

## The subspecies of *Pelargonium cucullatum* (Geraniaceae)\*

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### ABSTRACT

*Pelargonium cucullatum* (L.) L'Hérit. is shown to consist of three infraspecific taxa, which are given subspecific ranking under the names *P. cucullatum* subsp. *cucullatum*, subsp. *tabulare* Volschenk and subsp. *strigifolium* Volschenk. It is also shown that *P. angulosum* (Mill.) L'Hérit. (*Geranium angulosum* Mill.) is synonymous with *P. cucullatum* subsp. *cucullatum*, but that the name *P. angulosum* has been misapplied for many years to subsp. *strigifolium*. The latter was formerly known as *P. acerifolium* L'Hérit., non *Geranium acerifolium* Cav.

*Pelargonium cucullatum* (L.) L'Hérit. is a conspicuous and well-known species. It was first collected in 1672 by the Dutch botanist Paul Hermann of Leiden, probably on the slopes of Table Mountain where it is still abundant. The first record of its introduction into cultivation in England was that of Bentick in 1690. Harvey (1860) reported that it was used for ornamental hedgerows in Cape Town during his stay from 1838 to 1840. Horticulturally it is an important species which has been used extensively in hybridization, especially in the breeding of the 'regal' cultivars.

The identity and circumscription of *P. cucullatum* is important, as Van der Walt (1979) designated it as the lectotype species of the genus *Pelargonium*.

*P. cucullatum* in its original circumscription consisted of two taxa. The first taxon has leaves which are dentate but not incised and grows against the north-western, western and southern slopes of the Cape Peninsula as well as near Saldanha Bay. The second taxon has angularly incised leaves and occurs on the eastern side of the Cape Peninsula, on the eastern side of False Bay, and eastwards along the coast as far as the vicinity of Gansbaai. It always grows close to the beach. In both taxa the leaves are villous and soft to the touch. It was found that a third taxon, *P. acerifolium* L'Hérit. (commonly but erroneously known as *P. angulosum*), has such a close morphological resemblance to *P. cucullatum* that we do not consider it justified to afford them separate specific status. In this taxon the leaves are angularly incised, strigose and harsh to the touch. No structural differences could be detected between the flowers of the three taxa although the petals of *P. acerifolium* are often light pink instead of pinkish purple. As can be expected from the different textures of the indumentum, there is a difference in the shape of the individual trichomes on the leaves. Hence in *P. acerifolium* the trichomes are relatively short, broad-based and curved, whereas in the other two taxa the trichomes are conspicuously long, slender and straight.

A complete anatomical study was made of the young stems, petioles and laminae. The only differences that we noted between the three taxa are the presence of a central fibrous column in the central vascular bundle of the petiole of the first two

taxa enumerated above (but absent in the third); and the arrangement of the guard cells of the stomata which are raised above the surface of the epidermis in the first two taxa, but are level with the surface of the epidermis in the third taxon.

We also examined the pollen grains of all three taxa with a light- and a scanning electron microscope, but could detect no difference between them.

Cuttings as well as field-collected seed of all three taxa were grown side-by-side in Stellenbosch to determine whether the differences which we observed were environmentally induced. We found that the plants retained their respective characters under these conditions. From this we conclude that the differences are genetically fixed.

It is our considered opinion that the degree of morphological similarity between the three taxa is of such a magnitude that we must regard them as conspecific. Nevertheless the differences in leaf shape and indumentum are striking, and are linked to an allopatric distribution which suggests a high degree of spatial genetical isolation between them. For these reasons we regard them as three separate subspecies of the same species to which the name *P. cucullatum* applies.

We interpret Linnaeus's original description as follows. Firstly, that the epithet *cucullatum* sensu stricto applies to the beach-hugging subspecies with incised, villous leaves. Secondly, that the subspecies with dentate, non-incised, villous leaves, found against the western, north-western and southern slopes on the Cape Peninsula be designated subsp. *tabulare* Volschenk, and finally that the former *P. acerifolium* be given a new name, subsp. *strigifolium* Volschenk.

The total combined distribution range of the three subspecies does not exceed about 220 km from west to east, and the three subspecies at places occur in close proximity to one another. It may seem unusual for three subspecies to occur in such a small area, but we would like to point out that this area is well-known for the diversity of its flora. It is a mountainous area with deep intervening valleys in a region where great differences in climate and environmental conditions occur over short distances. This rugged topography provides effective barriers against migration and gene flow. Thus subsp. *cucullatum* occurs in cool situations near the beach mostly against east- or south-facing slopes (but west-facing immediately east of False Bay), on sandy

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and well-drained soil under a rainfall regime of 400–800 mm per annum. Subsp. *tabulare* occurs under a range of environmental conditions, from the dry, hot, west-facing slopes on the Cape Peninsula to cool moist conditions towards the tip of the Peninsula and on its east-facing slopes with an annual rainfall varying from 200 to 1 000 mm. The environmental conditions at Saldanha Bay where this subspecies also grows are probably more or less similar to those on the Cape Peninsula. Our impression is that subsp. *tabulare* can exist under conditions as moist as those under which subsp. *cucullatum* thrives, but that it can also survive in much hotter and drier situations. It occurs from near the beach to altitudes as high as 500 m. Subsp. *strigifolium* is essentially montane and occurs further inland at altitudes of 300–900 m, experiencing an annual rainfall of 600–1 000 mm per annum. It is found on a variety of soils derived from sandstone, shale, tillite, granite and granofir, and plants experiencing the lower end of the rainfall range are often found on heavy soils. Whereas the habitat of subsp. *strigifolium* can become very wet during the winter months, it is drier during summer than the habitats of either subsp. *cucullatum* or subsp. *tabulare*, where the air is moist throughout the year due to their close proximity to the sea. All three subspecies occur in fynbos.

