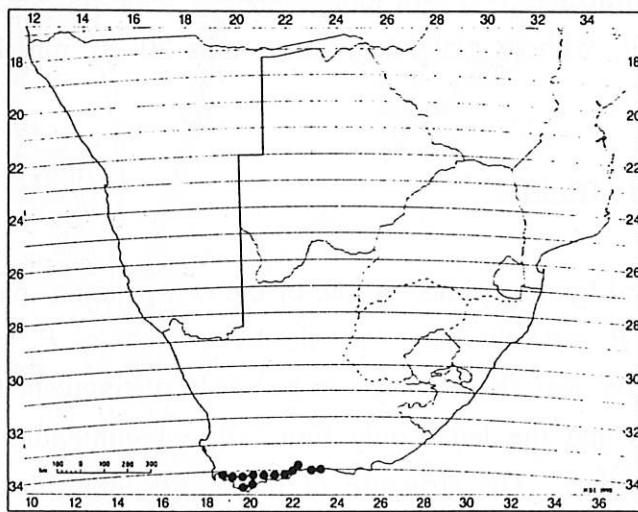


Figure 8.51.2 Geographical distribution of *P. dipetalum*.

Material studied

- 3322 (Oudtshoorn): George (-CD), *Schlechter* 2401 (Z).
- 3418 (Simonstown): Betty's Bay (-BD), *Levyns* 11417 (BOL).
- 3419 (Caledon): Viljoen's Pass (-AA), *Acocks* 4368 (S); Elgin (-AA), *Compton* 14323 (NBG); *Smith* 2539 (PRE); Houw Hoek (-AA), *Guthrie* 2225 (NBG); *Schlechter* 7561 (BOL, E, Gx3, K, MO, NH, P, PREx2, S, W, Z); Houw Hoek Pass (-AA), *Vorster* 2852, 2853, s.n. (STEU); Palmiet River, Oude Brug (-AA), *Leighton* 503 (BOL); 4 km E of Theewaterkloof bridge to Greyton (-AA), *Vorster* 2900 (STEU); Near Caledon (-AB), *Bolus* 9902 (BOL, K); Caledon, hill N of Bath (-AB), *Marloth* 11085 (PRE, STE); Caledon (-AB), *Purcell* SAM45919 (SAM); Driebosch, Kleinmond (-AC), *Marais* s.n. (NBG); Suikerboskop, E of Botrivier Lagoon (-AC), *Oliver* 5798 (PRE, STE); Kleinmond (-AC), *Stokoe* 1327 (BOL); *Van der Walt* 1525 (STEU); Groot Hagelkraal, near Pearly Beach (-AC), *Van Wyk* 1154 (STE); Happy Valley, Riviersonderend (-BA), *Compton* 10665 (NBG); Zwarteburg near Sandfontein (-BA), *Schlechter* 10358 (BOL); Foothills of Riviersonderend Mountains (-BB), *Lewis* 63209 (PRE); *Stokoe* s.n. (PRE); Riviersonderend, near Olifantsbos (-BB), *Marloth* 11090 (PRE); Riviersonderend (-BB), *Middlemost* 1509 (NBG); Sweetmilk Valley (-BB), *Niven* s.n. (S); Neetling's farm, Riviersonderend (-BB), *Wilman* 978 (BOL, PRE); Sandy's Glen, near Sandfontein (-BC), *Hugo* 908 (PRE, STE); Mierkraal, 10 km from Bredasdorp to Elim (-BD), *Fischer* 277 (STEU); Koksrivier (-DA), *Hugo* 1606 (STE); Vlei between Elim and Die Poort (-DA), *Leighton* s.n. (BOL, K); Hills NW of Elim (-DA), *Oliver* 3344 (STE); Haelkraalrivier (-DA), *Oliver* 5895 (STE); Poort near Hagelkraalrivier (-DA), *Thompson* 3917 (STE); Road from Elim to Die Dam (-DA), *Van Wyk* 801 (STE); Rietfontein Nature Reserve (-DB), *Beyers* s.n. (STEU); Uitvlugt, S slopes of Bredasdorp Mountains (-DB), *Boucher* 3775 (STE); Zoutendalsvlei (-DB), *Fellingham* 398 (STE); 15 km from Bredasdorp to Heuningrug (-DB), *Fischer* 286 (STEU); Mierkraal SW of Bredasdorp (-DB), *Hugo* 823 (STE); 4 miles from Elim (-DB), *Maguire* 845 (NBG); Vogelvlei, near Napier (-DB), *Schlechter* 1867 (PRE); *Schlechter* 10494 (BOL, PRE).
- 3420 (Bredasdorp): Knoblauch, Swellendam (-AB), *Ecklon & Zeyher* 457 (Sx2, SAM); Bontebok Park, Swellendam (-AB), *Van der Walt* 541 (STEU); De Hoop farm (-AC), *Van der Merwe* 2015 (STE); De Hoop Nature Reserve (-AD), *Hugo* 881 (STE); Zuurbraak (-BA), *Thode* A2301 (PRE); Potberg Nature Reserve (-BC), *Burgers* 1810 (STE); Uyshoek. 7 km N of Arniston (CA), *Hugo* 840 (PRE, STE); Elandsvlei between Bredasdorp & Spitskop (-CA), *Hugo* 1174 (STE); Near Bredasdorp (-CA), *Leighton* s.n. (BOL); *Leighton* NBG671/33 (K).
- 3421 (Riversdale): Farm Watergat, Riversdale (-AA), *Marais* 172, 173 (STEU); Dekriet siding (-AB), *Oliver* 5692 (STE); Schoemanshoek, Albertinia (-BA), *Boucher* 3720 (STE); Canca, 12 km of Albertinia (-BA), *Oliver* 5717 (STEU); Rykdalersplaas, Albertinia (-BC), *Marais* 170 (STEU).
- 3422 (Mossel Bay): Mossel Bay, near Golden Rendezvous Hotel (-AA), *Vlok* 1855 (STE); Belvidere, Knysna (-BB), *Duthie* 500 (BOL, BOL-FOURCADE, K, NH, P, PRE, SAM, STE); *Duthie* s.n. (BOL, NH); *Van der Walt* 842, 844 (STEU).

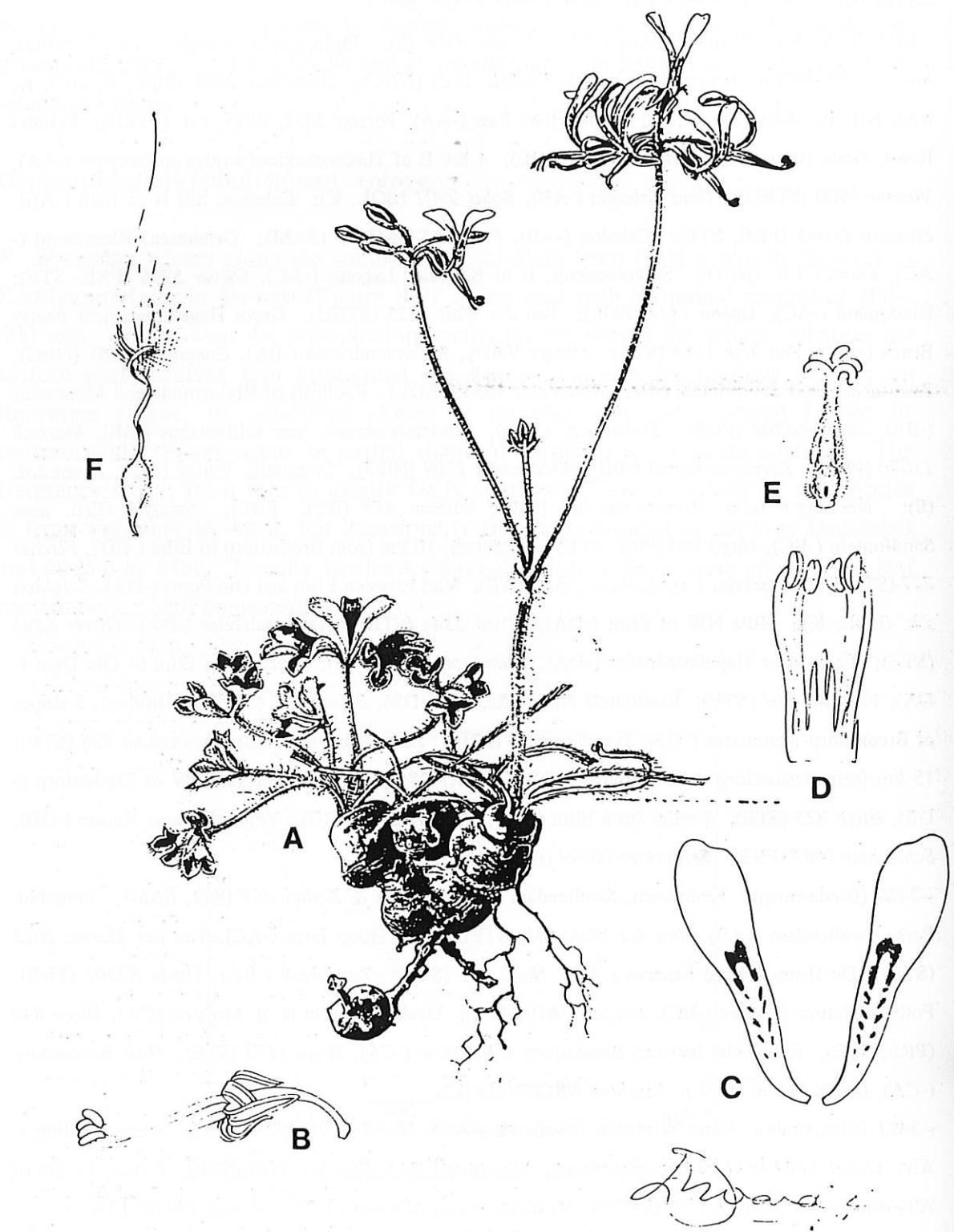


Figure 8.52.1 *Pelargonium ternifolium*. A, flowering plant $\times 1$; B, flower without petals $\times 2$; C, petals $\times 3$; D, androecium $\times 3$; E, gynoecium $\times 4$; F, mericarp $\times 3$.

--3423 (Knysna): Knysna (-AA), *Breyer 23973, 25210* (PRE); *Duthie s.n.* (BOL); Knysna Heads (-AA), *Fourcade 2018* (BOL, BOL-FOURCADE, K); Keurboomsrivier, Knysna (-AB), *Adamson D331* (PRE).

8.52 *Pelargonium ternifolium* Vorster in Van der Walt & Vorster, Bothalia 13: 431 (1981b); substitute name for *P. trifoliatum* Harv.: 271 (1860); Van der Walt & Vorster: 141, fig. (1981a). TYPE - Cape Province: " . Klein Drakenstein & Dal Josefat . . " *Drège 7497* (S, lecto!, designated here; G!, K!, L!, MO!, Px2!, W!).

Pelargonium trifoliatum Harv.: 271 (1860); Knuth: 351 (1912); non Sweet: t. 394 (1826a); nec (Eckl. & Zeyh.) Steud. (1841). TYPE - Cape Province: " . Klein Drakenstein & Dal Josefat . . " *Drège 7497* (S, lecto!, designated here; G!, K!, L!, MO!, Px2!, W!).

Geraniospermum trifoliatum (Harv.) Kuntze: 95 (1891).

A geophyte 90--250 mm tall when in flower. **Tuber:** a turnip-shaped, often moniliform root 6--10 mm long and 6--8 mm in diameter. **Leaves** green, petiolate; lamina cordate to circular in outline, 10--20(-30) x 15--35(-70) mm, trifoliolate; pinnae widely oblanceolate, apices 2--6 times deeply incised, 7--18(-40) x 9--18(-45) mm, adaxially and abaxially conspicuously hirsute with long appressed hairs; petiole 30--100 mm long and ca. 1 mm in diameter, rigid, spreading horizontally from the growing point and bending vertically in the middle, hirsute with stiff hairs and distally appressed curly hairs interspersed with short glandular hairs; stipules subulate, adnate to petioles with apices free, 4--14 mm long and 1--2 mm wide, ciliate. **Inflorescence:** scape 25--160 mm long, 1--1,5 mm in diameter, branched, bearing 2-3(4) pseudo-umbelllets with 3--7 flowers each; peduncles 25--130 mm long, ca. 1 mm in diameter, green, sparsely strigose interspersed with very short glandular hairs; bracts lanceolate, 2--3 x 1 mm, abaxially strigose with distally appressed hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 7--10 mm long, green to reddish brown, strigose with glandular hairs interspersed. **Sepals** 5, lanceolate, apices acute, 5--8 mm long, 1--2 mm wide, reflexed during anthesis, green to reddish brown with white margins, indumentum abaxially as on peduncle. **Petals** 2 in posterior position, white to pink with dark red feather-like markings, spatulate to obovate, 11--18 x 2,5--6 mm, bases cuneate, apices rounded or emarginate, reflexed through more than 90°. **Stamens:** staminal column 3--4,5 mm long, white to pink, papillate; perfect stamens 4, protruding from the flower, lateral two 8,5--10 mm long, anterior two 9--11 mm long, free filaments wine-red; staminodes 3--8 mm long with short stiff hairs on the posterior ones; anthers wine-red, 1,5--2 mm long, pollen orange. **Gynoecium:**

ovary 2,5--6 mm long; style 1,5--4,5 mm long, pink; stigma branches 1--1,5 mm long, wine-red. **Fruit:** bases of mericarps ca. 5 mm long, without glandular hairs, tails 22--27 mm long. (Figure 8.52.1).

Diagnostic features and affinities

P. ternifolium is a geophyte with very small, often moniliform tubers and trifoliolate leaves, hence the specific epithet. The flowers have only two white to pink petals. The sepals are reflexed and the long stamens protrude from the flower. *P. ternifolium* has only four fertile stamens which are almost of the same length. The papillate staminal column resembles that of all the other two-petaled species of section *Hoarea* as well as that of *P. auritum*, *P. bubonifolium* and *P. parvipetalum*.

The orientation of the petioles of *P. ternifolium* resembles that of *P. fergusoniae*, *P. reflexum* and *P. nephrophyllum*. All four species have long thin petioles, spreading horizontally from the stem-growing point and bending vertically in the middle. *P. fergusoniae* and *P. reflexum* have palmately compound leaves and *P. nephrophyllum* has palmatively veined, kidney-shaped leaves. All four species belong to different floral structure groups.

Geographical distribution and ecology

P. ternifolium is confined to the south-western coastal plain, from Moorreesburg in the north to Stellenbosch in the south, and from Darling in the west to Du Toitskloof in the east (Figure 8.52.2). The annual rainfall of this area occurs mainly during winter and varies from 400 mm in the west to 700 mm in the east. *P. ternifolium* usually occurs on foothills but it has been found at a height of over 1000 m in the Hawequas Mountains, but it was also collected on the flats around Stellenbosch. It grows in dry renosterveld, but also in wet fynbos in clay, sand or loam, on quartzite reefs or granite slopes and flowers from December to April with the peak during the hot months of February and March, after the leaves have died.

