

THYMELAEACEAE

SYSTEMATICS OF *PASSERINA TRUNCATA* AND A NEW SUBSPECIES *MONTICOLA*

INTRODUCTION

Most of the *Passerina* L. species are endemic to the Cape Floristic Region. The rejection of the name

Lachnaea conglomerata L. (Rhamnaceae) (Cafferty & Beyers 1999; Brummitt 2000) has necessitated nomenclatural changes to *P. glomerata* Thunb., a taxon also recognized in the now outdated revision of Thoday

(1924). In the present paper the name *P. glomerata* is rejected and *Passerina rigida* Wikstr. var. *truncata* Meisn. is raised to the species level. Based on leaf anatomy (Bredenkamp & Van Wyk 1999, 2000, 2001a) as well as vegetative and floral morphology (Bredenkamp & Van Wyk 2001b), a new subspecies of *P. truncata* is described.

MATERIALS AND METHODS

Material from the following herbaria was studied: B, BM, BOL, BREM, C, G, GRA, HAL, K, LINN, M, MEL, MO, NBG, NCY, P, PR, PRC, PRE, S, SAM, SBT, SRGH, TCD, UPS, W and WU. For the anatomical study, both fresh and rehydrated leaves were used. For *Passerina truncata* subsp. *truncata*, vouchers of Bredenkamp 973, 977, 984, 985, 988, 994, and 1002 were used; for *P. truncata* subsp. *monticola*, Stokoe 8040 and Esterhuysen 28587 were used.

Light microscope (LM) was used in general leaf anatomical studies. Methods used to prepare transverse sections and cuticle preparations are described by Bredenkamp & Van Wyk (2000).

Scanning electron microscope (SEM) was used to study the leaf surface (including epicuticular waxes) and to verify the structure of the cuticular membrane (Bredenkamp & Van Wyk 2000).

Transmission electron microscope (TEM) was used to study the structure of the mucilaginous epidermal cell walls (Bredenkamp & Van Wyk 1999).

1. *Passerina truncata* (Meisn.) Bredenkamp & A.E. van Wyk, stat. nov. Type: Western Cape, near Tulbagh Waterfall, April 1865, Zeyher 43 (K!, lecto., here designated; MEL!, MO!, NBG!, S!, W!).

Passerina rigida Wikstr. var. *truncata* Meisn. in A.D.C., Prodrum systematis naturalis 14, : 563 (1857); C.H. Wright: 13 (1915); Thoday: 153 (1924).

Passerina rigida Wikstr. var. *tetragona* Meisn.: 563 (1857) pro parte quoad specimen Drège 2971; C.H. Wright: 13 (1915); Thoday: 153 (1924). Type: Western Cape, circa Ezelsbank Drège 2971 (P!, lecto., here designated; K!).

Lachnaea conglomerata L.: 560 (1753); L.: 374 (1784); Willd.: 434 (1799); Wikstr.: 323 (1818); Thunb.: 374 (1825); Meisn.: 562 (1857); Cafferty & Beyers: 171, 172 (1999); Brummitt: 805 (2000) nomen rejiciendum. *Passerina conglomerata* Thunb. fide Wikstr.: 322 (1818) nom. illeg.

Passerina glomerata sphalm. quoad *L. conglomerata* L. sensu Thunb.: 75 (1794); Willd.: 434 (1799); Wikstr.: 323 (1818); Thunb.: 374 (1825); Meisn.: 562 (1857); Cafferty & Beyers: 171, 172 (1999). *Lachnaea glomerata* sphalm. quoad *L. conglomerata* L. sensu Thunb.: 75 (1794). *Passerina ericoides* sensu Thunb.: 374 (1825) non L.: 236 (1767, 1771). *Passerina glomerata* sensu Thoday: 153 (1924) nom. illeg.

Shrubs, shrublets or low stunted shrublets (0.2–) 0.4–1.5(–2.0) m high. Stems branching from base to growing points; branchlets ascending, straight or arcuate (subsp. *monticola*), greyish brown, younger branchlets whitish tomentose, older branchlets with whitish scales, remains of indumentum and scales flaking off with cork on older branchlets; cork fissured between leaf scars or tessellate,