The present-day distribution areas of the three subspecies are not all continuous (Fig. 1). The main concentration of subsp. *cucullatum* is east of False Bay, but a few populations also occur on the Peninsula immediately west of False Bay but separated by a distance of about 35 km. This is not much, but as this subspecies is conspicuously absent

on the intervening lowlands, it is assumed that the two concentrations are genetically isolated from each other. Subsp. *tabulare* is concentrated on the Cape Peninsula, but there are also a few populations around Saldanha Bay, separated by a break of about 90 km from the Peninsula concentration. In the case of subsp. *strigifolium*, it is unclear whether the disjunctions shown in Fig. 1 are real, or due only to imperfect collecting. It is nevertheless certain that it does not occur below about 300 m.

The seeds of *P. cucullatum* are dispersed by wind, but their aerodynamic properties are such that it is unlikely that they are spread more than a few metres from the parent plant. For this reason it seems probable that the disjunct concentrations of the three subspecies are relics from a former much wider distribution. This is supported by evidence of past climatic fluctuations cited below.

Investigations by Brain & Meester (1964) indicated that the pattern of rainfall changes in southern Africa followed a cyclical sequence since the Plio-Pleistocene (1–2 million years ago) with three wet periods (pluvials) during which the rainfall may have been 150% higher than at present. It is conceivable that during one or more of these pluvials, conditions were moist enough along the west coast to enable subsp. *tabulare* to occupy a continuous area between Cape Point and Saldanha Bay. During the inter-pluvial this subspecies would have died out in the intervening area with only the present two relic populations surviving where conditions were still favourable for its continued existence. The same hypothesis could explain the present disjunct distribution of subsp. *cucullatum*, with the break in distribution afforded by the drier Cape Flats; as well as the confinement of subsp. *strigifolium* to mountainous areas, moister than the intervening areas. It is possible that during a pluvial the intervening areas were moist enough for the subsp. *strigifolium* to occupy a continuous area, but that when it became drier and conditions at lower altitudes became unsuitable for the survival of this subspecies, populations were left stranded on isolated masses of higher land.

The environmental differences experienced by the three subspecies, and even more so their environmental requirements, are still imperfectly understood, and much data remain to be gathered. All three appear to be quite adaptable when cultivated, and the restricted nature of their natural environment is perhaps to be sought in subtle moisture differences affecting seed germination.

***Pelargonium cucullatum* (L.) L'Hérit. in Ait., Hort. Kew. edn 1, 2: 426 (1789). Type: Africa, without precise locality, specimen in Hort. Cliff. 345.17 (BM, lecto., here designated!) (Fig. 2).**

Erect, perennial shrub, 1–2 m high, with a taproot system and a series of underground runners giving rise to aerial shoots at intervals. Branches herbaceous, becoming woody at base with age, 6–10 mm in diameter, sparsely to densely pubescent to villous, beset with glandular hairs, green but turning brown with age. Leaves crowded at ends of branches, alternate, simple, petiolate; lamina (20–)

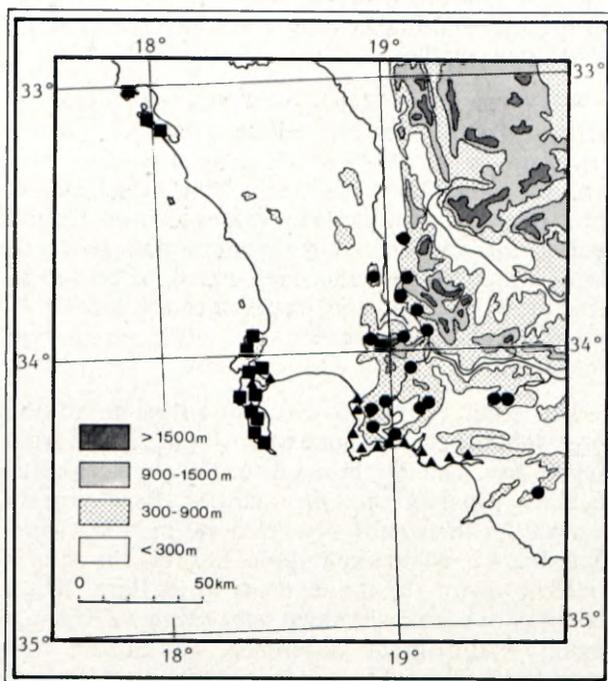


FIG. 1.—*Pelargonium cucullatum* (L.) L'Hérit. Map of the extreme south-western portion of the Cape Province, indicating the known geographical distribution of the three subspecies. ▲, subsp. *cucullatum*; ■, subsp. *tabulare*; ●, subsp. *strigifolium*.