Material studied

--3318 (Cape Town): Between Mamre and Darling (-AD), *Esterhuysen* 18863 (BOL); Goudmyn, Moorreesburg (-BA), *Marais* 164 (STEU); Neulfontein, Moorreesburg (-BA), *Marais* 320 (STEU); Near Malmesbury (-BC), *Bolus s.n.* (BOL); Malmesbury (-BC), *Drijfhout* 1535 (STEU); Diepkloof turnoff on N7 (-BC), *Marais* 260 (STEU); Modderasvlei, Riebeek-Kasteel (-BD), *Drijfhout* 1627

(STEU); Farm Jonkershoek, E of Porseleinberg (-BD), *Marais 319* (STEU); Riebeek-Kasteel (-BD), *Pillans 9994* (BOL); *Salter 2007* (K); Voorspoed, Malmesbury (-BD), *Van der Walt 1036* (STEU); Klipheuwel (-DA), *Boucher 3534* (STE); Swellengift (-DA), *Marais 134* (STEU); Klein Drakenstein & Dal Josefat (-DB), *Drège 7497* (G, K, L, MO, Px2, S, W); Between Klapmuts & Paarl (-DB), *Esterhuysen 21195* (BOL); Farm Lemoenkloof, Paardeberg (-DB), *Marais s.n.* (STEU); SW of Paardeberg (-DB), *Salter & Leighton s.n.* (BOL); Wellington (-DB), *Zeyher s.n.* (BOL); Bottelary, 9 km from Stellenbosch (-DD), *Acocks 4338, 4359* (S); Klapmuts (-DD), *Acocks 4341* (S); Hercular's Pillar (-DD), *Acocks 4348* (S); *Salter 6566* (BOL, K); Bonterivier (-DD), *Buyss 87* (STEU); Farm Rustenberg (-DD), *Drijfhout 2627* (STEU); Hill slopes near Stellenbosch (-DD), *Duthie 1075* (PRE); *Duthie 1075a* (BOL); *Duthie s.n.* (BOLx4); Stellenbosch (-DD), *Duthie s.n.* (BOLx2, K, SAMx2, STEU); Botmaskop (-DD), *Duthie s.n.* (BOLx2, STEUx2); *Garside 15951* (BOL); Mountain slopes near Stellenbosch (-DD), *Duthie s.n.* (BOL); Stellenbosch flats (-DD), *Duthie s.n.* (STEU); Paptegaaiberg (-DD), *Garside 661* (K); *Garside s.n.* (STEU); Stellenboschberg (-DD), *Schonken 167* (STEU).

-3319 (Worcester): Vogelvlei, Gouda (-AC), *Esterhuysen 18823* (BOL); Hawequas Mountains (-CA), *Esterhuysen s.n.* (BOL); Du Toitskloof (-CA), *Esterhuysen 20993* (BOLx2); *Van der Walt s.n.* (STEU); Die Poort, Du Toitskloof (-CA), *Marais 337* (STEU); Vondeling, W slope of Groenberg, Wellington (-CA), *Marais 382* (STEU); Elandskloof, off Du Toitskloof (-CC), *Esterhuysen 15727* (BOL).

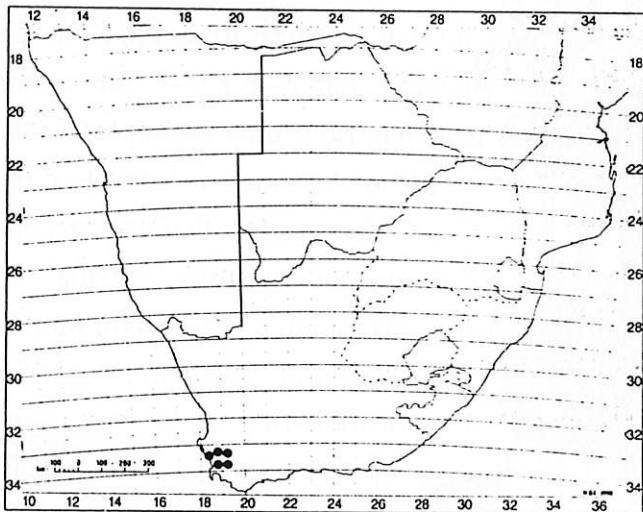


Figure 8.52.2 Geographical distribution of *P. ternifolium*.

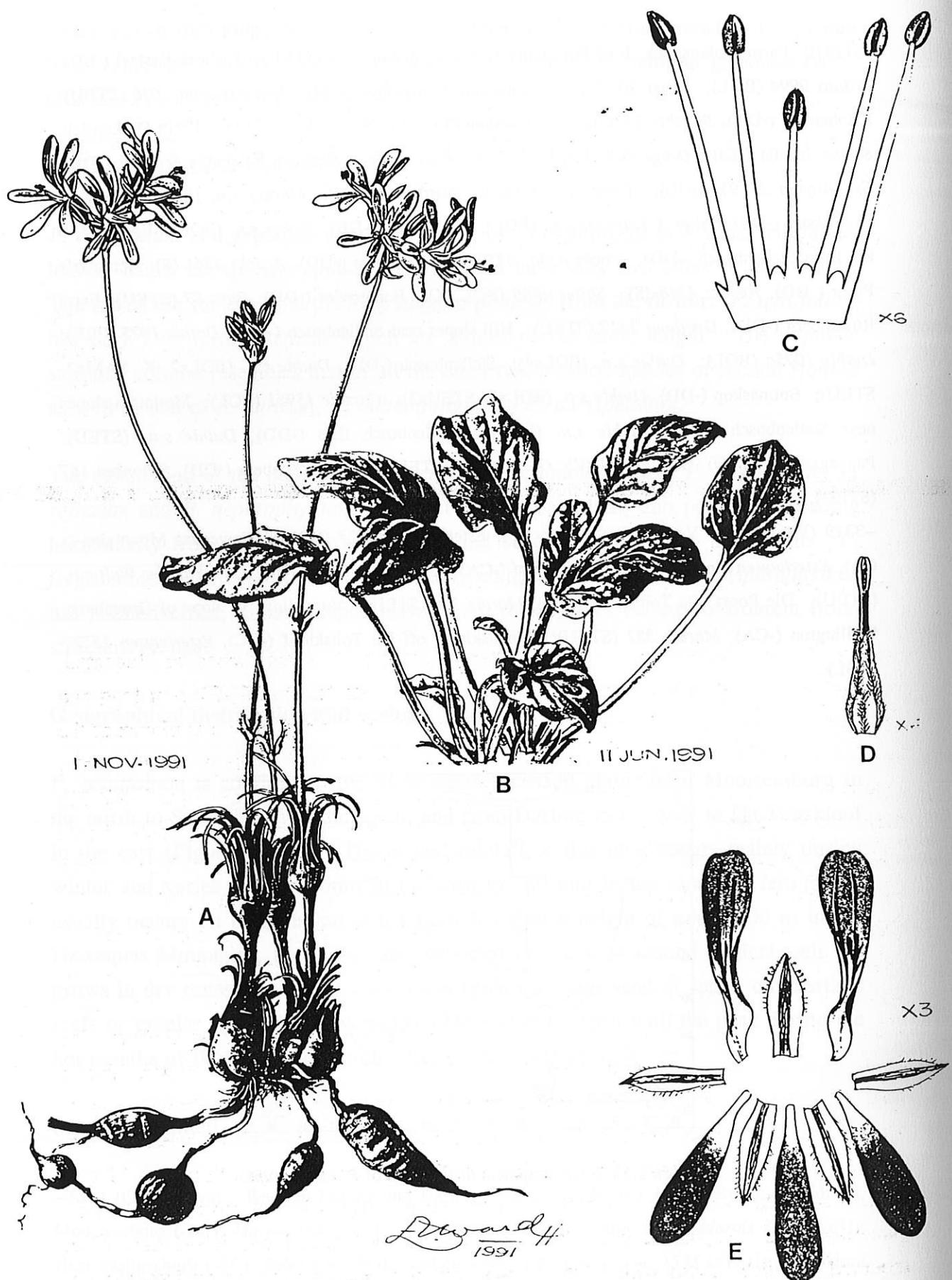


Figure 8.53.1 *Pelargonium triphyllum*. A, flowering plant x1; B, plant with leaves x1; C, androecium x6; D, gynoecium x6; E, petals and sepals x3.

TRIPHYLLUM GROUP

Geophytes with simple or trifoliate leaves. Scape branched, bearing 2-4 pseudo-umbelllets with 3-10 flowers each. Hypanthium short, 7-19 mm long. Flowers with pale pink or bright pink, ligulate petals; claws of the posterior two petals are auriculate. Stamens 5, more or less of the same length, much longer than the sepals, protrude from the flower; staminal column smooth. Tectum of pollen striate-reticulate.

8.53 *Pelargonium triphyllum* Jacq., Collectanea 4: 199 (1791b); Jacq.: 9, t. 515 (1792); Willd.: 647 (1800); Pers.: 227 (1806); DC.: 651 (1824); Spreng.: 52 (1826); Loudon: 568 (1829); G. Don: 726 (1831); Loudon: 271 (1832); Steud.: 290 (1841); Harv.: 266 (1860); Knuth: 336 (1912). TYPE - "Ex Promontorio bonae Spei" (W, holo!).

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

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

Geraniospermum triphyllum (Jacq.) Kuntze: 95 (1891).

A geophyte 70-170 mm tall when in flower. **Tuber:** a turnip-shaped or elongated, sometimes moniliform root with several stem-growing points, 10-35(-60) mm long and 5-30 mm in diameter. Leaves simple or compound with 2 or more lateral pinnae at the base of the laminae, green, petiolate; lamina (or median pinna) ovate or widely ovate, base cuneate or truncate, apex obtuse or rounded, margin entire, 10-30(-40) x 5-20(-35) mm; small lateral pinnae ovate, 4-9 x 4-6 mm, adaxially and abaxially sparsely hirsute with long appressed hairs interspersed with short glandular hairs, margins ciliate; petiole 10-50 mm long and 0,5-1 mm in diameter, prostrate to erecto-patent, hirsute with appressed curly hairs interspersed with long and short glandular hairs and sometimes long stiff non-glandular hairs; stipules subulate, adnate to the petioles for two thirds to almost their total length, 5-12 mm long and 1-2 mm wide, ciliate. **Inflorescence:** scape 20-60(-100) mm long, 1-2 mm in diameter, branched, bearing 2-4 pseudo-umbelllets with 3-10 flowers each; peduncles 20-75(-90) mm long, 0,5-1 mm in diameter, hirsute with appressed curly hairs interspersed with long and short glandular hairs; bracts lanceolate, 2,5-4 mm long, 1-2 mm wide, abaxially hirsute with appressed hairs interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 7-19 mm long, reddish brown, densely hirsute with appressed curly hairs interspersed with long glandular hairs. **Sepals** 5, lanceolate, apices acute, 6-8 mm long, 1,5-2 mm wide, recurved, reddish brown with white or pink margins, indumentum as on hypanthium. **Petals** 5, pale pink to bright pink, apices recurved during anthesis; posterior two with

wine-red feather-like markings or a single blotch in the centre, ligulate, claws white or pale pink, auriculate, 4–6 mm long, apices rounded, truncate or emarginate, 10,5–15 x 2–4 mm; anterior three unguiculate-spathulate, claws filiform; 2–3,5 mm long, apices rounded, 7,5–13 x 1,5–3 mm. **Stamens:** staminal column 1–3 mm long, white, smooth; perfect stamens 5, protrude from the flower, remaining straight during anthesis, posterior one 7–10 mm long, lateral two 7,5–10,5 mm long, anterior two 8–11 mm long, pink to wine-red; staminodes 1,2–3 mm long; anthers wine-red, 1,5–2 mm long, pollen orange. **Gynoecium:** ovary 3–5 mm long; style 2–5 mm long, with glandular and non-glandular hairs, wine-red; stigma branches 1–2,5 mm long, wine-red. **Fruit:** bases of mericarps 4–6 mm long, with glandular hairs, tails 17–30 mm long. (Figure 8.53.1).

Diagnostic features and affinities

P. triphyllum is a small geophyte with simple or three-parted to many-parted leaves. The specific epithet *triphyllum* refers to the sometimes three-parted laminae. The colour of the small flowers varies from pink to a striking bright pink and the claws of the posterior petals are auriculate. Another outstanding feature of this species is the long protruding stamens, with the stamens always longer than the sepals. This is similar to what is the case of the *Auritum* type of flower, although in *P. auritum* the staminal column is papillate, whereas in *P. triphyllum* the staminal column is smooth.

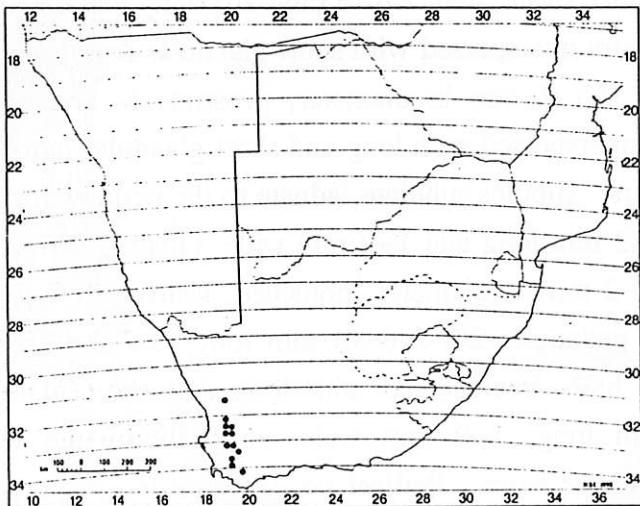


Figure 8.53.2 Geographical distribution of *P. triphyllum*.

Geographical distribution and ecology

P. triphyllum occurs in mountain fynbos on the mountain slopes of the south-western escarpment from Nieuwoudtville in the north to Riviersonderend in the south (Figure 8.53.2), an area receiving an annual rainfall of 400–1000 mm mainly in winter. Plants grow in moist places in coarse or stony sand or on shale bands, usually in shallow soil. Locally plants are fairly frequent and flower from October to December. In most cases flowers appear after the leaves have died.

Material studied

--3119 (Calvinia): De Lande, Nieuwoudtville (-AC), *Von Willert s.n.* (STEU).

--3219 (Wuppertal): Krakadouw Peak (-AA), *Taylor 11953* (STE); Tafelberg, Cederberg (-AC), *Esterhuysen 14338* (BOL); Wolfberg, Cederberg (-AD), *Esterhuysen 18111* (BOL, K); *Esterhuysen 22451* (BOL); Elandskloof (-CA), *Compton 16769, 16772, 16773* (NBG); Sneuberg, Cederberg (-CA), *Esterhuysen 18020* (BOL, K); Hexberg, Kouebokkeveld Mountains (-CA), *Esterhuysen 18478* (BOL); Top of Sneuberg (-CA), *Leipoldt 472* (BOL); Sandfontein Peak, Cederberg (-CB), *Esterhuysen s.n.* (BOL).

--3319 (Worcester): Groot Winterhoek (-AA), *Esterhuysen 19775* (BOL, K); Slagboom, Agter-Witzenberg (-AB), *Cillie s.n.* (STEU); Gydouw (-AB), *Leipoldt 4005* (BOL); *Leipoldt 4006* (BOL, K); Lakenvlei (-BC), *Barker 1299* (NBG); Sonklip Peak, N of Matroosberg (-BC), *Esterhuysen 18742* (BOL); Bushmans Vlei, Botha's Halt (-CB), *Pica Survey 597* (PRE); Rooihoopte, Villiersdorp (-CD), *Bayer 3172* (NBG); Villiersdorp (-CD), *Esterhuysen 4311* (BOL).

--3419 (Caledon): Riviersonderend (-BB), *Leipoldt s.n.* (Z).

CAROLI-HENRICI GROUP

Geophytes with simple or pinnately compound, irregularly bipinnatisect leaves. Scape and peduncles usually thick (3–5 mm in diameter), wine-red or brownish green. Scape branched, bearing 2–5 pseudo-umbelllets with 6–30(–50) flowers each. Flowers white, cream-coloured or yellow. Stamens 2 or 4 fertile, longer than the sepals, and remaining straight during anthesis.



Figure 8.54.1 *Pelargonium githagineum*. A, flowering plant x1; B, androecium x3; C, gynoecium x3; D, petals x2.

8.54 *Pelargonium githagineum* E.M. Marais, sp. nov. in sectione *Hoarea*.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napiforme vel oblongum, 35--40 mm longum, 20--40 mm in diam. Folia hysterantha, rosulata, viridia, petiolata; lamina elliptica, ovata vel triangulata, crenata, 20--70 mm longa, 10--65 mm lata, adaxiale pilosa et glandulosa, abaxiale velutina; petiolus 15--80 mm longus, prostratus, pilosus et glandulosus; stipulae petiolo adnatae. Inflorescentia: scapus pseudoumbellis 2--5, utraque 6--27 floribus; pedunculus githagineus. Pedicellum ca. 0,5 mm longum. Hypanthium 9--20 mm longum, githagineum, dense glandulosum. Sepala 5, lanceolata, githaginea, 6--8 mm longa, 1,5--3 mm lata, unum posterium erectum, cetera patentia. Petala 5, alba, dua postica ligulata vel spathulata, 8,5--10 mm longa, 2--3 mm lata, tria antica spathulata, 6,5--9 mm longa, 1,5--2,5 mm lata. Stamina fertilia 4, staminodia 6, petalis longiora.