scaberulent. Leaves sessile, decussate, imbricate on young branchlets, diverging at 15°–45°, four-ranked, cymbiform; lamina inversely ericoid, narrowly oblong to oblong in outline, length $\times$ depth (1.7–)2.0–3.0(–4.0) $\times$ (0.6–)0.8–1.0 (–1.7) mm, becoming keeled in upper part; adaxial surface concave, tomentose; abaxial surface laterally compressed and glabrous; apex truncate or rounded (subsp. *monticola*); base dilated; margins involute. Inflorescences comprising polytelic synflorescences, spikes reduced, resembling terminal subcapitate inflorescences, each characterized by two terminal leaves with axillary blind-ending rudimentary flowers, enveloping minute growing point; proliferating growth less common; subcapitate inflorescences $\pm$ ellipsoid, pale green or straw-coloured, 4–8-flowered. Bracts enveloping flowers and fruits, accrescent after anthesis, becoming more coriaceous and rounded at fruit set, decussate, imbricate, sessile, appressed or ascending, obovate to widely obovate in outline, length $\times$ depth (2.5–)2.9–4.0 $\times$ 1.4(–2.4) mm, adaxially concave, villous, abaxially convex, glabrous, coriaceous to thickly coriaceous, ribbed (subsp. *monticola*) or ribbed and reticulately veined on both sides of main vein, concolorous, pale green or greyish green, senescing to yellowish brown; base cuneate; main vein extending into obtuse to acute apex; margins involute. Flowers actinomorphic, bisexual, hypogynous. Floral envelope 4.9–6.4 mm long, comprising a hypanthium (fused calyx and androecium) and calyx lobes, papery and yellow-pink during pollination, dehydrated after shedding of pollen, turning red to brown. Pedicel very short or absent. Receptacle very short. Disc absent. Hypanthium a membranous cylindric tube, glabrous at ovary or apex of ovary tomentose, neck tomentose, 0.7–0.8 mm long, abscission tissue and articulation plane absent. Calyx petaloid; lobes 4, imbricate in bud, flexed in flower; outer lobes concave ovate or cymbiform, adaxially sparsely pubescent or apex tomentose, abaxially glabrous; inner lobes oblong to elliptic or widely obovate, adaxially sparsely pubescent or tomentose, abaxially glabrous. Corolla absent. Petaloid scales absent. Androecium dimorphic, diplostemonous, arising from hypanthium at separation point of calyx lobes; filaments of antipetalous whorl 0.9–1.2 mm and those of antisepalous whorl $\pm$ 1.4 mm long; anthers (0.8–)0.9 $\times$ 0.4 mm, sub-basifixed, 2-theous and 4-locular. Ovary superior (2.4–)2.5 $\times$ 0.9 mm, unilocular, placentation parietal; ovule 1, pendulous, laterally attached near top of ovary. Style situated laterally from top of ovary, maintaining lateral position in hypanthium neck, reaching beyond hypanthium rim. Stigma $\pm$ globose, mop-like or penicillate. Fruit an achene with pericarp membranous and dry, 2.5 $\times$ 1.2 mm, enveloped by persistent, loosely arranged hypanthium, the latter fragmenting over widest circumference of fruit, resulting in shedding of fragmented hypanthium, calyx lobes and androecium. Seed broadly fusiform with outgrowths at both micropylar and funicular ends; tegmen black and shiny, often with white spots; endosperm formation nuclear, but later becoming cellular throughout. Conservation status: Not Threatened (IUCN Species Survival Commission 1994).

Key to subspecies

- 1a Shrubs or shrublets from various habitats; stems branching from base, straight; branchlets straight; leaves diverging at $\pm$ 15°, narrowly oblong to oblong, apex truncate, keeled, appearing humped on the back; bracts appressed,

thickly coriaceous, ribbed and reticulately veined on each side of main vein, greyish green, senescing to yellowish brown; main vascular bundle variously arranged, types B2, 3, 5 (Bredenkamp & Van Wyk 2001a)

. 1a. subsp. *truncata*

1b Shrubs or low shrublets from mountain habitats; stems often stunted; branchlets lax, arcuate; leaves diverging at $\pm 45^\circ$, narrowly oblong, apex truncate to rounded and keeled; bracts ascending, coriaceous, ribbed on each side of main vein, pale green; main vascular bundle bordering on abaxial epidermis, type B6 . . 1b. subsp. *monticola*