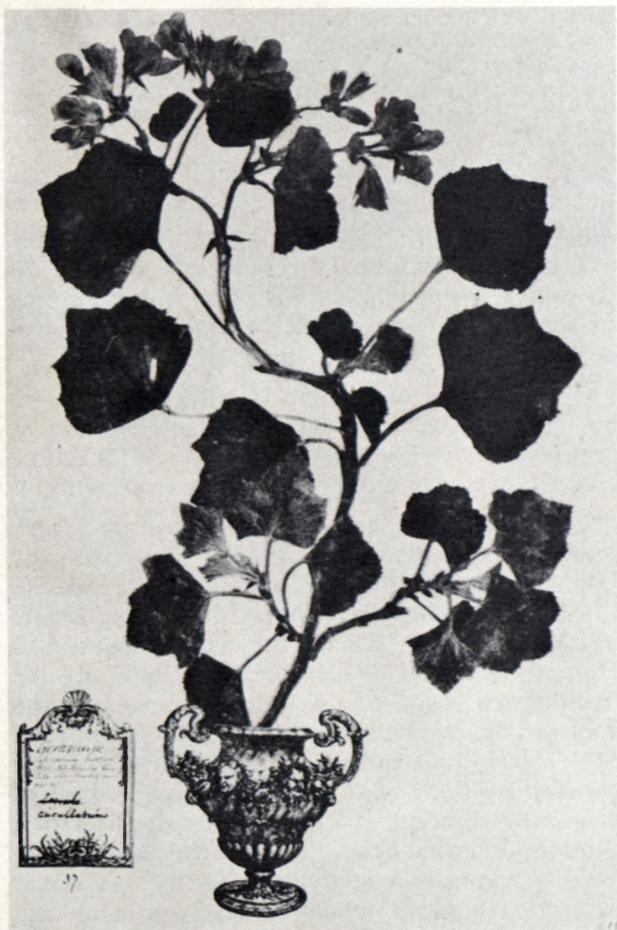


FIG. 2.—*Pelargonium cucullatum* (L.) L'Hérit. subsp. *cucullatum*.  
Lectotype: specimen in Hort. Cliff. 345.17 of *Geranium cucullatum* L. in BM. Photo: J.J.A. van der Walt.

40–55 (–110) mm long and (20–) 50–90 (–180) mm wide, firm, flat to hood-shaped at base, circular, reniform or triangular in outline, with or without shallow angular incisions, base reniform, cordate, obtusely subcordate or cuneately incised, margin irregularly denticulate, often entire in proximal  $\frac{1}{4}$  of lamina, margin occasionally red, strigose or villous, beset with glandular hairs, veins adaxially sunken below leaf surface but abaxially prominent, green; petiole (8–) 20–55 (–90) mm long, subcylindrical, somewhat flattened dorsiventrally, adaxially grooved, villous and beset with glandular hairs, stipules 5–10 mm long and 3–7 mm wide, free, ovate to narrowly ovate with acute apices, membranous, densely pilose, caducous, light green. *Inflorescence* a branched flowering stem bearing up to 4 pseudo-umbels of (1–) 3–9 (–13) flowers each, with 1–2 small foliar leaves and 2–4 bracts at each ramification; bracts 5–9 mm long and 2–4 mm wide, ovate to broadly ovate with acute apices, sparsely pilose to villous (especially abaxially and at margins), green; peduncle (20–) 30–60 (–70) mm long, erect, sometimes slightly bent in bud stage, becoming nodding-recurved after flowering, pubescent or polose, beset with glandular hairs, green or tinged with red. *Pedicel* 2–7 (–11) mm long, villous, green or reddish brown. *Hypanthium* 5–12 mm long, villous, green or reddish brown. *Sepals* 5, 12–20 mm long and 2–6 mm wide, elliptic to narrowly elliptic with acute apices, villous (in-

duimentum abaxially longer than adaxially), green or reddish brown. *Petals* 5, 15–32 mm long and 6–17 mm wide, light pink or dark pinkish purple, rarely white; posterior two obovate, asymmetric, with dark purple streaks and a reddish purple tinge at the bases widening to reddish purple patches; three anterior petals 15–28 mm long and 6–12 mm wide, obovate to elliptic to narrowly elliptic, with reddish purple markings. *Stamens*: 7 fertile (rarely less) [two 12–18 (15) mm, two 10–16(13) mm, two 8–13(9) mm and one 11–15 (12) mm long]; staminodes 3 (rarely more), 5–10 (8) mm long; staminal column white to pale pink; anthers 2–3 mm long, dorsifixed, introrse, purple; pollen orange. *Gynoecium*: style reddish purple, 6–9 mm long, proximal half sparsely pilose; stigmata 5, 2–4 mm long, dark reddish purple. *Mericarps* 15–31 mm long (base 4–6 mm long, tail 11–25 mm long). *Seed* 3–4 mm long.