TYPE - Cape Province: S of Sutherland, 3 km on the Ouberg turnoff, Marais 243 (STE, holo; BOL, K, MO, NBG, PRE).

A deciduous geophyte with a regularly shaped subterranean tuber, 120--300 mm tall when in flower. **Tuber:** a turnip-shaped or elongated root with a short flattened stem, covered with flaking dark brown periderms, 35--40 mm long and 20--40 mm in diameter. **Leaves** radical, hysteranthous, rosulate, simple, green, petiolate; lamina elliptic, ovate or triangular, base cuneate to truncate, apex rounded, margin deeply crenate, 20--70 x 10--65 mm, adaxially pilose with patent hairs interspersed with very short glandular hairs, abaxially velutinous; petiole 15--80 mm long and 1,5--4 mm in diameter, prostrate, densely pilose with patent hairs interspersed with glandular hairs; stipules triangular to subulate, adnate to petioles for half their length, 7--15 mm long and 1,5--5 mm wide, ciliate. **Inflorescence:** scape 5--25 mm long, 3--5 mm in diameter, greenish red, branched, bearing 2--5 pseudo-umbelllets with 6--27 flowers each; peduncles 65--260 mm long, 2--5 mm in diameter, greenish red, densely covered with glandular hairs interspersed with patent non-glandular hairs; bracts subulate, reclinate, 3--8 mm long, 1--2 mm wide, hirsute; flower buds, flowers and fruits erect. **Pedicel** 0,5--2 mm long. **Hypanthium** 9--20 mm long, greenish red, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 6--8 mm long, 1,5--3 mm wide, posterior one erect, others patent, greenish red with white margins, indumentum abaxially as on peduncle. **Petals** 5, white; posterior two ligulate to spathulate, 8--11 x 2--3 mm, bases cuneate, apices truncate to emarginate, recurved during anthesis; anterior three connivent, spathulate, bases attenuate, apices rounded, 6,5--9 x 1,5--2,5 mm. **Stamens** 10, basally connate, staminal column 1,5--3 mm long, white, smooth; perfect stamens 4, protruding from the flower, 9--12 mm long, free filaments wine-red; staminodes 3--6 mm long; anthers wine-red, ca. 2 mm long, pollen orange. **Gynoecium:** ovary superior, oblong-conical,

5-lobed, 3,5--6 mm long, densely sericeous; style filiform, 3--7,5 mm long, white; stigma with 5 recurved branches, 0,6--1,5 mm long, adaxially pink. **Fruit:** a schizocarp consisting of 5 mericarps, bases of mericarps 5--6 mm long, without glandular hairs, tails 28--35 mm long. (Figure 8.54.1).

Diagnostic features and affinities

P. githagineum is a geophyte with a dense mass of simple prostrate, pilose leaves and very small white flowers. The flowers have only four fertile stamens with long wine-red filaments. The small white flowers of *P. githagineum*, with the stamens longer than the petals, resemble those of *P. parvipetalum*. In *P. githagineum* however, the staminal column is smooth and the number of stamens four, whereas in *P. parvipetalum* the column is papillate and the number of stamens five. Although the flowers of *P. githagineum* are protandrous, closed stigma branches protrude from the flower buds. During anthesis the filaments lengthen more than the style and when the anthers open, the stigma branches are concealed in the androecium. Eventually, when the anthers are dropped, the stigma branches open to take the position previously occupied by the anthers.

The rosette growth form as well as the structure of the leaf resemble that of *P. punctatum*, *P. triandrum* and *P. curviandrum*. The flowers of these three species are much larger and of a different structure than those of *P. githagineum*.

The scape is very short and the scape and peduncles are very thick if compared with other species of section *Hoarea*. In this *P. githagineum* resembles *P. caroli-henrici*, another species with only four fertile stamens, but with no further resemblance in the floral structure. The specific epithet *githagineum* refers to the greenish red colour of the scape, peduncles and the hypanthia.

Geographical distribution and ecology

P. githagineum occurs on the Roggeveld plateau and around Matjiesfontein (Figure 8.54.2), an area with an annual rainfall of 100--200 mm during the winter months. Plants grow on sandstone ridges under bushes, and are locally abundant. It is an early flowering species of section *Hoarea* and flowers from September to October, before the leaves wither.

Material studied

--3220 (Sutherland): S of Sutherland, 3 km on the Ouberg turnoff (-BC), *Marais 243* (BOL, K, MO, NBG, PRE, STE); Komsberg, farm De Kom (-DA), *Marais 143* (STEU).

--3320 (Montagu): Whitehill Ridge, Laingsburg (-BA), *Leighton 254* (BOL); 4 km from Matjiesfontein on Sutherland road (-BA), *Marais 211* (STEU).

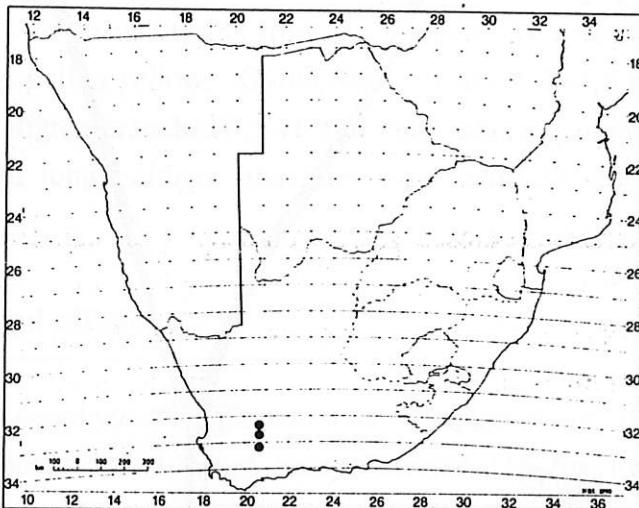


Figure 8.54.2 Geographical distribution of *P. githagineum*.

8.55 *Pelargonium caroli-henrici* B. Nord., Plant Systematics and Evolution 155: 333 (1987). TYPE - Cape Province: Koekenaap. *Nordenstam 2883a* (S, holo!).

A geophyte 110--250 mm tall when in flower. **Tuber:** a turnip-shaped root 30--60 mm long and 15--40 mm in diameter. **Leaves:** green, petiolate; lamina broadly ovate, base cuneate, 20--30(-50) x 20--40 mm, pinnately compound, irregularly pinnatifoliated to bipinnatisect, densely pilose with white patent hairs interspersed with glandular hairs; pinnae 10--15 x 6--8 mm, apices obtuse; petiole 10--30(-50) mm long and 1--2 mm in diameter, erecto-patent, indumentum as on lamina; stipules subulate, adnate to petioles for almost their total length, ca. 10 mm long and ca. 1 mm wide, hirsute. **Inflorescence:** scape 10--40 mm long, 2--5 mm in diameter, branched, bearing 2--5 pseudo-umbelllets with (10-)15--25(-50) flowers each; peduncles green to wine-red, 50--200 mm long, 2,5--4 mm in diameter, densely covered with glandular hairs interspersed with patent white hairs; bracts green, patent or reflexed, subulate, 3--8 mm long, 1--1,5 mm wide, abaxially hirsute interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 22--33 mm long, wine-red, covered with glandular hairs, sparsely

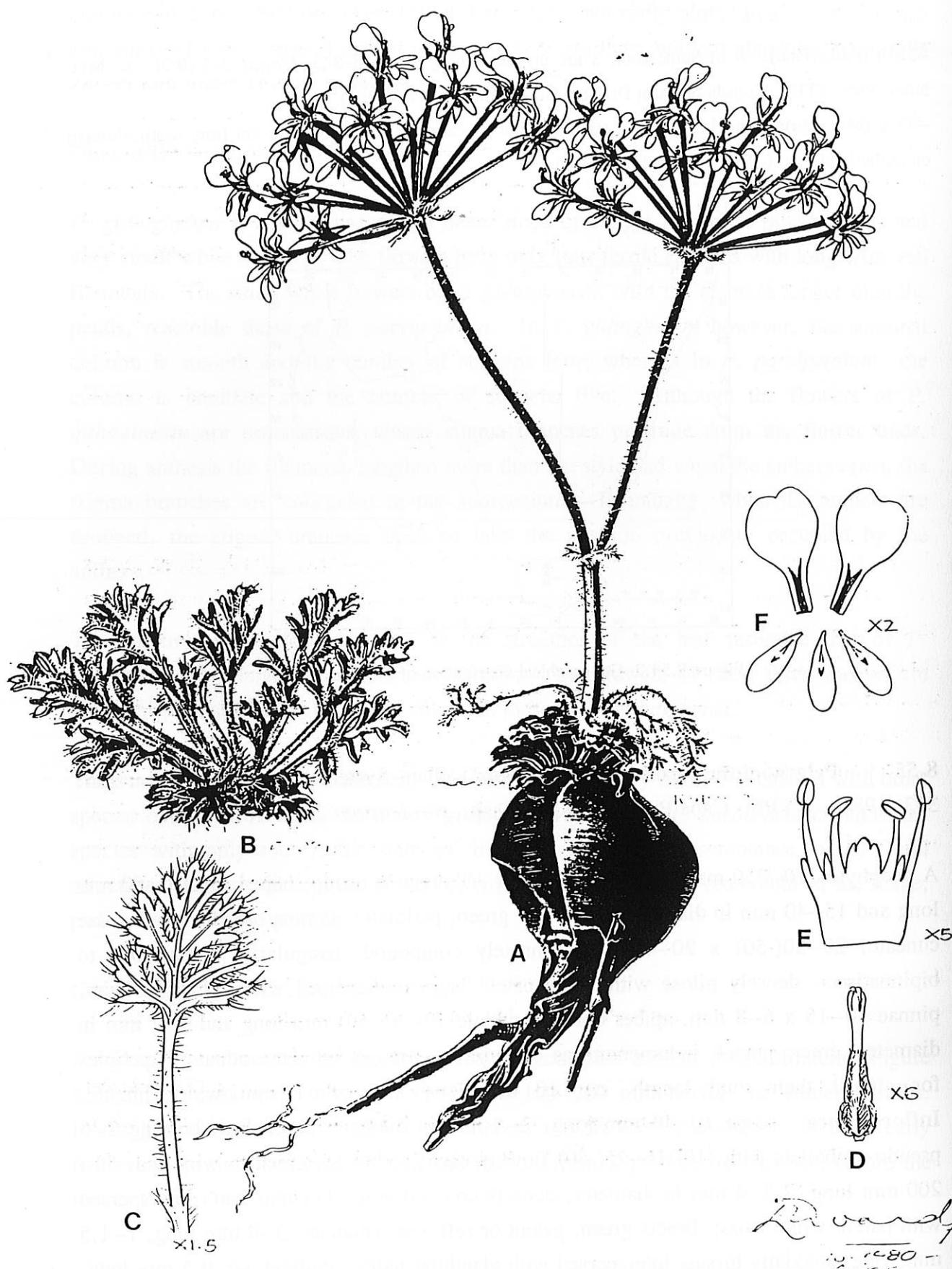


Figure 8.55.1 *Pelargonium caroli-henrici*. A, flowering plant x1; B, plant with leaves x1; C, leaf x1.5; D, gynoecium x6; E, androecium x5; F, petals x2.

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interspersed with patent non-glandular hairs. Sepals 5, lanceolate, apices acute, 4--6 mm long, 1--2.5 mm wide, patent, base wine-red and apex green, with white margins, hirsute, interspersed with glandular hairs. Petals 5, yellow to cream-coloured, patent during anthesis; posterior two unguiculate-spathulate to unguiculate-obcordate, cotyliform, claws dark red, cuneate, apices rounded or emarginate, 8--15 x 3--7 mm; anterior three with dark red blotches in the centre, spathulate to broadly spathulate, bases attenuate, apices rounded, 4.5--11 x 2--4 mm. Stamens: staminal column 2.5--4 mm long, pink, smooth; perfect stamens 4, protruding from the flower, lateral two 6--9 mm long, anterior two 6.5--9 mm long, free filaments wine-red, twisted so that pollen surfaces of the anthers are turned to the front; staminodes 3--5 mm long; anthers wine-red, ca. 1.5 mm long, pollen yellow. Gynoecium: ovary 2.5--4.5 mm long; style 1--4 mm long, wine-red; stigma branches 0.5--1 mm long, adaxially wine-red. Fruit: bases of mericarps 4--5 mm long, without glandular hairs, tails 25--28 mm long. (Figure 8.55.1).

Diagnostic features and affinities

P. caroli-henrici is a geophyte with pinnatilobed to bipinnatisect, densely pilose leaves and thick wine-red peduncles, bearing many-flowered (15--25 flowers) pompon-like pseudo-umbelllets. The yellow or cream-coloured flowers have long (20--33 mm), wine-red hypanthia and only four fertile stamens. The free filaments are twisted so that pollen surfaces are turned to the front. This is in contrast with the majority of species of *Pelargonium* where the dehisced anthers are borne in such a way that the pollen-covered surfaces show backwards and could be touched by the abdomen of a visiting insect trying to get to the nectar in the hypanthium (Scott Elliot 1891). The petals are patent in a cup-shaped manner. The dark red claws of the posterior petals and the dark red blotches on the anterior ones together with the wine-red filaments form prominent nectar guide-lines in the centre of the cup-shaped flower.

P. caroli-henrici resembles *P. rubiginosum* in respect to the leaf structure, the indumentum and colour of the scape, the peduncles and the hypanthia, the colour and the markings of the petals and the form of the anterior petals. These two species differ from each other in respect to the form of the posterior petals, the number of the fertile stamens (two fertile stamens in *P. rubiginosum*), the structure of the androecium and the pattern of the tectum of the pollen grains. The two species occupy two separate, but adjacent distribution areas.

The thick wine-red peduncles and long hypanthia of *P. caroli-henrici* resemble those of *P. rubiginosum*, *P. moniliforme* and *P. vinaceum*. *P. githagineum* shows similar characteristics, but with much shorter hypanthia. The leaves of *P. caroli-henrici* and *P. rubiginosum* are pinnatilobed to bipinnatifid, whereas the others have simple or trifoliolate leaves.

P. caroli-henrici is named in honour of professor Karl Heinz Rechinger, a friend of B. Nordenstam, the author of this species.

Geographical distribution and ecology

P. caroli-henrici occurs on the lowland quartzite areas of the Knersvlakte, from the flats west of Garies in the north to Koekenaap in the south (Figure 8.55.2). This is a hot and arid area with an annual rainfall of 50–150 mm in winter. Populations are usually very small and single plants grow on flat areas with white quartzite pebbles and very short succulent vegetation. *P. caroli-henrici* flowers in October after the leaves have died.

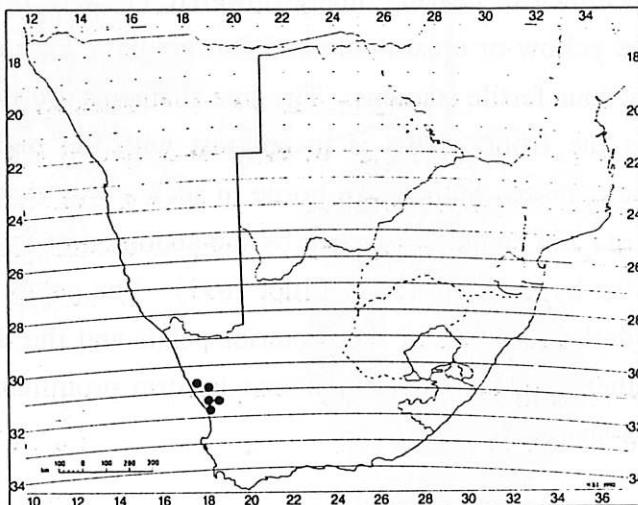


Figure 8.55.2 Geographical distribution of *P. caroli-henrici*.

Material studied

- 3017 (Hondeklipbaai): Baievlei & Rooiberg, at Soutfontein turnoff (-DB), *Drijfhout 2708* (STEU).
- 3018 (Kamiesberg): 6 km on Kliprand road, N of Bitterfontein (-CD), *Marais 281* (STEU); Kamagab, 10 km NE of Bitterfontein (-CD), *Nordenstam & Lundgren 1464* (S).
- 3118 (Vanrhynsdorp): Groot Graafwater (-AD), *Hall 2460* (STEU); Groot Graafwater turnoff (-BC), *Bayer 2209* (NBG); N7 road, at Groot Graafwater turnoff (-BC), *Marais 130* (STEU); Knersvlakte, 8 km

E of Varsrivier bridge on N7 road (-BD), *Nordenstam & Lundgren 1944* (S); Moedverloor, 4 km N of Holrivier bridge (-CB), *Nordenstam 2950* (S); Koekenaap (-CB), *Nordenstam 2883a* (S); Koekenaap, 1 km E of the road (-CB), *Nordenstam & Lundgren 1679* (S).

8.56 *Pelargonium rubiginosum* E.M. Marais, sp. nov. in sectione *Hoarea*.

Herba perennis acaulescens tuberosa. Tuber: subterraneum, napiforme vel oblongum, 20--60 mm longum, 15--20 mm in diam. Folia: hysterantha, rosulata, petiolata; lamina ovata, irregulariter pinnatilobata vel bipinnatifida, 15--60 mm longa, 10--45 mm lata, viridia, dense albopilosa et glandulosa; petiolus 10--60 mm longus, erecto-patens, glandulosus et pilosus; stipulae petiolo adnatae. Inflorescentia: scapus pseudoumbellis 2--5, utraque 10--30 floribus; pedunculus rubiginosus. Pedicellum ca. 0,5 mm longum. Hypanthium 14--32 mm longum, rubiginosum, glandulosum et sparsim hirsutum. Sepala 5, lanceolata, 4,5--6 mm longa, 1--3 mm lata, reflexa. Petala 5, alba, cremea vel pallide flava, dua postica unguiculato-spathulata vel unguiculato-obcordata, 9--16 mm longa, 2,5--4,5 mm lata, tria antica spathulata, 5,5--13 mm longa, 1,5--4 mm lata. Stamina: fertilia 2, staminodia 8.

TYPUS - Cape Province: "Jenkinskop, 17 km N of Eksteenfontein, Richtersveld", *Van Jaarsveld 4100* (STE, holo., BOL, K, MO, NBG, PRE).

A deciduous geophyte with a small regularly shaped subterranean tuber, 70--200 mm tall when in flower. Tuber: a turnip-shaped or elongated root with a short flattened stem, covered with flaking dark brown periderms, 20--60 mm long and 15--20 mm in diameter. Leaves radical, hysteranthous, erecto-patent, green, petiolate; lamina broadly ovate, base cuneate, apex rounded, 15--60 x 10--45 mm, pinnately compound, irregularly pinnatilobed to bipinnatisect, densely pilose with white patent hairs interspersed with glandular hairs; segments linear, 5--10 mm long, 2--6 mm wide, apices obtuse; petiole 10--60 mm long and 1--3 mm in diameter, erecto-patent, indumentum as on lamina; stipules subulate, adnate to petioles for one third of their length, 3--7 mm long and ca. 1 mm wide, hirsute. Inflorescence: scape 10--30 mm long, 2--5 mm in diameter, branched, bearing 2--5 pseudo-umbelllets with 10--30 flowers each; peduncles wine-red to brown-red, 30--170 mm long, 1--2,5 mm in diameter, pilose with glandular hairs interspersed; bracts green, erect, subulate, 3--6 mm long, 1 mm wide, abaxially hirsute; flower buds, flowers and fruits erect. Pedicel ca. 0,5 mm long, green. Hypanthium 14--32 mm long, wine-red to brown-red, covered with glandular hairs interspersed with non-glandular hairs. Sepals 5, lanceolate, apices acute, 4,5--6 mm long, 1--2 mm wide, reflexed, green, indumentum abaxially as on hypanthium. Petals 5, white, cream-coloured or yellow with red or crimson markings in the centre, patent during anthesis;

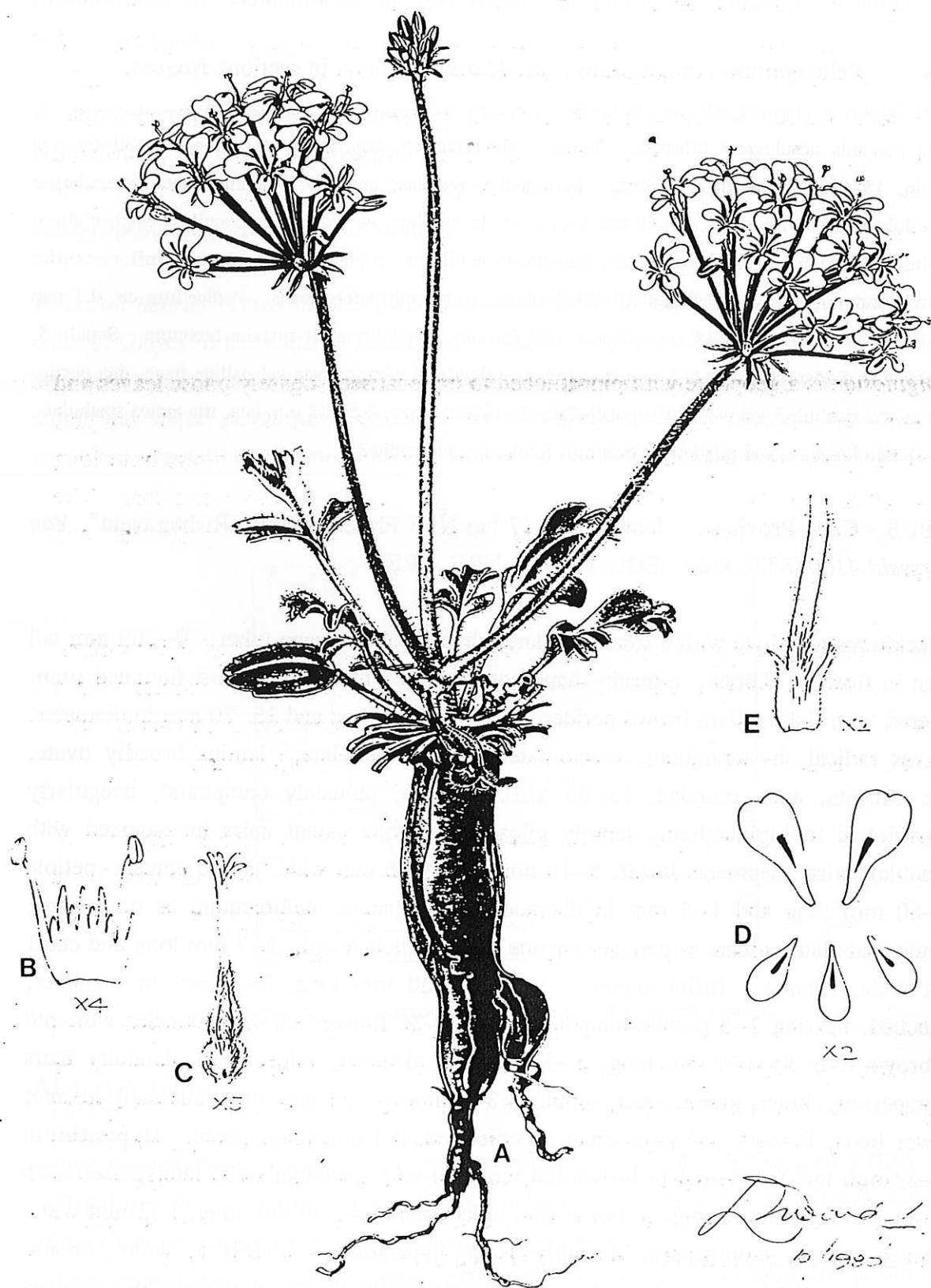


Figure 8.56.1 *Pelargonium rubiginosum*. A, flowering plant x1; B, androecium x4; C, gynoecium x5; D, petals x2; E, leaf base with stipules x2.

posterior two unguiculate-spathulate to unguiculate-obcordate, bases cuneate, apices rounded to emarginate, 9--16 x 2,5--4,5 mm; anterior three spathulate, bases attenuate, apices rounded, 5,5--13 x 1,5--4 mm. **Stamens** 10, basally connate, staminal column 1,5--3 mm long, white, smooth; perfect stamens 2 (anterior position), white, 5--9 mm long, protruding from the flower; staminodes 2--6,5 mm long; anthers pale pink, ca. 1 mm long, pollen yellow. **Gynoecium:** ovary superior, oblong-conical, 5-lobed, 2,5--4,5 mm long, densely sericeous interspersed with glandular hairs; style filiform, 1,5--4,5 mm long, pink; stigma with 5 branches, 0,5 mm long, pink. **Fruit:** a schizocarp consisting of 5 mericarps, bases of mericarps 4--5 mm long, without glandular hairs, tails 22--30 mm long. (Figure 8.56.1).

Diagnostic features and affinities

P. rubiginosum is a geophyte with pinnatilobed to bipinnatisect, densely pilose leaves and thick wine-red or brown-red peduncles, bearing many-flowered (10--30 flowers) pompon-like pseudo-umbelllets. The white, yellow or cream-coloured flowers have long (14--33 mm), wine-red or brown-red hypanthia and only two fertile stamens. The specific epithet *rubiginosum* refers to the wine-red or brown-red peduncles and hypanthia.

The stigma branches are very short and not recurved as in most species of *Pelargonium*. In this *P. rubiginosum* resembles *P. punctatum* and *P. triandrum*, both species with a reduction in the number of fertile stamens, but with a different floral structure. The structure of the tectum of the pollen grains of these three species is identical.

P. rubiginosum resembles *P. fumariifolium* in that the flowers of both species have a very delicate appearance. In both cases the hypanthia are long, and both have only two fertile stamens, but the position of the fertile stamens differs. In *P. rubiginosum* the anterior two filaments bear anthers, and in *P. fumariifolium* the lateral ones do.

P. rubiginosum resembles *P. caroli-henrici* in respect of the leaf structure, the indumentum and colour of the scape, the peduncles and the hypanthia, the colour and the markings of the petals and the form of the anterior petals. However, these two species differ from each other in respect to the form of the posterior petals, the number of fertile stamens (four fertile stamens in *P. caroli-henrici*) as well as the structure of the androecium. The two species occupy separate distribution areas. *P. rubiginosum* occurs north of the 30° latitude and *P. caroli-henrici* occurs south of the same latitude.

Geographical distribution and ecology

P. rubiginosum occurs in the Richtersveld, from Khubus in the north to Eksteenfontein in the south. It was also collected on the foothills of the Kourkamma Mountains south of Komaggas (Figure 8.56.2). This area receives a scant rainfall of less than 100 mm per annum, occurring during the winter months only. *P. rubiginosum* occurs on granite, in coarse sand or quartzite and plants are found in rock crevices at high elevations or on foothills in direct sunlight or light shade. The plants are usually locally abundant. *P. rubiginosum* flowers from October to November. Herbarium specimens collected in the field do not have leaves and flowers together, but in the garden there are still leaves present at flowering time.

Material studied

- 2816 (Oranjemund): S of Khubus (-BD), *Nordenstam* 1775 (S, STE); Doornpoort (-DB), *Hall NBG* 706/53 (NBG).
- 2817 (Vioolsdrif): Jenkinskop (-CB), *Van Jaarsveld* 4100 (BOL, K, MO, NBG, PRE, STE); 2 miles NE of Eksteenfontein (-CD), *Nordenstam* 1839 (S, STE).
- 2917 (Springbok): Kourkamma Mountain (-CD), *Drijfhout* 2811 (STEU); *Van Jaarsveld s.n.* (STEU).

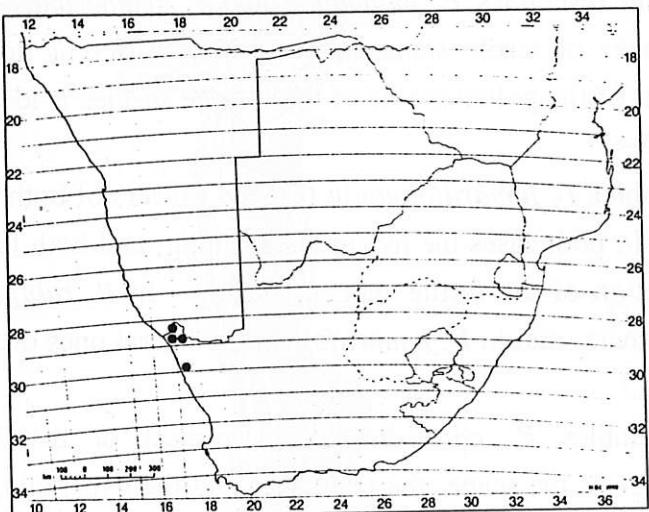


Figure 8.56.2 Geographical distribution of *P. rubiginosum*.

PUNCTATUM GROUP

Geophytes with simple prostrate leaves. Scape branched, bearing 2--8 pseudo-umbelllets with 4--45(-60) flowers each. Flowers cream-coloured or yellow. Stamens 2, 3, 4 or 5 fertile, very long and protrude from the flower, curved upwards during anthesis.

8.57 *Pelargonium oblongatum* Harv. in Flora Capensis 1: 263 (1860); Hooker: t. 5996 (1872); Knuth: 329 (1912); Van der Walt: 29, fig. (1977). TYPE - Cape Province: Kaus Mountain, near Kookfontein, Namaqualand, *Drège s.n. sub. P. oblongatum* (TCD, lecto!, designated here, E!, Gx2!, K!, L!, MEL!, MO!, OXF!, Pl!, S!, W!).

Geraniospermum oblongatum (Harv.) Kuntze: 95 (1891).

A geophyte 160--300 mm tall when in flower. **Tuber:** an oblong or turnip-shaped root 30--150 mm long and 20--30 mm in diameter. **Leaves** bright green, petiolate; lamina simple, ovate or orbicular, base cordate or truncate, apex obtuse or rounded, margin irregularly dentate, 25--110 x 20--105 mm, adaxially covered with long and short glandular hairs, abaxially densely covered with short soft patent hairs interspersed with glandular hairs, margins ciliate; petiole 10--70(-100) mm long and 2--3(-6) mm in diameter, prostrate, covered with long glandular hairs; stipules triangular, adnate to the petioles for half or more than half their length, 5--25 mm long and 2--5 mm wide, ciliate, apices laterally curved. **Inflorescence:** scape 10--180 mm long, 2--5 mm in diameter, branched, bearing 2--5(-7) pseudo-umbelllets with 4--8(-24) flowers each; peduncles 10--70 mm long, 1,5--2,5 mm in diameter, covered with glandular hairs, sparsely interspersed with long soft patent hairs; bracts lanceolate, 8--10 mm long, 3--5 mm wide, reflexed, abaxially hirsute with patent hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 33--68 mm long, green, densely covered with glandular hairs interspersed with long stiff patent hairs. **Sepals** 5, lanceolate, apices attenuate, 13--20 mm long, 2--5 mm wide, posterior one erect, others patent, green, indumentum as on peduncle. **Petals** 5, pale yellow or cream-coloured, patent during anthesis with apices recurved; posterior two with wine-red feather-like markings, unguiculate-obovate to widely unguiculate-obovate, bases cuneate, apices truncate or emarginate, 22--35 x 7,5--15 mm; anterior three widely spatulate, bases narrowly cuneate, apices rounded, 15--28 x 5--10 mm. **Stamens:** staminal column 2--4 mm long, white; perfect stamens 5, protruding from the flower, bending upwards, posterior one 8--20 mm long, lateral two 14,5--25 mm long, anterior two 17--31 mm long, white; staminodes 4--6 mm long; anthers wine-red, 3--4 mm long, pollen orange. **Gynoecium:** ovary 3,5--8 mm long; style 6--14 mm long,