#### KEY TO THE SUBSPECIES

- Margin of lamina more or less angularly incised:  
 Lamina villous; central vascular bundle in petiole with a fibrous column ..... (a) subsp. *cucullatum*  
 Lamina strigose; central vascular bundle in petiole mostly without a fibrous column ..... (c) subsp. *strigifolium*  
 Margin of lamina not angularly incised, lamina villous; central vascular bundle in petiole with a fibrous column ..... (b) subsp. *tabulare*

#### (a) subsp. *cucullatum*

*Geranium cucullatum* L., Sp. Pl. edn 1: 677 (1753) pro parte, emend. Volschenk; Burm. f., Geran. 35 (1759) pro parte; L., Sp. Pl. edn 2: 946 (1763) pro parte; Berg., Descr. Pl. Cap. 174 (1767) pro parte; Burm. f., Prodr. Fl. Cap. 18 (1768) pro parte; Thunb., Prodr. 114 (1794) pro parte; Fl. Cap. 518 (1823) pro parte — var. *fimbriatum* Burm. f., Geran. 35 (1759); Prodr. Fl. Cap. 18 (1768). *Pelargonium cucullatum* (L.) L'Hérit. in Ait., Hort. Kew edn 1, 2: 426 (1789) pro parte; Van der Walt, Pelargoniums S. Afr. 1: 12 (1977) pro parte; Van der Walt & Vorster, Pelargoniums S. Afr. 2: 43 (1981) *Geranospermum cucullatum* (L.) Kuntze, Rev. Gen. 1: 93 (1891).

*Geranium angulosum* Mill., Gard. Dict. edn 8: no. 22 (1768). *Pelargonium angulosum* (Mill.) L'Hérit. in Ait., Hort. Kew. edn 1, 2: 426 (1789); Salisb., Prodr. 314 (1796); Willd., Sp. Pl. 3: 671 (1800); Pers., Syn. Pl. 2: 231 (1807); Willd., Enum. 706 (1809); Ait. f., Hort. Kew edn 2, 4: 174 (1812); DC., Prodr. 1: 672 (1824); G. Don, Gen. Syst. 1: 740 (1831); Eckl. & Zeyh., Enum. 1: 80 (1835); Harv. in Fl. Cap. 1: 302 (1860); Knuth in Pflanzenreich 4, 129: 460 (1912); Salter in Adamson & Salter, Fl. Cape Penins. 518 (1950). *Geranospermum angulosum* (Mill.) Kuntze, Rev. Gen. 1: 94 (1891).

*Geranium acerifolium* Cav., Diss. 4: 243, t. 112, fig. 2 (1787); Thunb., Prodr. 114 (1794); Fl. Cap. edn 2: 520 (1823). Iconotype: Cav., Diss. 4: t. 112, fig. 2 (1787).

#### Diagnostic features

*Lamina* slightly to strongly hood-shaped, shallowly and angularly incised in distal half, base obtusely subcordately to cuneately incised, villous; *petiole* usually shorter than lamina, with a central fibrous column present in the central vascular bundle. *Pseudo-umbels* with 5–7 flowers each. *Petals* usually dark pinkish purple, occasionally white. (Fig. 3).

#### Geographical distribution and habitat

The subsp. *cucullatum* has a small, continuous distribution from the vicinity of Gansbaai in the east to Gordon's Bay in the west, with a few isolated populations in the Cape Peninsula which are separated from the rest by False Bay. The leaves of the plants on the peninsula are less villous than



FIG. 3.—*Pelargonium cucullatum* (L.) L'Hérit. subsp. *cucullatum*. Scale denotes 50 mm.

elsewhere. The plants occur from near the high water mark on the narrow coastal flats and in the lower foothills of the mountains, but always practically within sight of the sea (Fig. 1).

The subsp. *cucullatum* is a constituent of moist coastal fynbos. It occurs under rainfall regime of 400–800 mm per annum, on well-drained, sandy soils which are mainly derived from Table Mountain Sandstone.

Flowering takes place from September to February. The impression was gained that individual plants of this subspecies have a longer flowering period than the subsp. *tabulare*, and this may be ascribed to the moister, perhaps more favourable environmental conditions experienced by the subsp. *cucullatum*.

#### Material studied

CAPE.—3318 (Cape Town): Table Mountain, near Constantia (–CD), Ecklon 623 (W). 3418 (Simonstown): Kalkbaai (–AB), Zeyher s.n. in SAM 14592 (SAM); Muizenberg (–AB), Dümmer 512 (E); Lansdell s.n. in PRE 55718 (PRE); MacOwan 79 (BOL; PRE; SAM; W); Marloth 35 (PRE); Penther 2171 (W); Scott-Elliot 197 (E); Silver Mine Valley (–AB), Pillans 2708 (BOL); Simonstown (–AB), Marloth 3615 (PRE; STE); Volschenk 22 (STE-U); Gordon's Bay (–BB), Davis s.n. in SAM 66648 (SAM); Duthie 306 (STE-U); Volschenk 40 (STE-U); between Gordon's Bay and Betty's Bay (–BD), Dyer 5761 (PRE); between Gordon's Bay and Koëlbaai (–BD), Ihlenfeldt 1673 (PRE); Betty's Bay (–BD), Rycroft 2722 (NBG); 2775 (NBG); 3155 (NBG); Van der Schijff 7424 (PRE); Van der Walt 433 (STE-U); Volschenk 23 (STE-U); 49 (STE-U); Werdermann & Oberdieck 711 (PRE); Hangklip (–BD), Rodin 3126 (BOL); Taylor 5866 (NBG); Harold Porter Reserve (–BD), Ebersohn 62/68 (NBG); Van der Walt 649 (STE-U); Koëlbaai (–BD), Boucher 473 (PRE). 3419 (Caledon): near Hermanus (–AC), Gillett 28 (STE); Jordaan 896 (STE); Rogers 26600 (PRE); Van