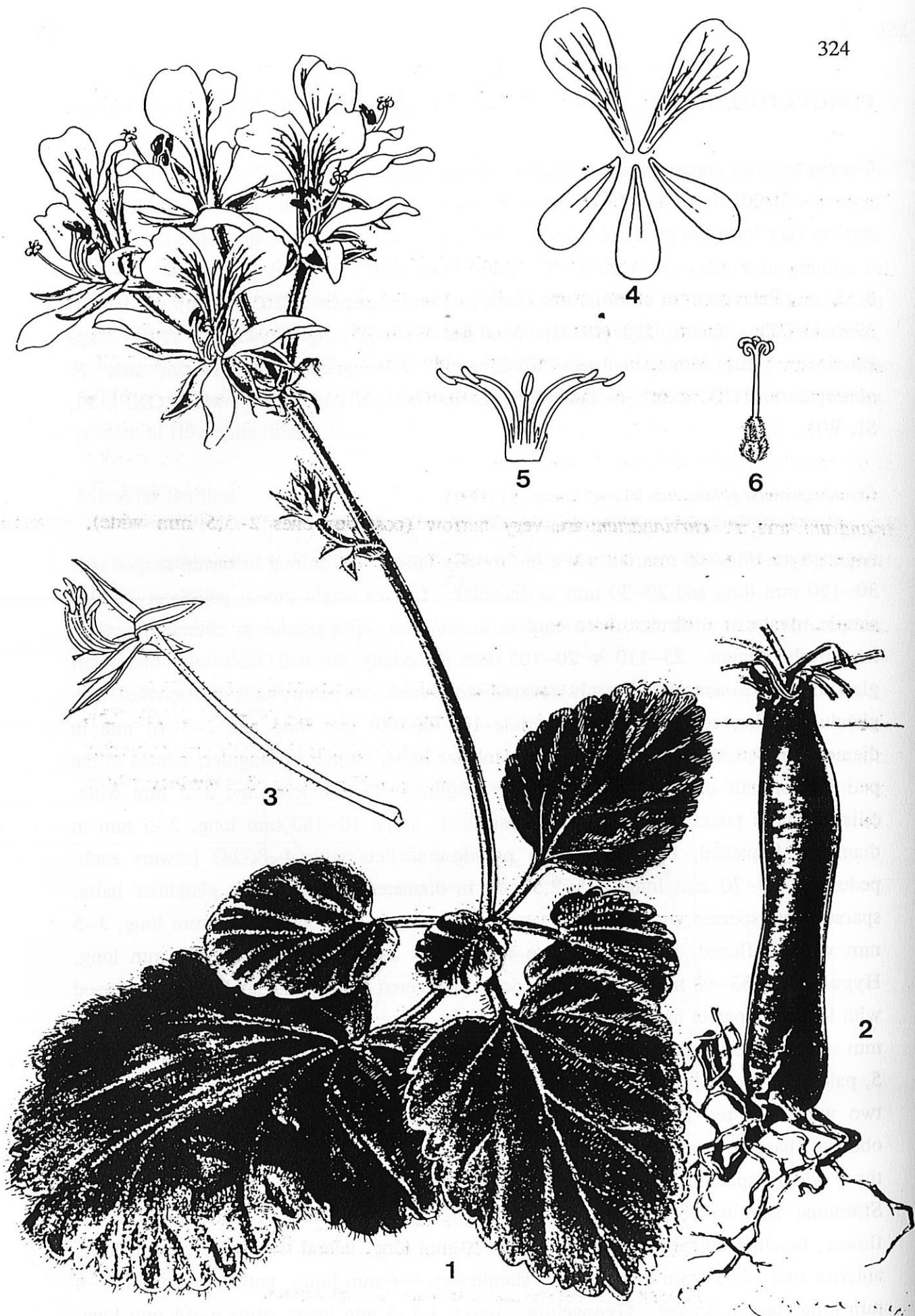


Figure 8.57.1 *Pelargonium oblongatum*. 1, flowering plant $\times 1$; 2, tuber $\times 1$; 3, flower without petals $\times 1$; 4, petals $\times 1$; 5, androecium $\times 1$; 6, gynoecium $\times 1.5$.

white or pale green; stigma branches 1,2--2,5 mm long, adaxially pink. Fruit: bases of mericarps 6--7 mm long, with prominent glandular hairs, tails ca. 30 mm long. (Figure 8.57.1).

Diagnostic features and affinities

P. oblongatum is a very attractive species with bright green simple leaves and very large pale yellow or cream-coloured flowers. The specific epithet *oblongatum* refers to the sometimes oblong tuber. The indumentum on the scape, peduncle and hypanthia are very similar to that of *P. carneum* and *P. radiatum*, both species with also very large flowers. However, the stamens of the latter two species are borne straight during anthesis, whereas those of *P. oblongatum* are bending upwards. Similar long curved stamens are also present in *P. punctatum*, *P. triandrum* and *P. curviandrum*. These three species have also simple prostrate leaves like *P. oblongatum*, but the petals of *P. punctatum*, *P. triandrum* and *P. curviandrum* are very narrow (posterior ones 2-5,5 mm wide), whereas those of *P. oblongatum* are wide (posterior ones 7,5--15 mm wide).

Geographical distribution and ecology

P. oblongatum is restricted to Namaqualand and the Richtersveld and occurs from Stinkfontein Mountain in the north to the Kamiesberg in the south (Figure 8.57.2). This is a very hot and arid area with a scant annual rainfall of less than 200 mm occurring mainly in winter. *P. oblongatum* flowers in October and November after the leaves have died.

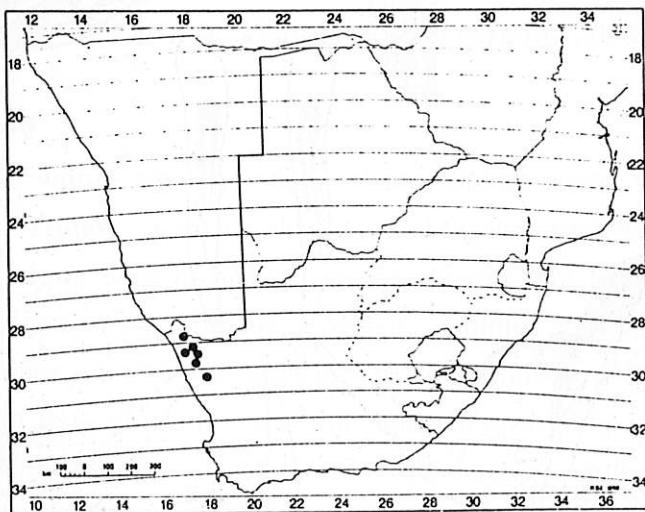


Figure 8.57.2 Geographical distribution of *P. oblongatum*.

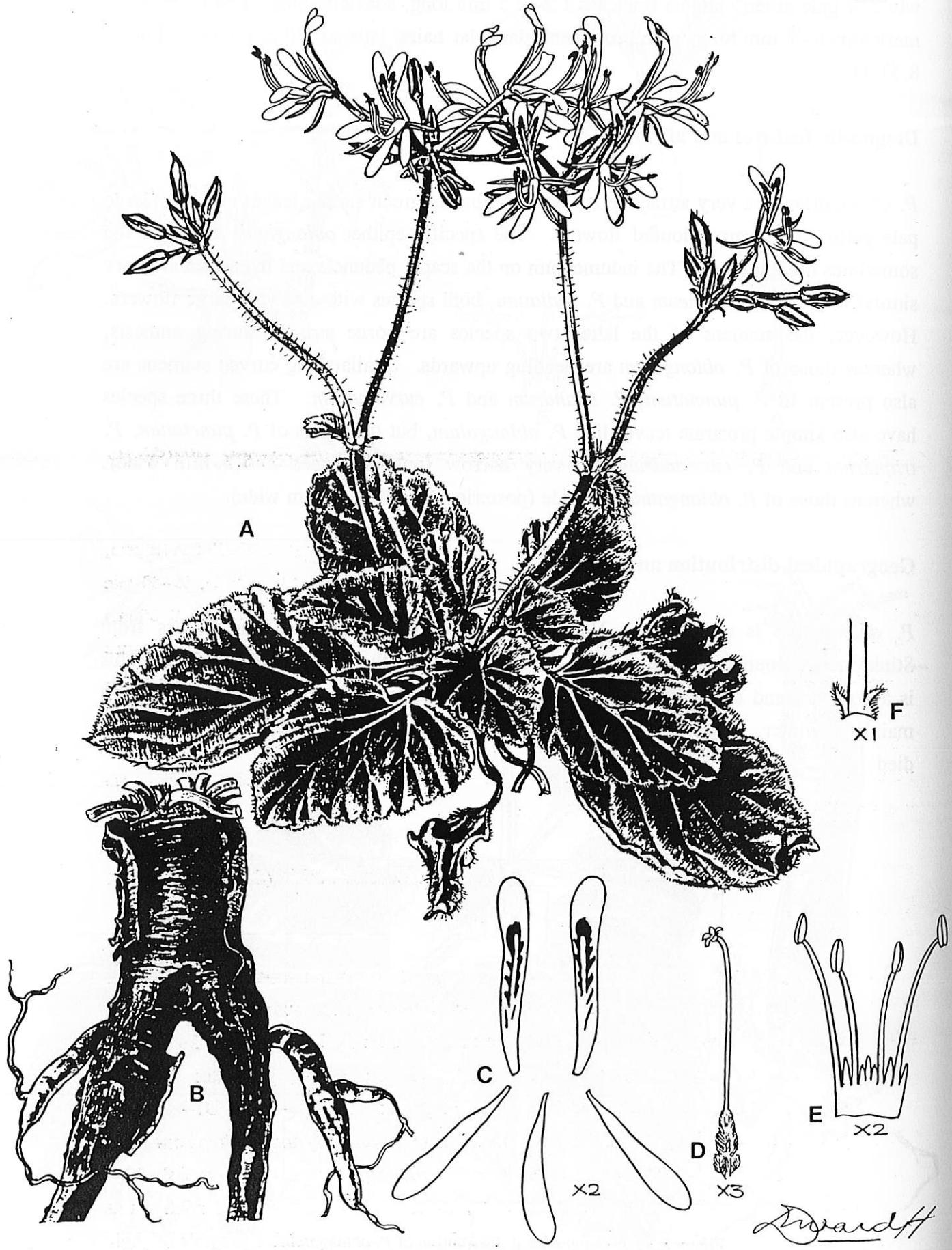


Figure 8.58.1 *Pelargonium curviandrum*. A, flowering plant $\times 1$; B, tuber $\times 1$; C, petals $\times 2$; D, gynoecium $\times 3$; E, androecium $\times 2$; F, leaf base with stipules $\times 1$.

Material studied

- 2817 (Vioolsdrif): Stinkfontein Mountain (-CA), *Herre s.n.* (BOL); Stinkfontein Mountain, above Eksteenfontein (-CD), *Williamson 4463* (STEU).
- 2917 (Springbok): Kaus Mountain, near Kookfontein (-AD), *Drège 3237* (P); *Drège s.n. sub P. oblongatum* (E, Gx2, K, L, MEL, MO, OXF, P, S, TCD, W); Rabas, near Steinkopf (-BA), *Compton s.n.* (NBG); Aninaus Pass, 9 km W of Steinkopf (-BA), *Nordenstanq 1593* (S); Ratelpoort (-BD), *Hall s.n.* (NBG); Okiep (-DB), *Pillans s.n.* (K); Klein Komaggas (-DC), *Herre s.n.* (BOL); Komaggas (-DC), *Herre s.n.* (BOL).
- 3018 (Kamiesberg): Studer's Pass (-AC), *Van der Walt s.n.* (STEU).

8.58 *Pelargonium curviandrum* E.M. Marais, sp. nov. in sectione *Hoarea*, *P. punctato* affine.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napiforme vel oblongum, 15--50 mm longum, 12--25 mm in diam. Folia hysterantha, rosulata, viridia, petiolata; lamina ovata, crenata, 25--80 mm longa, 20--60 mm lata, adaxiale glandulosa et pilosa, abaxiale velutina et glandulosa; petiolus 10--55 mm longus, prostratus, glandulosus et pilosus; stipulae petiolo adnatae, ciliatae. Inflorescentia: scapus pseudoumbellis 2--4(-6), utraque 7--23(-29) floribus. Pedicellum ca. 0,5 mm longum. Hypanthium 18--30 mm longum, sparsim breveque glandulosum et hirsutum. Sepala 5, lanceolata, 7--12 mm longa, 1,5--3 mm lata, patentia. Petala 5, alba, dua postica ligulata, 17--23 mm longa, 2,5--3 mm lata, subtiliter carmineo-rubra, tria antica anguste spathulata, 12--15 mm longa, 2,5--3 mm lata. Stamina fertilia 4, dua anterioria 13--20 mm long sursum curvata, staminodia 6.

TYPE - Cape Province: 12 km E of Vanwyksdorp, *Lavranos 20941* (STE, holo, BOL, K, MO, NBG, PRE).

A deciduous geophyte with a small regularly shaped subterranean tuber, 100--300 mm tall when in flower. Tuber: a turnip-shaped or elongated root with a short flattened stem, covered with flaking dark brown periderms, 15--50 mm long and 12--25 mm in diameter. Leaves radical, hysteranthous, rosulate, simple, green, petiolate; lamina ovate, apex obtuse, base cuneate to truncate, margin crenate, 25--80 x 20--60 mm, adaxially covered with long glandular hairs interspersed with very long soft patent non-glandular hairs, abaxially velutinous interspersed with long glandular hairs; petiole 10--55 mm long and 2--4 mm in diameter, prostrate, covered with short glandular hairs and long soft patent non-glandular hairs; stipules subulate, adnate to petioles for half of their

length, 4--8 mm long and 1--2 mm wide, ciliate, apices laterally curved. **Inflorescence:** scape 30--200 mm long, 1--3 mm in diameter, branched, bearing 2--4(-6) pseudo-umbelllets with 7--23(-29) flowers each; peduncles 50--120 mm long, 1--2 mm in diameter, covered with short glandular hairs interspersed with long soft patent non-glandular hairs; bracts narrowly triangular, 4--5 mm long, 1--1.5 mm wide, hirsute; flower buds, flowers and fruits erect. **Pedicel** ca. 0.5 mm long. **Hypanthium** 18--30 mm long, reddish brown, sparsely covered with short glandular hairs and non-glandular hairs. **Sepals** 5, lanceolate, apices acute, 7--12 mm long, 1.5--3 mm wide, patent, reddish brown with white margins, indumentum abaxially as on peduncle. **Petals** 5, white to cream-coloured, patent during anthesis; posterior two with wine-red feather-like markings, ligulate, bases cuneate, apices rounded, 17--23 x 2.5--3 mm; anterior three narrowly spatulate, bases attenuate, apices rounded, 12--15 x 2.5--3 mm. **Stamens** 10, basally connate, staminal column 1.5--3.5 mm long, white, smooth; perfect stamens 4, lateral two 11--18 mm long; anterior two 13--20 mm long, protruding from the flower, curved upwards during anthesis, white; staminodes 2.5--6 mm long; anthers wine-red, 2--2.5 mm long, pollen orange. **Gynoecium** lengthens conspicuously during anthesis; ovary superior, oblong-conical, 5-lobed, 3.5--5.5 mm long, densely sericeous; style filiform, 6--12 mm long, white; stigma with 5 branches, 0.5--1 mm long, adaxially pink. **Fruit:** a schizocarp consisting of 5 mericarps, bases of mericarps 5--6 mm long, with glandular hairs, tails 22--25 mm long. (Figure 8.58.1).

Diagnostic features and affinities

P. curviandrum is a geophyte with simple prostrate leaves, with the older leaves bigger than the younger ones. The long and narrow ligulate petals are white to cream-coloured and as a result of the orientation of the two posterior petals the feather-like markings on them appear as a unit.

P. curviandrum has four fertile stamens which are nearly twice the length of the sepals and protrude from the flower. The flower is protandrous and the stamens are initially bent upwards during anthesis, hence the specific epithet *curviandrum*. After some time the anthers are dropped and the filaments bend downwards. At the same time the gynoecium lengthens and the stigma finally takes the original position of the anthers, a situation which indicates the involvement of a special pollinator.

P. curviandrum seems to be related to *P. punctatum* and *P. triandrum*. All of them have simple rosulate leaves and a similar floral structure. The petals of all three species are long and narrow with feather-like markings on the posterior two. All three of them have

very long protruding stamens, long styles and very short stigma branches. *P. curviandrum* has ten filaments and four fertile stamens, a structure that fits in with the androecium of the genus. Both *P. punctatum* and *P. triandrum* have a reduced number of filaments with only two fertile stamens in *P. punctatum* or three fertile stamens in *P. triandrum*. The tectum pattern of the pollen grains of *P. curviandrum* is striate-reticulate and differs from that of *P. punctatum* and *P. triandrum* which is striate.

P. punctatum and *P. triandrum* sometimes show a reduction in the number of carpels also, and can have a four- or a five-lobed ovary. *P. curviandrum* always has a five-lobed ovary.

Geographical distribution and ecology

P. curviandrum occurs in the southern Cape on the mountain ranges between the 33° and 34° latitudes, from Montagu in the west to Oudtshoorn in the east (Figure 8.58.2), an area with an annual rainfall of 100--200 mm. It grows in mountain fynbos or in spekboomveld and usually occurs in very small populations. The peak of the flowering time is from October to November.

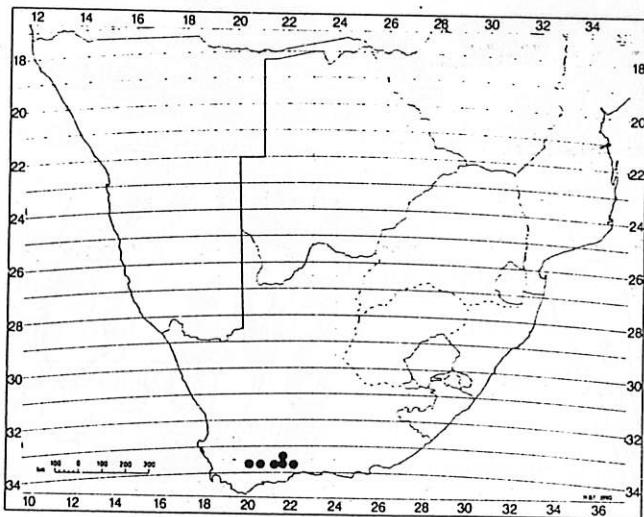


Figure 8.58.2 Geographical distribution of *P. curviandrum*.

Material studied

--3320 (Montagu): 8 km N of Montagu (-CA), Hall 2117 (NBG); Joubertskop (-DA), Van Jaarsveld 10324 (STEU).

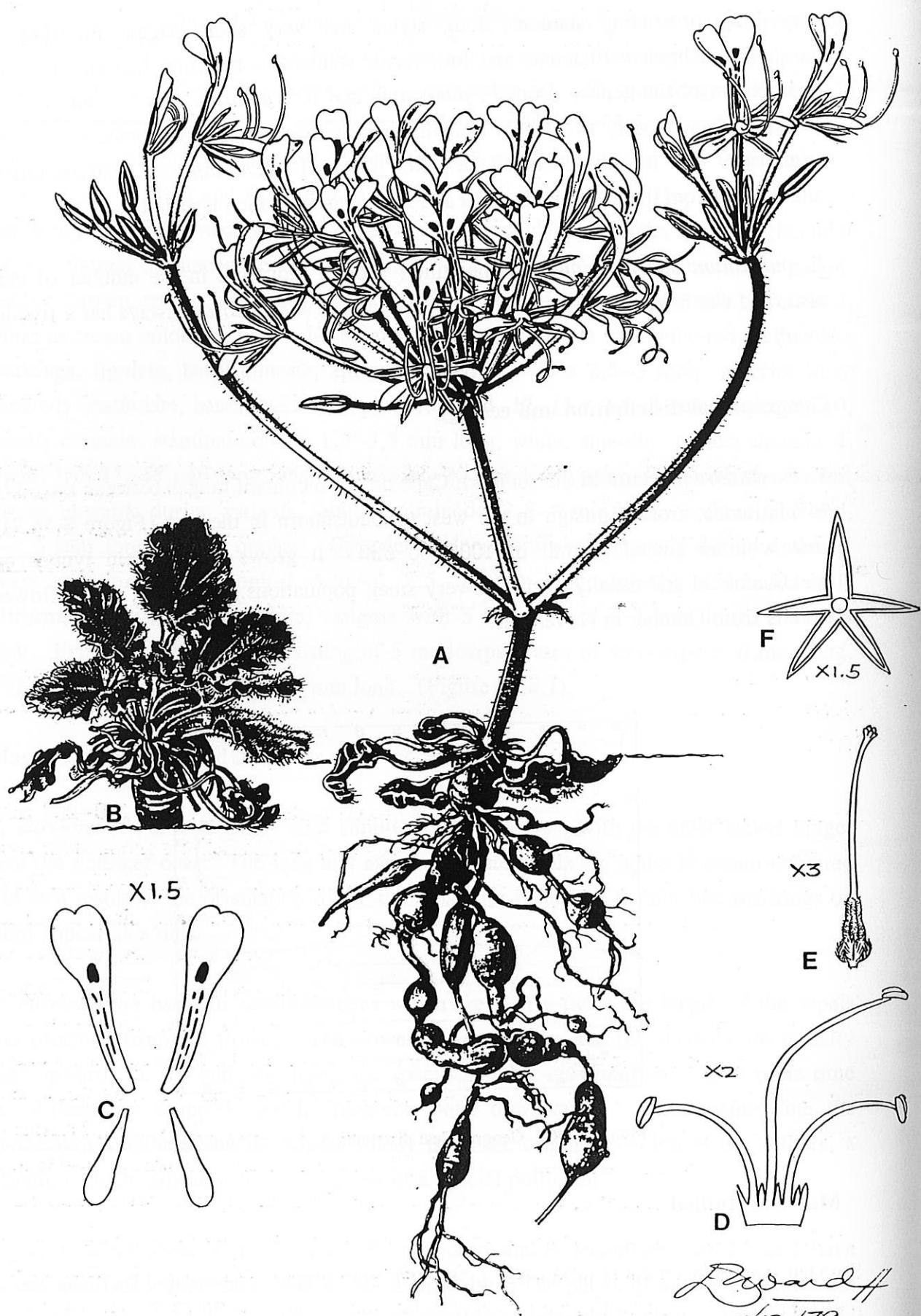


Figure 8.59.1 *Pelargonium triandrum*. A, flowering plant x1; B, plant with leaves x1; C, petals x1.5; D, androecium x2; E, gynoecium x3; F, sepals x1.5.

--3321 (Ladismith): Huisrivier Pass, Matjiesvlei turnoff (-BC), *Marais* 168 (STEU); Roodeberg, Ladismith (-CB), *Compton* 3864 (BOL); 12 km E of Vanwyksdorp (-DA), *Lavranos* 2094I (BOL, K, MO, NBG, PRE, STE).

--3322 (Oudtshoorn): Bakenskraal, 12 km S of Oudtshoorn (-CA), *Barker* 65 (BOL, K).

8.59 *Pelargonium triandrum* E.M. Marais, sp. nov. in sectione *Hoarea* distincta propter stamina fertilia solum tria, *P. punctato* affine.

Herba perennis acaulescens tuberosa. Tuber subterraneum, napiforme, interdum moniliforme, 20--60 mm longum, 10--15 mm in diam. Folia hysterantha, rosulata, viridia, petiolata; lamina ovata, crenata, 15--75 mm longa, 15--65 mm lata, adaxiale et abaxiale pilosa et glandulosa; petiolus 14--80 mm longus, prostratus, pilosus et glandulosus; stipulae petiolo adnatae. Inflorescentia: scapus pseudoumbellis 2--4(-7), utraque 7--26(-30) floribus. Pedicellum ca. 0,5 mm longum. Hypanthium 23--32 mm longum, glandulosum et sparsim hirsutum. Sepala 5, lanceolata, 7--11 mm longa, 1--3 mm lata, unum posterium erectum, cetera patentia. Petala 4, cremea vel pallida flava, dua postica ligulata vel unguiculata spathulata, subtiliter carmineo rubra, 19--25 mm longa, 3--5,5 mm lata, tria antica anguste spathulata, 9,5--17 mm longa, 2--3 mm lata. Stamina fertilia 3, unicum anterium 20--32 mm longum, staminodia 5.

TYPE - Cape Province: 27 km N of Citrusdal on old road to Clanwilliam, at turnoff to Algeria Forestry Station, *Van der Walt & Vorster* 1276 (STE, holo, BOL, K, MO, NBG, PRE).

A deciduous geophyte with a small regularly shaped subterranean tuber, 100--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, 20--60 mm long and 10--15 mm in diameter. Leaves radical, hysteranthous, rosulate, simple, green, petiolate; lamina broadly ovate, apex rounded or obtuse, base cuneate, truncate or cordate, margin irregularly crenate, 15--50 x 15--65 mm, adaxially and abaxially densely pilose and densely covered with glandular hairs; petiole 14--80 mm long and 1--4 mm in diameter, prostrate, densely pilose interspersed with glandular hairs; stipules subulate, adnate to petioles for half their length, 10--14 mm long and 1--2 mm wide, ciliate, apices laterally curved. Inflorescence: scape 20--90 mm long, 2--4 mm in diameter, branched, bearing 2--4(-7) pseudo-umbelllets with 7--26(-30) flowers each; peduncles 30--90 mm long, 1,5--2 mm in diameter, covered with glandular hairs interspersed with patent non-glandular hairs; bracts lanceolate, 5--7 mm long, 1--2 mm wide, abaxially hirsute; flower buds, flowers and fruits erect. Pedicel ca. 0,5 mm long. Hypanthium 23--32 mm long, straw-coloured to pale reddish brown, indumentum as on peduncle. Sepals 5,

lanceolate, apices acute, 7–11 mm long, 1–3 mm wide, posterior one erect, others patent, pale reddish brown with margins white, indumentum abaxially as on peduncle. Petals 4, cream-coloured to pale yellow, patent during anthesis; posterior two with wine-red feather-like markings, ligulate to unguiculate-spathulate, bases cuneate, apices emarginate, 19–25 x 3–5,5 mm; anterior two narrowly spathulate, bases attenuate, apices rounded, 9,5–17 x 2–3 mm. Stamens 8, basally connate, staminal column 1,5–3 mm long, white, smooth; perfect stamens 3, protruding from the flower, curved upwards during anthesis, lateral two 11–21,5 mm long, anterior one 20–32 mm long, white; staminodes 2–5 mm long; anthers dark pink, 1,5–2 mm long, pollen orange. Gynoecium: lengthens conspicuously during anthesis; ovary superior, oblong-conical, 4–5-lobed, 3–4,5 mm long, densely sericeous; style filiform, 3,5–10 mm long, white to pale pink; stigma with 4–5 branches, 0,3–0,5 mm long, adaxially dark pink. Fruit: a schizocarp consisting of 4–5 mericarps, bases of mericarps 4 mm long, without glandular hairs, papillate at distal end, tails 23–32 mm long. (Figure 8.59.1).

Diagnostic features and affinities

P. triandrum is characterized by the reduced number of filaments (eight) and only three very long fertile stamens, hence the specific epithet. This structure of the androecium is unique for the genus. *P. triandrum* resembles *P. punctatum* and *P. curviandrum* in that all three species have simple prostrate leaves, pseudo-umbellets with a large number of flowers, long hypanthia, very long and narrow petals, very long protruding fertile stamens, long styles and very short stigma branches. In all three species there is a marked lengthening of the style during anthesis. This and the way in which the stamens are borne indicate an involvement of a special pollinator for these three species. The number of the fertile stamens, however differs in the different species. *P. curviandrum* has four fertile stamens, *P. triandrum* only three, and *P. punctatum* only two.

Geographical distribution and ecology

P. triandrum is known from a small distribution area along the Olifantsrivier, from Clanwilliam in the north to Algeria in the south. Recently it was also collected in Hartnekskloof on the Ceres-Karoo side of the escarpment (Figure 8.59.2). This area receives an annual rainfall of 100–200 mm occurring mainly in winter. *P. triandrum* occurs in broken succulent veld or dry fynbos on sandstone. Plants grow amongst rocks in red loam or under bushes in partial shadow or in direct sunlight and are usually locally abundant. It flowers from late October to November.

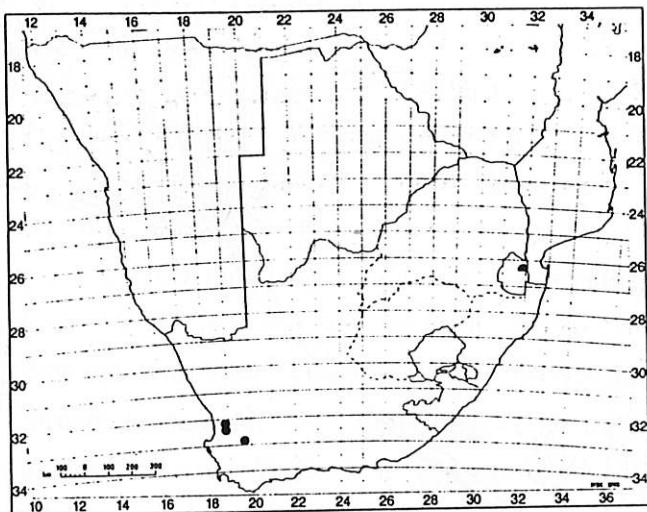


Figure 8.59.2 Geographical distribution of *P. triandrum*.

Material studied

--3218 (Clanwilliam): Clanwilliam (-BB), *Hall NBG719/52* (NBG); *Van Niekerk s.n.* (STEU); 8 km S of Clanwilliam on gravelled road (-BB), *Marais 304* (STEU); Ramskop Nature Reserve, Clanwilliam (-BB), *Van der Walt 1278* (STEU); 20 km from Algeria to Clanwilliam (-BB), *Van der Walt s.n.* (STEU); Rondegat, 25 km S of Clanwilliam (BD), *Friedrich 452* (STEU); Kriedouwkrantz (-BD), *Leighton 3346* (BOL); *Pocock 771* (PRE); Olifantsrivier, at turnoff to Algeria (-BD), *Van der Walt s.n.* (STEU); *Van der Walt & Vorster 1276* (BOL, K, MO, NBG, PRE, STE).

--3219 (Wuppertal): Hartnekskloof, Ceres Karoo (-DC), *Van Zyl s.n.* (STEU).

8.60 Pelargonium punctatum (Andr.) Willd., Species plantarum 3: 645 (1800); Pers.: 226, 227 (1806); Dietr.: 49 (1807); Ait. f.: 161 (1812); DC.: 650 (1824); Spreng.: 51 (1826); Loudon: 568 (1829); G. Don: 729 (1831); Loudon: 271, 272 (1832); Steud.: 289 (1841); Harv.: 264 (1860); Knuth: 332 (1912); Van der Walt & Vorster: 117, fig. (1981). ICONOTYPE: Andrews, The Botanist's Repository 1: t. 60 (1799).

Geranium punctatum Andr.: t. 60 (1799); Poir.: 746 (1812). ICONOTYPE: Andrews, The Botanist's Repository 1: t. 60 (1799).

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

Geraniospermum punctatum (Andr.) Kuntze: 95 (1891).