der Walt 492 (STE-U); Kleinmond (–AC), Pillans 8234 (BOL); Strey 2964 (PRE); Van Breda 1432 (PRE); Volschenk 1 (STE-U); 2 (STE-U); 3 (STE-U); 4 (STE-U); Voëlklip (–AC), Barker 1613 (NBG); Kleinrivier Mountains (–AD), Ecklon 625 (W); Mosselrivier (–AD), Potts 5011 (SAM); Verkiis s.n. in STE 11215 (STE); near Stanford (–AD), Radloff s.n. in STE-U (ser. 1) 13696 (PRE); between Stanford and Hermanus (–AD), Gillett 4175 (BOL); Marsh 872 (STE).

#### Taxonomic notes

Our interpretation of Linnaeus's concept of *Geranium cucullatum* is based on the following sources which were available from the original description in L., Sp. Pl. edn 1: 677 (1753):

1. Linnaeus's description (GERANIUM calycibus monophyllis, foliis cucullatis dentatis). This is insufficient to distinguish from one another the three subspecies recognized in the present treatment.

2. Specimens seen by Linnaeus: the only specimens which had definitely been seen by Linnaeus before the publication of the Species Plantarum, are two sheets in the Clifford Herbarium in BM, almost certainly the subject(s) of Linnaeus's Hort. Cliff. 345 (1738) (see below). Both have the trivial name *cucullatum* written in Linnaeus's own handwriting. We have chosen the first of these, no. 345.17, as a lectotype specimen of *Geranium cucullatum*, because it reflects the major part of Linnaeus's concept as evidenced by the literature citations discussed below. The second specimen, no. 345.17 $\alpha$ , represents a different taxon and is taken as basis for the subsp. *tabulare* Volschenk as distinguished in the present work.

3. Linnaeus's reference to previous publications:

- a. Linnaeus, Hort. Cliff. 345 (1738): the description is practically identical to that in Sp. Pl. *l.c.* In addition Linnaeus cited from Boerhave, Lugdb. 263 (1720) '... folio hirsuto ...'
- b. Dillenius, Hort. Elth. 155, t. 129, fig. 156 (1732): the description 'foliis ... minus angulosus, ... mollitium', as well as the illustration, clearly concern the subsp. *cucullatum*.
- c. Hermann, Hort. Lugdb. Bat. 274 (1687): the illustration on p. 275 is of the currently recognized subsp. *cucullatum*.
- d. Martyn, Hist. Pl. Rar. Cent. 28, t. 28 (1728): the description 'folia ... sinuata seu potius angulosa ... utrinque villosa' as well as the accompanying illustration clearly concern the subsp. *cucullatum*.
- e. Van Royen, Lugdb. 353 (1740): described it as 'folio hirsuto cum fimbriis purpureis'. In addition Van Royen cited Linnaeus's Hort. Cliff. *l.c.*, which, as we have seen above, appears to comprise two elements.
- f. Linnaeus, Hort. Ups. 196 (?): not seen.

Wendland (Coll. Pl. 3, 45: t. 54 (1806)) described *P. rubens* from the Cape. From his description and figure it seems to be synonymous with *P. cucullatum* subsp. *cucullatum*, but in the absence of a specimen there cannot be absolute certainty.

(b) subsp. *tabulare* Volschenk, subsp. nov., a subsp. *cucullato* lamina circulari basi reniformi vel cordata; a subsp. *strigifolio* lamina villosa non

strigosa margine non angulari basi non cuneata, petalis e atro-subroseis purpureis non pallide roseis vel e subroseis purpureis differt.

Type: Africa, without precise locality, specimen in Hort. Cliff. 345. 17 (BM, holo!). Figs. 4 & 5.

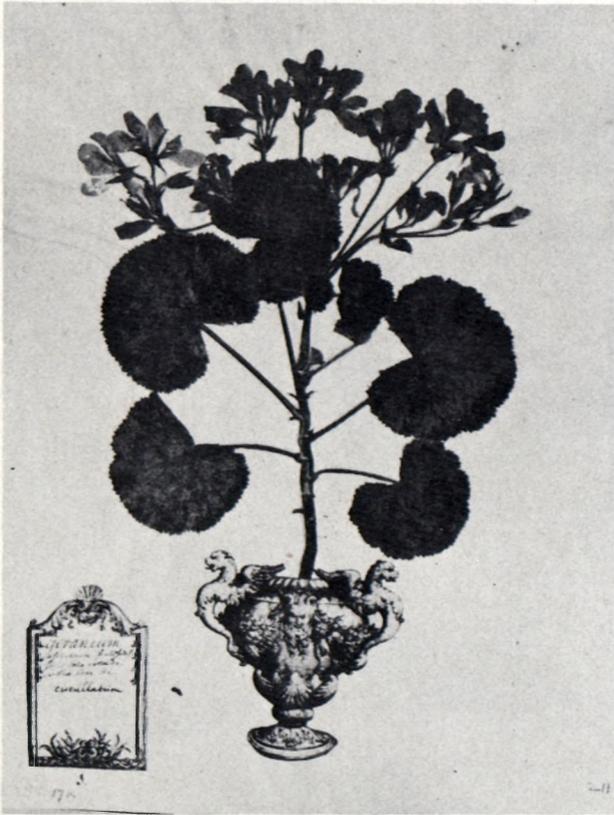


FIG. 4.—*Pelargonium cucullatum* (L.) L'Hérit. subsp. *tabulare* Volschenk. Lectotype: specimen in Hort. Cliff. 345.17 $\alpha$  in BM. Photo: J.J.A. van der Walt.

*Geranium cucullatum* L., Sp. Pl. edn 1: 677 (1753) pro parte; Burm. f., Geran. 35 (1759) pro parte; L., Sp. Pl. edn 2: 946 (1763) pro parte; Berg., Descr. Pl. Cap. 174 (1767) pro parte; Burm. f., Prodr. Fl. Cap. 18 (1768) pro parte; Cav., Diss. 4: 241, t. 106, fig. 1 (1787); Thunb., Prodr. 114 (1794) pro parte; Fl. Cap. 518 (1823) pro parte. *Pelargonium cucullatum* (L.) L'Hérit. in Ait., Hort. Kew ed. 1, 2: 426 (1789) pro parte; Willd. Sp. Pl. 3: 670 (1800); Enum. 706 (1809); Pers., Syn. Pl. 2: 231 (1807); Ait. f., Hort. Kew. edn 2, 4: 174 (1812); DC., Prodr. 1: 671 (1824); Spreng., Syst. Veg. 3: 58 (1826); G. Don, Gen. Syst. 1: 740 (1831); Eckl. & Zeyh., Enum. 1: 80 (1835); Harv. in Fl. Cap. 1: 302 (1860); Marloth, Fl. Kapl. 116, fig. 30 (1908); Knuth in Pflanzenreich 4, 129: 466 (1912); Marloth, Fl. S. Afr. 2: 90 (1925); Salter in Adamson & Salter, Fl. Cape Penins. 518 (1950); Mason, Western Cape Sandveld Flow. 134, t. 56 (1972); Van der Walt, Pelargoniums S. Afr. 1: 12 (1977) pro parte (pro icon.).

#### Diagnostic features

*Lamina* hood-shaped, circular in outline, base reniformly to cordately incised, villous; *petiole* equalling or exceeding lamina in length, with a central fibrous column present in the central vascular bundle. *Pseudo-umbels* with (5–) 6–9 (–13) flowers each. *Petals* usually dark pinkish purple. Fig. 5.

#### Geographical distribution and habitat

The subsp. *tabulare* occurs in two relatively restricted areas separated from each other by a distance of about 90 km; namely on the Cape

Peninsula where it ranges from Lion's Head and Table Mountain southwards to Cape Point, and in the vicinity of Saldanha Bay (Fig. 1). On the Cape Peninsula it occurs as a component of fynbos, from sea level to about 500 m against the mountain slopes, but always practically within sight of the sea. It grows on well-drained, usually stony and often sandy soils derived from Table Mountain Sandstone, shale and tillite. It receives an annual rainfall of 400–1 000 mm on the Cape Peninsula. In the Saldanha Bay area it occurs in fynbos vegetation in sheltered ravines, under conditions somewhat reminiscent of those on the Cape Peninsula, but receiving only about 200 mm of rain per annum.

It should be noted that the Saldanha Bay plants are smaller than those on the Cape Peninsula, especially in respect of the leaves and flowers, but this appears to be a result of less favourable environmental conditions and is not of taxonomic significance.

The flowering period stretches from late September to February, with a peak in October and November.



FIG. 5.—*Pelargonium cucullatum* (L.) L'Hérit subsp. *tabulare* Volschenk. Scale denotes 50 mm.

#### Material studied

CAPE.—3318 (Cape Town): Langebaan (–AA), Axelson 3576 (NBG); Taylor 3773 (NBG); Postberg Nature Reserve (–AA), Volschenk 28 (STE-U); 29 (STE-U); peninsula west of Saldanha Bay (–AA), Pillans 6883 (BOL); Salter 3925 (BOL); Camp's Bay (–CD), Ecklon & Zeyher 4827 (SAM); Marloth 9356 (PRE); Volschenk 9 (STE-U); 10 (STE-U); Cape Town (–CD), Pegler s.n. in PRE 55751 (PRE); Young s.n. in PRE 26417 (PRE); Devil's Peak (–CD), Thompson 31 (PRE); Wolley-Dod 2469 (BOL); Kirstenbosch (–CD), Grant 2639 (PRE); north of Window Stream (–CD), Esterhuysen 501 (BOL; PRE); Lion's Head (–CD), Van der Walt 470 (STE-U); Sea Point (–CD),