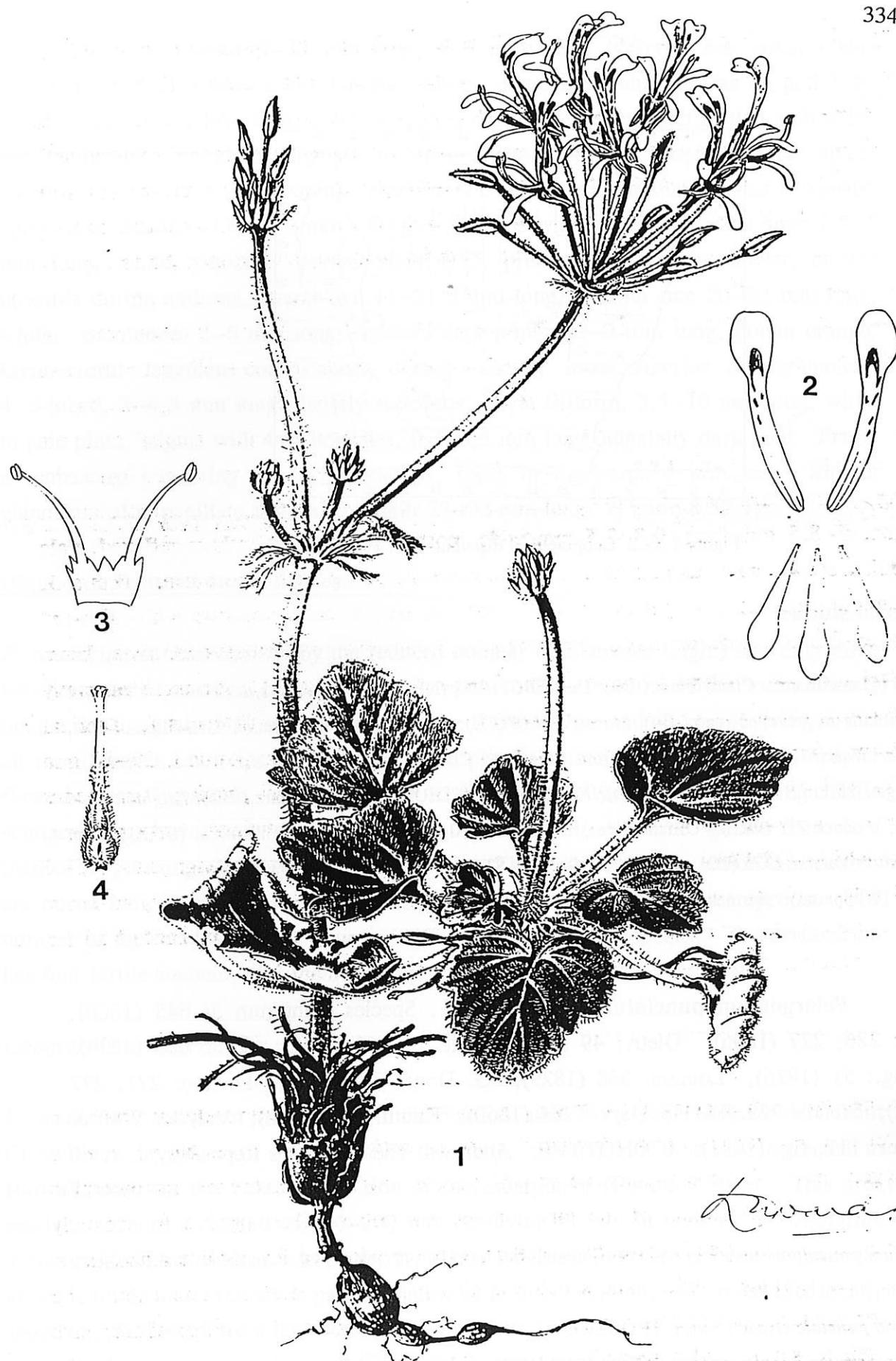


Figure 8.60.1 *Pelargonium punctatum*. 1, flowering plants $\times 1$; 2, petals $\times 1.5$; 3, androecium $\times 2$; 4, gynoecium $\times 5$.

A geophyte 100--300 mm tall when in flower. **Tuber:** a turnip-shaped or sometimes moniliform root 14--30 mm long and 14--25 mm in diameter. **Leaves** simple, green, petiolate; lamina broadly ovate, apex rounded or obtuse, base cuneate, truncate or cordate, margin irregularly crenate, 16--90 x 12--100 mm, adaxially sparsely pilose, with short glandular hairs sparsely interspersed, abaxially densely pilose, interspersed with glandular hairs; petiole 25--60 mm long and 2--5 mm in diameter, prostrate, densely pilose, interspersed with glandular hairs; stipules subulate, adnate to petioles for half their length, 10--18 mm long and 1--2 mm wide, ciliate, apices laterally curved. **Inflorescence:** scape 20--160 mm long, 2--5 mm in diameter, branched, bearing 2--8 pseudo-umbellets with (10-)17--45(-60) flowers each; peduncles 20--100 mm long, 1--2 mm in diameter, covered with short glandular hairs interspersed with long patent non-glandular hairs; bracts lanceolate, 6--7 mm long, 1--2 mm wide, abaxially hirsute interspersed with glandular hairs. **Pedicel** ca. 0,5 mm long. **Hypanthium** 20--30 mm long, pale reddish brown, indumentum as on peduncle. **Sepals** 5, lanceolate, apices acute, 5--8,5 mm long, 0,8--2,5 mm wide, posterior one erect, others reflexed, pale reddish brown with margins white, indumentum abaxially as on peduncle. **Petals** 5, cream-coloured to pale yellow, patent during anthesis; posterior two with wine-red feather-like markings or small dots, ligulate or narrowly unguiculate-spathulate, bases cuneate, apices rounded or emarginate, 11--20 x 2--5 mm; anterior three narrowly spathulate, bases attenuate, apices rounded, 8--13 x 1,5--3,2 mm. **Stamens** 7; staminal column 1,5--2,5 mm long, white; perfect stamens 2, in anterior position, 10--18 mm long, protruding from the flower, curved upwards during anthesis, white; staminodes 1,5--4 mm long; anthers yellow, 1--1,5 mm long, pollen yellow. **Gynoecium:** lengthens conspicuously during anthesis; ovary 4--5-lobed, 2--4 mm long; style 2,5--9 mm long, pink to pale pink; stigma with 4--5 branches, 0,3--0,5 mm long, adaxially dark pink. **Fruit:** 4--5 mericarps, bases of mericarps 3--4 mm long, without glandular hairs, papillate at distal end, tails 21--25 mm long. (Figure 8.60.1).

Diagnostic features and affinities

P. punctatum is characterized by its simple, prostrate leaves and extremely zygomorphic flowers. The hairy leaves are arranged in a rosette with the older leaves bigger than the younger ones. The cream-coloured or pale yellow flowers are extremely zygomorphic because of the orientation of the long and narrow petals. The ligulate to narrowly spathulate posterior petals are borne together, with the wine-red feather-like markings or small dots forming a unit. The specific epithet *punctatum* refers to these dots. The anterior petals are patent during anthesis. There is a reduction in the number of filaments from ten to seven, and a reduction in the number of fertile stamens to two. In the

majority of specimens there is also a reduction in the number of carpels from five to four. The flowers are protandrous and initially the fertile stamens are very long and protrude from the flower. The style lengthens conspicuously during anthesis and when the anthers are dropped the stigma takes the original position of anthers. This mechanism ensuring cross pollination is not confined to section *Hoarea*, but is typical for *Pelargonium*. The stigma branches in this species are very short, much shorter than the stigmas of the majority of species of section *Hoarea*.

P. punctatum is related to *P. triandrum* and *P. curviandrum*, because they reveal similarities in leaf and floral structures.

Geographical distribution and ecology

P. punctatum has a small distribution area in the drier parts of the south-western Cape. It was collected at Botterkloof, Lokenburg and north of Nieuwoudtville on the eastern side of the Bokkeveld Mountain range, but also along the Olifantsrivier around Klawer to the west of this escarpment (Figure 8.60.2). This is a dry area where high temperatures are reached during summer. Although low temperatures can be reached in winter, the area remains frost-free. The annual rainfall of 100--300 mm occurs usually during the winter months. Plants occur in dry fynbos or in karroid vegetation with many succulents and are found on rocky hillsides under bushes in well-drained soil derived from sandstone. Although the distribution area of this species is small, populations usually consist of numerous plants.

When in flower, *P. punctatum* is a spectacular sight. The scape is branched, bearing two to eight pseudo-umbelllets, each with a large number of flowers. Flowering time for this species is during the early summer months of October and November. Individual plants have a relative long flowering period due to the large number of pseudo-umbelllets per plant and the large number of flowers per pseudo-umbellet opening in succession.

Fruitset in cultivation is very poor, but in field collections, every flower was found to produce a mericarp. This implies that in nature there is no imperfection in the reproductive biology of this species. At the same time it indicates that a special pollinator may be involved which is not present in the garden.

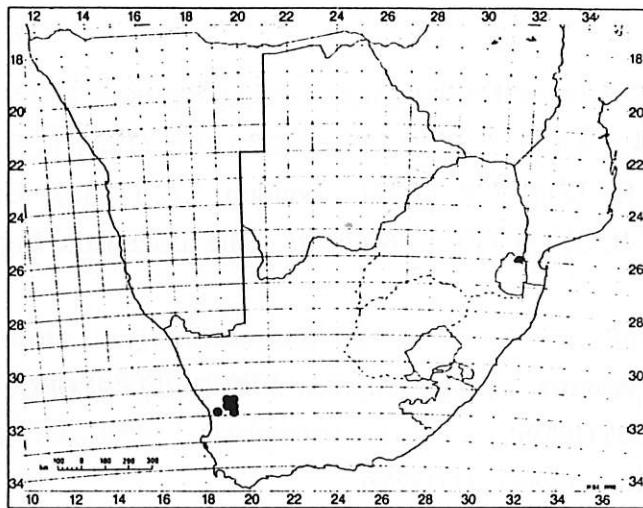


Figure 8.60.2 Geographical distribution of *P. punctatum*.

Material studied

--3118 (Vanrhynsdorp): Olifantsrivier Valley (-DC), *Pillans s.n.* (BOL); Near Klawer station (-DC), *Marloth 12554* (PRE).

--3119 (Calvinia): 12 km from Nieuwoudtville to Brandkop (-AC), *Fischer 34* (STEU); Rondekop, Nieuwoudtville (-AD), *Lavranos & Pehleman 18876* (STEU); Lokenburg, Stinkfonteinberg (-CA), *Marais 69* (STEU); At crossing of Clanwilliam/Calvinia and Nieuwoudtville roads (-CB), *Meve 273* (STEU); Botterkloof Pass (-CD), *Franson s.n.* (PRE); *Hall 961* (NBG), *Marais 67* (STEU); *Van der Walt 944* (STEU); *Weber 2* (STEU).

INSUFFICIENTLY KNOWN SPECIES

8.61 *Pelargonium bifolium* (*Burm. f.*) *Willd.*, Species plantarum 3: 645 (1800); Pers.: 226 (1806); DC.: 650 (1824); Spreng.: 51 (1826); G. Don: 726 (1831); Steud.: 677 (1840); Steud.: 284 (1841); Harv.: 265 (1860); Knuth: 332 (1912). ICONOTYPE: Burman, Rariorum africanarum plantarum: 90, t. 35, f. 1 (1738).

Geranium bifolium Burm. f.: 52, n. 73 (1759); Cav.: 254, t. 115, f. 3 (1787). ICONOTYPE: Burman, Rariorum africanarum plantarum: 90, t. 35, f. 1 (1738).

Geraniospermum bifolium (*Burm. f.*) *Kuntze*: 94 (1891).

8.62 *Pelargonium calviniae* Knuth in Pflanzenreich 4, 129: 344 (1912). TYPE - Cape Province: "Calvinia, nördlich von Waterkloof, um 6 m, Diels 751 (B, holo+).

8.63 *Pelargonium coronillifolium* (Andr.) Pers., Synopsis plantarum 2: 227 (1806) (as "*coronillaefolium*"); Ait. f.: 163 (1812); DC.: 653 (1824); Spreng.: 53 (1826); Loudon: 570 (1829); G. Don: 728 (1831); Loudon: 272 (1832); Steud.: 677 (1840); Steud.: 285 (1841). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 305 (1803b).

Geranium coronillifolium Andr.: t. 305 (1803b); Poir.: 757 (1812). ICONOTYPE: Andrews, The Botanist's Repository 5: t. 305 (1803b).

Dimacia coronillifolium (Andr.) Sweet: 77 (1826c).

8.64 *Pelargonium eupatoriifolium* (Eckl. & Zeyh.) Steud., Nomenclator botanicus, 2nd edn, 2: 286 (1841) (as "*eupatoriaefolium*"). TYPE - Cape Province: ". . Collibus argilosis non procul a 'Luisfontein' (Clanwilliam)", Ecklon & Zeyher 494 (Not seen).

Hoarea eupatoriifolia Eckl. & Zeyh.: 64 (1835). TYPE - Cape Province: ". . Collibus argilosis non procul a 'Luisfontein' (Clanwilliam)", Ecklon & Zeyher 494 (Not seen).

8.65 *Pelargonium gracile* (Eckl. & Zeyh.) Steud., Nomenclator botanicus, 2nd edn, 2: 286 (1841). TYPE - Cape Province: ". . Collibus argilosis inter 'Kochmannskloof' et flumen 'Gauritzrivier' terra 'Kannaland' (Zwellendam)", Ecklon & Zeyher 491 (S, lecto!, designated here, S!).

Hoarea gracilis Eckl. & Zeyh.: 64 (1835). TYPE - Cape Province: ". . Collibus argilosis inter 'Kochmannskloof' et flumen 'Gauritzrivier' terra 'Kannaland' (Zwellendam)", Ecklon & Zeyher 491 (S, lecto!, designated here, S!).

8.66 *Pelargonium gracilipes* Knuth in Pflanzenreich 4, 129: 331 (1912). TYPE - Cape Province: Pakhuis, Clanwilliam, in hard clay soil on hill slopes, Leipoldt 517 (BOL, holo!).

8.67 **Pelargonium hantamianum** Knuth in Pflanzenreich 4, 129: 344 (1912). Cape Province: Hantam-Gebirge, Meyer s.n. (B+, holo.).

8.68 **Pelargonium hemicyclicum** Hutch. & C.A. Smith in Kew Bulletin 1928: 272 (1928). TYPE - Cape region. Described from a living specimen at Kew, the tuber collected by Mr. Ingram.

8.69 **Pelargonium ladysmithianum** Knuth in Repertorium specierum novarum regni vegetabilis 28: 90 (1930). TYPE - Cape Province: Huisrivier Mountains, Marloth 13121 (B+, holo.; PRE, lecto.!, designated here).

8.70 **Pelargonium ochroleucum** Harv. in Flora capensis 1: 263 (1860); Knuth: 331 (1912). TYPE - Cape Province: Near the Great Fish River. Drège s.n. sub. *P. reflexum* E Meyer. (TCD, lecto.!, designated here, CGE!, E!, Gx4!, K!, MEL!, MO!, OXF!, Px3!, PRE!, S!, SAM!).

Geraniospermum ochroleucum (Harv.) Kuntze: 94 (1891).

8.71 **Pelargonium oxaloïdes** (Burm. f.) Willd., Species plantarum 3: 642 (1800); Pers.: 226 (1806); DC.: 650 (1824) (excl. *G. oxaloïdes* Andr.); Spreng: 51 (1826); G. Don: 726 (1831); Steud: 679 (1840); Steud: 288 (1841); Harv.: 264 (1860); Knuth: 334 (1912). TYPE - "Cap bon Spei" (G, lecto.!, designated here).

Geranium oxaloïdes Burm. f.: 51, n. 71 (1759); Burm. f.: 19 (1768); Cav.: 237, t. 97, f. 2 (1787). TYPE - "Cap bon Spei" (G, lecto.!, designated here).

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

Geraniospermum oxalodes (Burm. f.) Kuntze: 95 (1891) (by mistake).

8.72 **Pelargonium pulchellum** Salisb., Paradisis londinensis 1: t. 39 (1807); non Sims (1801). ICONOTYPE: Salisbury, Paradisis londinensis 1: t. 39 (1807).

8.73 **Pelargonium setosum** (*Sweet*) *DC.*, *Prodromus* 1: 652 (1824); *Loudon*: 570 (1829); *G. Don*: 727 (1831); *Loudon*: 271 (1832); *Steud.*: 290 (1841); *Harv.*: 270 (1860). **ICONOTYPE:** *Sweet*, *Geraniaceae* 1: t. 38 (1820).

Hoarea setosa *Sweet*: t. 38 (1820); *Sweet*: 76 (1826c). **ICONOTYPE:** *Sweet*, *Geraniaceae* 1: t. 38 (1820).

Geranospermum setosum (*Sweet*) *Kuntze*: 95 (1891).

8.74 **Pelargonium sulphureum** *Knuth* in *Pflanzenreich* 4, 129: 326 (1912); non (*Sweet*) *Steud.*: 295 (1841). **TYPE - Cape Province:** "Hex-River, an dürren Stellen um 500 m", *Bolus* 13048 (BOL, holo!).

8.75 **Pelargonium theianthum** (*Eckl. & Zeyh.*) *Steud.*, *Nomenclator botanicus*, 2nd edn, 2: 290 (1841). **TYPE - Cape Province:** ". . . Lapidosis deserti 'Karro' ad fluvium 'Gauritzrivier' (Zwellendam)". *Ecklon & Zeyher* 490 (S, lecto.!, designated here, S!).

Hoarea theiantha *Eckl. & Zeyh.*: 63 (1835). **TYPE - Cape Province:** ". . . Lapidosis deserti 'Karro' ad fluvium 'Gauritzrivier' (Zwellendam)". *Ecklon & Zeyher* 490 (S, lecto.!, designated here, S!).

8.76 **Pelargonium trifidum** (*Burm. f.*) *Willd.*, *Species plantarum* 3: 646 (1800); *Pers.*: 227 (1806); *DC.*: 651 (1824); *Spreng.*: 52 (1826); *G. Don*: 726 (1831); *Steud.*: 680 (1840); *Steud.*: 290 (1841); *Harv.*: 267 (1860); *Knuth*: 337 (1912). **ICONOTYPE:** *Plukenet*, *Phytographia*: 186, t. 6 (1691).

Geranium trifidum *Burm. f.*: 52, n. 74 (1759); *Cav.*: 254, t. 115, f. 1 (1787). **ICONOTYPE:** *Plukenet*, *Phytographia*: 186, t. 6 (1691).

Geranospermum trifidum (*Burm. f.*) *Kuntze*: 95 (1891).

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INDEX OF NAMES AND SYNONYMS

(Valid names in bold; synonyms in *italics*)
("P." abbreviates *Pelargonium*; "G." abbreviates *Geranium*)

Species name	Synonym of	Page
<i>P.aciculatum</i> E.M. Marais		193.
<i>P.aestivale</i> E.M. Marais (<i>S.Afr.J.Bot.</i> 61(2):92 (1995))		100.
<i>P.affine</i> (Poir.) G.Don	<i>P.longiflorum</i> (Burm.f.) Jacq.	163.
<i>P.andrewsii</i> (Sweet) G.Don	<i>P.longifolium</i> (Burm.f.) Jacq.	150.
<i>P angustipetalum</i> E.M. Marais (<i>S.Afr.J.Bot.</i> 65(1):50 (1999))		141.
<i>P.aprifolium</i> (Andr.) Loud. non J.Jacq.		108.
<i>P.appendiculatum</i> (L.f.) Willd.	<i>P.petroselinifolium</i> G.Don	234.
<i>P.aristatum</i> (Sweet) G. Don		113.
<i>P.asarifolium</i> (Sweet) Loudon		295.
<i>Pastragalifolium</i> (Cav.) Jacq.		124.
<i>P.atrum</i> L'Hérit.	<i>P.pinnatum</i> (L.) L'Hérit.	273.
<i>P.attenuatum</i> Harv.	<i>P.auritum</i> (L.) Willd. var. <i>auritum</i>	137.
<i>P.auriculatum</i> Willd.		150.
<i>P.auritum</i> (L.) Willd.	<i>P.longifolium</i> (Burm.f.) Jacq.	271.
<i>P.auritum</i> (L.) Willd. var. <i>auritum</i>		273.
<i>P.auritum</i> (L.) Willd. var. <i>carneum</i> E.M. Marais		277.
<i>P.barbatum</i> Jacq.	<i>P.proliferum</i> (Burm.f.) Steud.	168.
<i>P.bifolium</i> (Burm. f.) Willd.		337.
<i>P.bijugum</i> (Eckl. & Zeyh.) Steud.	<i>P.chelidonium</i> (Houtt.) DC.	115.
<i>P.bipinnatifidum</i> (Eckl. & Zeyh.) Steud.	<i>P.longifolium</i> (Burm.f.) Jacq.	150.
<i>P.bubonifolium</i> (Andr.) Pers.		280.
<i>P.caedonicum</i> L.Bol.		179.
<i>P.calviniae</i> Knuth		338.
<i>P.campestre</i> (Eckl. & Zeyh.) Steud.		239.
<i>P.carinatum</i> J.C.Wendl.	<i>P.rapaceum</i> (L.) L'Hérit.	263.
<i>P.carneum</i> Jacq.		244.
<i>P.caroli-henrici</i> B. Nord.		315.
<i>P.cavanillesii</i> Knuth	<i>P.heterophyllum</i> Jacq.	181.
<i>P.centauroides</i> DC.	<i>P.incrassatum</i> (Andr.) Sims	214.
<i>P.chelidonium</i> (Houtt.) DC.		115.
<i>G.ciliatum</i> Andr., non Cav.	<i>P.radicatum</i> Venten.	230.
<i>P.ciliatum</i> (Cav.) Pers., non Jacq.	<i>P.proliferum</i> (Burm.f.) Steud.	168.
<i>P.ciliatum</i> Jacq., non L'Hérit.	<i>P.longifolium</i> (Burm.f.) Jacq.	150.
<i>P.ciliatum</i> L'Hérit., non Jacq.	<i>P.heterophyllum</i> Jacq.	181.
<i>P.concavifolium</i> Pers.	<i>P.radicatum</i> Venten.	230.
<i>P.condensatum</i> Pers.	<i>P.incrassatum</i> (Andr.) Sims	214.
<i>P.confertum</i> E.M. Marais		197.
<i>P.congestum</i> (Sweet) G.Don	<i>P.bubonifolium</i> (Andr.) Pers.	280.
<i>P.connivens</i> E.M. Marais		203.
<i>P.conspicuum</i> (Sweet) G.Don	<i>P.grenvilleae</i> (Andr.) Harv.	218.
<i>P.coronillifolium</i> (Andr.) Pers.		338.
<i>P.corydaliflorum</i> (Sweet) DC	<i>P.rapaceum</i> (L.) L'Hérit.	263.
<i>P.crinitum</i> Harv.	<i>P.radiatum</i> (Andr.) Pers.	248.
<i>P.curviandrum</i> E.M. Marais (<i>S.Afr.J.Bot.</i> 60(6):333 (1994))		327.
<i>P.depressum</i> Jacq.	<i>P.longiflorum</i> Jacq.	163.
<i>P.dioicum</i> Ait.f.	<i>P.auritum</i> (L.) Willd. var. <i>auritum</i>	273.
<i>P.dipetalum</i> L'Hérit.		299.
<i>P.ellaphieae</i> E.M. Marais		293.
<i>P.enustum</i> (Thunb.) DC.	<i>P.auritum</i> (L.) Willd. var. <i>carneum</i> Marais	277.
<i>P.erythrophyllum</i> (Eckl. & Zeyh.) Steud.	<i>P.dipetalum</i> L'Hérit.	299.
<i>P.eupatoriifolium</i> (Eckl. & Zeyh.) Steud.		338.
<i>P.fasciculaceum</i> E.M. Marais		201.
<i>P.fergusoniae</i> L.Bol.		157.
<i>P.ficaria</i> Willd.	<i>P.chelidonium</i> (Houtt.) DC.	115.
<i>P.fissifolium</i> (Andr.) Pers.		104.
<i>P.floribundum</i> (Andr.) Ait.f.	<i>P.fissifolium</i> (Andr.) Pers.	104.
<i>P.foliosum</i> DC.	<i>P.viciifolium</i> DC.	146.
<i>P.fumariifolium</i> Knuth		210.
<i>P.githagineum</i> E.M. Marais (<i>S.Afr.J.Bot.</i> 64(5):308 (1998))		313.
<i>P.gracile</i> (Eckl. & Zeyh.) Steud.		338.
<i>P.gracilipes</i> Knuth		338.
<i>P.gracillimum</i> Fourc.		259.
<i>P.grenvilleae</i> (Andr.) Harv.		218.
<i>P.hantamianum</i> Knuth		339.
<i>P.hemicyclum</i> Hutch. & C.A. Smith		339.
<i>P.heteroblobum</i> DC.		133.
<i>P.heterophyllum</i> Jacq.		181.
<i>P.heterophyllum</i> (Andr.) Loud. non Jacq.	<i>P.longifolium</i> (Burm.f.) Jacq.	150.
<i>G.heterophyllum</i> Thunb.	<i>P.violiflorum</i> (Sweet) DC.	133.
<i>P.hirsutum</i> Loudon non (Burm.f.) Ait.	<i>P.longifolium</i> (Burm.f.) Jacq.	150.
<i>P.hirsutum</i> (Burm.f.) Ait. non Loudon	<i>P.violiflorum</i> (Sweet) DC.	133.
<i>P.hirtum</i> Willd., non (Burm.f.) Jacq.	<i>P.undulatum</i> (Andr.) Pers.	159.
<i>P.incrassatum</i> (Andr.) Sims	<i>P.auritum</i> (L.) Willd. var. <i>auritum</i>	273.
<i>P.laciniatum</i> (Andr.) Pers.	<i>P.heterophyllum</i> Jacq.	181.
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<i>P.lanceofolium</i> (Sweet) G.Don	<i>P.proliferum</i> (Burm.f.) Steud.	339.
<i>P.lancifolium</i> (Eckl. & Zeyh.) Steud.	<i>P.longifolium</i> (Burm.f.) Jacq.	150.
	<i>P.longifolium</i> (Burm.f.) Jacq.	150.

<i>P.leeanum</i> (Sweet) G.Don	<i>P.proliferum</i> (Burm.f.) Steud.	168.
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<i>P.leptum</i> L.Bol.		143.
<i>P.lessertiaefolium</i> (Eckl. & Zeyh.) Steud.	<i>P.pinnatum</i> (L) L'Hérit.	124.
<i>P.lheritieri</i> (Sweet) G.Don	<i>P.dipetalum</i> L'Hérit.	299.
<i>P.lineare</i> (Andr.) Pers.	<i>P.longiflorum</i> Jacq.	163.
<i>P.longiflorum</i> Jacq.		163.
<i>P.longifolium</i> (Burm.f.) Jacq.		150.
<i>P.luteolum</i> N.E. Br.		255.
<i>P.luteum</i> (Andr.) G. Don		206.
<i>P.marginatum</i> Knuth non (Cav.) Link	<i>P.ellaphieae</i> E.M. Marais	293.
<i>P.maximiliani</i> Schltr.	<i>P.carneum</i> Jacq.	244.
<i>P.melananthon</i> Jacq.	<i>P.auritum</i> (L) Willd. var. <i>auritum</i>	273.
<i>P.moniliforme</i> Harv.		223.
<i>P.meyeri</i> Harv.	<i>P.chelidonium</i> (Houtt.) DC.	115.
<i>P.namaquense</i> Knuth	<i>P.bubonifolium</i> (Andr.) Pers.	280.
<i>P.nephrophyllum</i> E.M. Marais		241.
<i>P.nervifolium</i> Jacq.		120.
<i>P.nivenii</i> Harv.	<i>P.dipetalum</i> L'Hérit.	299.
<i>P.niveum</i> (Sweet) Loudon	<i>P.violiflorum</i> (Sweet) DC.	133.
<i>P.nummulifolium</i> Salisb.		253.
<i>P.nutans</i> DC.	<i>P.rapaceum</i> (L.)L'Hérit.	263.
<i>P.oblongatum</i> Harv.		323.
<i>P.ochroleucum</i> Harv.		339.
<i>P.ornithopifolium</i> (Eckl. & Zeyh.) Steud.	<i>P.pinnatum</i> (L) L'Hérit.	124.
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<i>P.ovatifolium</i> Steud.	<i>P.undulatum</i> (Andr.) Pers.	159.
<i>P.oxydolium</i> (Andr.)Pers.	<i>P.heterophyllum</i> Jacq.	181.
<i>G.oxalioide</i> Andr.	<i>P.radiatum</i> (Andr.) Pers.	248.
<i>P.oxaloides</i> (Burm. f.) Willd.		339.
<i>P.parnassiooides</i> DC	<i>P.proliferum</i> (Burm.f.) Steud.	168.
<i>P.parvipetalum</i> E.M. Marais (S.Afr.J.Bot.65(1):54(1999))		285.
<i>P.penniforme</i> Pers.	<i>P.proliferum</i> (Burm.I.) Steud.	168.
<i>P.petroselinifolium</i> G.Don		108.
<i>P.pilosellifolium</i> (Eckl. & Zeyh.) Steud.		175.
<i>P.pilosum</i> (Cav.)Steud.,non Pers.	<i>P.heterophyllum</i> Jacq.	181.
<i>G.pilosum</i> Andr.non Cav.	<i>P.petroselinifolium</i> G.Don	108.
<i>P.pilosum</i> Pers.	<i>P.petroselinifolium</i> G.Don	108.
<i>P.pinnatum</i> (L) L'Hérit.		124.
<i>P.proliferum</i> (Burm.f.) Steud.		168.
<i>G.prolificum</i> L	<i>P.auritum</i> (L)Willd. var. <i>auritum</i>	273.
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<i>P.punctatum</i> (Andr.) Willd.		333.
<i>P.purpurascens</i> Pers.	<i>P.proliferum</i> (Burm.f.) Steud.	168.
<i>P.radiatum</i> (Andr.) Pers.		248.
<i>P.radicatum</i> Venten.		230.
<i>P.rapaceum</i> (L.) L'Hérit.		263.
<i>P.curvatum</i> (Sweet)G.Don	<i>P.aristatum</i> (Sweet) G.Don	113.
<i>P.reflexum</i> (Andr.) Pers.		131.
<i>P.revolutum</i> (Andr.)Pers.	<i>P.chelidonium</i> (Houtt.) DC.	115.
<i>P.roseum</i> (Andr.)Ait.non Ehrh.	<i>P.incrassatum</i> (Andr.) Sims	214.
<i>P.reticulatum</i> (Sweet)DC	<i>P.auritum</i> (L)Willd. var. <i>carneum</i> Marais	277.
<i>P.rumicifolium</i> (Sweet)Loudon	<i>P.longiflorum</i> Jacq.	163.
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<i>P.rutaefolium</i> Bak.	<i>P.rapaceum</i> (L.)L'Hérit.	263.
<i>P.selinum</i> (Andr.)Pers.	<i>P.rapaceum</i> (L.) L'Hérit.	263.
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<i>P.spathulatum</i> (Andr.)Pers.	<i>P.longiflorum</i> Jacq.	163.
<i>P.squamulosum</i> Knuth	<i>P.radicatum</i> Venten.	230.
<i>P.strigosum</i> (Eckl. & Zeyh.)Steud.	<i>P.auritum</i> (L)Willd.var. <i>carneum</i> Marais	277.
<i>P.sulphureum</i> Knuth		340.
<i>P.tenellum</i> (Andr.) G. Don		185.
<i>P.ternifolium</i> Vorster		305.
<i>P.theianthum</i> (Eckl. & Zeyh.) Steud.		340.
<i>P.triandrum</i> E.M. Marais (S.Afr.J.Bot.60(6):335(1994))		331.
<i>P.trifidum</i> (Burm.f.) Willd.		340.
<i>P.trifoliatum</i> Harv., non Sweet	<i>P.ternifolium</i> Vorster	305.
<i>P.trifoliatum</i> Steud.(by mistake)	<i>P.trifoliolatum</i> (Eckl. & Zeyh.) Marais	189.
<i>P.trifoliolatum</i> (Eckl. & Zeyh.) Marais(S.Afr.J.Bot.59(2):123(1993))		189.
<i>P.trilobum</i> (Thunb.) DC	<i>P.chelidonium</i> (Houtt.) DC.	115.
<i>P.triphyllum</i> Jacq.		309.
<i>P.tysonii</i> Szyszyl.	<i>P.proliferum</i> (Burm.f.) Steud.	168.
<i>P.undulaeflorum</i> (Sweet)G.Don	<i>P.auritum</i> (L) Willd. var. <i>auritum</i>	273.
<i>P.undulatum</i> (Andr.) Pers.		159.
<i>P.variifolium</i> Steud.	<i>P.violiflorum</i> (Sweet) DC.	133.
<i>P.viciifolium</i> DC.		146.
<i>P.vinaceum</i> E.M. Marais		226.
<i>P.violiflorum</i> (Sweet) DC.		133.
<i>P.virgineum</i> Pers.	<i>P.undulatum</i> (Andr.) Pers.	159.