Willms 3074 (Z); Signal Hill (-CD), Volschenk 6 (STE-U); 7 (STE-U); 8 (STE-U) Table Mountain (-CD), Bolus 2729 (BOL); Dümmer 332 (E); Ecklon 608 (W)\*; Ecklon & Zeyher 621 (SAM; W); Flanagan 2415 (PRE); Guthrie 2394 (NBG; PRE); MacOwan 6472 (SAM); Rodin 3221 (BOL; PRE); Schenk 551 (Z); Thode A5 (PRE); Werdermann & Oberdieck 65 (PRE). 3418 (Simonstown): farm Bergvliet (-AB), Purcell 237 (SAM); s.n. in BOL 16377 (BOL); south of Houtbaai (-AB), Smuts s.n. (STE); Muizenberg (-AB), Pillans s.n. in PRE 16366 (PRE); Oceanview near Kommetjie (-AB), Van der Walt 664 (STE-U); Simonstown, Red Hill (-AB), Leighton 3062 (BOL); Pillans 2194 (BOL); Rogers 11282 (PRE); Wynberg Hill (-AB), Salter 6393B (BOL); Verdoorn s.n. in PRE 55752 (PRE); Cape of Good Hope Nature Reserve (-AD), Dahlstrand 1080 (PRE); Cape Point (-AD), Herre s.n. in STE 11745 (STE); Buffelsbaai (-AD), Gillett 768 (STE); Olifantsbos (-AD), Leighton 3055 (BOL); 3056 (BOL); 3057 (BOL); Rycroft 2189 (NBG); near Vasco da Gama Hill (-AD), Hutchinson 652 (BOL; PRE).

(c) subsp. **strigifolium** Volschenk, stat. et nom. nov. Type: as for *P. acerifolium* L'Hérit. below.

*Pelargonium acerifolium* L'Hérit. in Ait., Hort. Kew. edn 1, 2: 427 (1789); Geran. t. 21 (1792); Salisb., Prodr. 315 (1796); Pers., Syn. Pl. 2: 231 (1807); Willd., Enum. 706 (1809); Ait. f., Hort. Kew. edn 2, 4: 174 (1812); DC., Prodr. 1: 672 (1824); Spreng., Syst. Veg. 3: 61 (1826); Eckl. & Zeyh., Enum. 1: 80 (1835); Knuth in Pflanzenreich 4, 129: 461 (1912); non *Geranium acerifolium* Cav. (1787). *Pelargonium angulosum* (Mill.) L'Hérit. var. *acerifolium* (L'Hérit.) Harv. in Fl. Cap. 1: 303 (1860) Iconotype: L'Hérit., Geran. t.21 (1792). Fig 6.



FIG. 6.—*Pelargonium cucullatum* (L.) L'Hérit. subsp. *strigifolium* Volschenk. Iconotype: L'Hérit. Geran. t. 21 (1792).

\*Ecklon & Zeyher 608 is the type of *Eumorpha catarractae* Eckl. & Zeyh., Enum. 1: 78 (1835). Specimens in S! and SAM! match *Pelargonium patulum* Jacq.

#### Diagnostic features

*Lamina* flat to somewhat hood-shaped, shallowly and angularly incised in distal half, base cuneately incised, strigose and with glandular hairs longer than ordinary hairs; *petiole* usually shorter than lamina, with a central fibrous column absent (rarely present) in the central vascular bundle. *Pseudo-umbels* with 3–5 flowers each. *Petals* usually light pink to pinkish purple. Fig. 7.



FIG. 7.—*Pelargonium cucullatum* (L.) L'Hérit. subsp. *strigifolium* Volschenk. Drijfhout 436 from the farm La Motte near Franschoek, flowering under glass in Stellenbosch. Scale denotes 50 mm.

#### Geographical distribution and habitat

The subsp. *strigifolium* has a montane distribution in the south-western Cape Province, being known from the mountains around Bainskloof in the north to Baardskeerdersbos in the south, and the southern Hottentots Holland Mountains in the west to the Kleinrivier Mountains near Caledon in the east, at altitudes of 300–900 m. In contrast to the subspecies *cucullatum* and *tabulare*, this subspecies does not occur in close proximity to the sea.

Like the other two subspecies, it is a constituent of fynbos. Few precise rainfall figures are available for its montane habitats, but the rainfall over the general area varies from about 600 to 1 000 mm per annum. It grows on soils derived from sandstone, shale and tillite, and in the vicinity of Paarl and Jonkershoek also on soils derived from granite and granofir. These soils can be quite heavy.

Plants from the Swartberg near Caledon are smaller than elsewhere, probably occurring under less than optimal conditions at the eastern border of

the area which is climatically suitable for this subspecies.

Flowering takes place from September to January, with a peak in October and November.

#### Material studied

CAPE.—3318 (Cape Town): Paarl Mountain (-DB), *Marais s.n. in STE-U 1742* (STE-U); *Marloth 3480* (PRE); *Van der Walt 652* (STE-U); *Volschenk 12* (STE-U); 33 (STE-U); Wellington (-DB), *Knobel s.n. in PRE 23760* (PRE); Jonkershoek (-DD), *Borchardt 301* (STE); *Marais s.n. in STE-U 1030* (STE-U); *Smith 306b* (STE-U); *Van der Walt 428* (STE-U); 506 (STE-U); 641 (STE-U); *Volschenk* (STE-U); 5 Jonkershoek, Assegaiboskloof (-DD), *Van der Walt 517* (STE-U); Jakkalsvlei (-DD), *Taylor 5153* (STE); 6956 (PRE); Swartboskloof (-DD), *Van der Merwe 2126* (STE); *Van der Walt 418* (STE-U); *Van Rensburg 2074* (PRE); *Walgate 987* (STE); Stellenbosch (-DD), *Wawra 123* (W); Stellenbosch, Botmaskop (-DD), *Van der Walt 537* (STE-U); *Van Rensburg 371* (STE); 374 (STE); near Paradise (-DD), *Herre s.n. in STE 306a* (STE); 306b (STE). 3319 (Worcester): Bainskloof (-CA), *Gillett 788* (BOL); *Kies 43* (NBG); Du Toitskloof, western entrance (-CC), *Pillans 8461* (BOL); Franschhoek (-CC), *Boucher 2353* (PRE; STE); *Phillips 1058* (SAM); *R.G. 5136* (PRE); *Thode A2187* (PRE); *Volschenk 35* (STE-U); Franschhoek Forest Reserve (-CC), *Esterhuysen s.n.* (BOL); Klein Drakenstein Mountains, Kasteelkloof (-CC), *Kruger 1465* (STE); mountains between Franschhoek and Villiersdorp (-CC), *Bolus 5136* (BOL); Wemmershoek Mountains (-CC), *Drijfhout 463* (STE-U); *Esterhuysen 4044* (PRE); 17718 (BOL; PRE). 3418 (Simonstown): mountains south of Gordon's Bay (-BB), *Marloth 10119* (PRE); *Smith 306a* (STE-U); Hottentotshollandkloof (-BB), *Ecklon & Zeyher 627* (SAM; W); Koëlberg Forest Reserve (-BB), *Rycroft 1438* (BOL; NBG; PRE); Sir Lowry's Pass (-BB), *Volschenk 39* (STE-U); Steenbras Dam (-BB), *de la Bat s.n. in STE-U 108* (STE; STE-U); *Salter 6518* (BOL); Arieskraal near Palmiet River (-BD), *Barker 3335* (NBG); *Leighton 784* (BOL); between Betty's Bay and Cape Hangklip (-BD), *Ihlenfeldt 1718* (PRE); Kleinmond (-BD), *Compton 12370* (NBG). 3419 (Caledon): between Villiersdorp and Elgin (-AA), *Bayliss 707* (PRE); Elgin (-AA), *Van Breda 563* (PRE); Grabouw (-AA), *Bolus 4112b* (BOL); 4112c (BOL); Lebanon River (-AA), *Van der Zel Z19* (PRE); 265 (PRE); Houhoek Pass, 5 km west of Botrivier (-AA), *Barker 8804* (NBG); *Volschenk 38* (STE-U); Palmiet River (-AA), *Penther 2153* (W); Caledon (-AB), *Penther 2136* (W); Swartberg (-AB), *Galpin 3820* (PRE); *Volschenk 36* (STE-U); *Zeyher s.n. in PRE 55753* (PRE); in SAM 13633 (SAM); in SAM 14593 (SAM); Paardeberg at Palmiet River Mouth (-AC), *Grobler 29286* (PRE; STE); Caledon, Hartebees River (-BC), *Elbrecht 22136* (PRE); near Strandkloof (-CB), *Van der Walt 603* (STE-U); Baardskeedersbos, on the hills (-DA), *Volschenk 44* (STE-U).

#### Taxonomic notes

We chose a completely new epithet for this subspecies, to avoid possible future confusion between the names *Pelargonium acerifolium* L'Hérit. (which is superseded by the new name *P.*

*cucullatum* subsp. *strigifolium*) and *Geranium acerifolium* Cav. Although this does not preserve continuity of epithet, it is permissible under Article 11.3 (ICBN, 1978), which states that an epithet has priority only within its own rank.

*Pelargonium acerifolium* L'Hérit. (1789) is not considered to be a recombination based on *Geranium acerifolium* Cav. (1787), but rather as a different name, because L'Héritier made no direct or indirect reference to Cavanilles and actually was concerned with a different taxon.

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#### UITTREKSEL

*Dit word aangetoon dat Pelargonium cucullatum (L.) L'Hérit. bestaan uit drie infraspesifieke taksons waaraan subspesifieke rang toegeken word onder die name P. cucullatum subsp. cucullatum, subsp. tabulare Volschenk en subsp. strigifolium Volschenk. Dit is verder bewys dat P. angulosum (Mill.) L'Hérit. (Geranium angulosum Mill.) sinoniem is met P. cucullatum subsp. cucullatum, maar dat die naam P. angulosum vir baie jare verkeerdelik op subsp. strigifolium toegepas is. Laasgenoemde was vroeër bekend as P. acerifolium L'Hérit., non Geranium acerifolium Cav.*

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