Leaf anatomy

Leaf inverse-dorsiventral, epistomatic. *Outline* in transverse section (t/s) transversely elliptic. *Lamina* width (570–)740–830(–980) μm , midrib in t/s (290–)330–460(–500) μm . *Adaxial epidermis* uniseriate, stomata anomocytic, cuticular membrane (CM) $\pm 2 \mu\text{m}$ thick; periclinal cell diam. 15 μm , anticlinal cell diam. 12.5 μm . *Abaxial epidermis* in surface view, cells arranged randomly, isodiametric or slightly oblong, pentagonal to heptagonal, (30–)40–55 $\times$ 30–40 μm ; CM smooth or with several domes per cell, wax platelets scarce, square to oblong, raised 30° – 90° , rounded to sharp edges; CM in t/s (20–)30–40(–50) μm thick, periclinal cell diam. (20–)30–45 μm , anticlinal cell diam. (25–)30–60 μm , epidermal cells large, with thick inner periclinal cell walls, becoming mucilaginous and containing abundant amounts of tanniferous compounds; outer periclinal wall domed. *Mesophyll*: palisade parenchyma in 2 or 3 layers of elongated cells with abundant chloroplasts and tanniferous compounds, density 3–5 cells per 50 μm ; spongy parenchyma of irregular cells $\pm$ densely arranged with largest intercellular spaces close to vascular bundles. *Main vascular bundle* centrally arranged (type B2) (Bredenkamp & Van Wyk 2001a), touching palisade parenchyma abaxially (type B3), or with palisade parenchyma abaxial of main vascular bundle specializing into collenchyma, containing ample amounts of tanniferous substances (type B5), or bordering on abaxial epidermis (type B6) (subsp. *monticola*), ovate with ample sclerenchyma, or widely to very widely ovate with sclerenchyma bulging laterally. *Bundle sheath* of (21–)25–30(–32) parenchymatous cells, $\pm$ rounded, tanniferous substances strongly present adaxially or specializing into collenchyma abaxially. *Secondary growth* present (subsp. *truncata*). *Secondary vascular bundles* 2–4 on each side of main bundle. *Sclerenchymatous hypodermal sheath* absent. Figure 4.

Nomenclatural notes

Lachnaea conglomerata was described by Linnaeus (1753), with synonyms from Plukenet (1700), Ray (1704) and Breyne (1678). This name was subsequently also used by Linnaeus in *Systema vegetabilium* (1784). However, there is no material of this taxon in the Linnean Herbarium (Savage 1945). The only original element found, is the illustration by Breyne (1678), determined as *Phyllica stipularis* L. by Cafferty & Beyers (1999).

Thunberg (1794), in error, made the illegitimate combination *Passerina glomerata*, citing 'L. glomerata Linn. Syst. 374' in synonymy. The specimen *Herb. Thunberg*

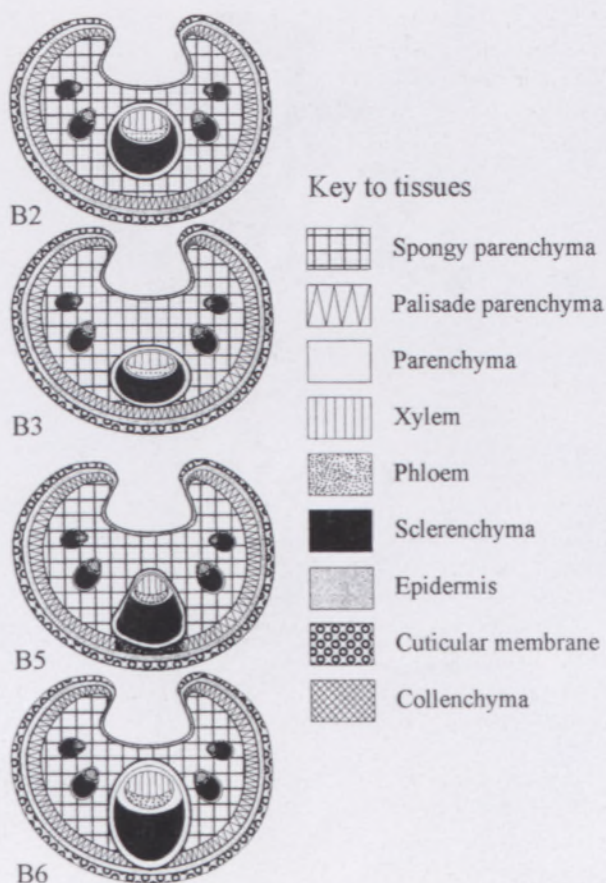


FIGURE 4.—Diagrammatic representation of t/s of leaves. *P. truncata* subsp. *truncata* characterized by leaf structural types B2, 3 & 5, and subsp. *monticola* by type B6.

9577 (UPS) (Figure 5), bears the inscription '*Passerina glomerata* α (Lin. herb.)' and was determined by Thoday as the type of *P. glomerata* Thunb. However, specimens 504.2 & 504.3 referred to in the Linnean Herbarium (Savage 1945), are both *P. paleacea* Wikstr., suggesting that Thunberg did not have a clear interpretation of *P. glomerata*. The specimen *Herb. Swartzii* s.n. (S) bears the name *Lachnaea conglomerata* L. and has been correctly identified as *P. glomerata* fide Thunberg (1794) and Thoday (1924). Unfortunately, neither Thunberg nor any of the contemporary Swedish botanists were aware that the illustrated synonym in Breyne on which *Lachnaea conglomerata* sensu Linnaeus was based, represents *Phyllica stipularis* L. (Rhamnaceae). Thunberg clearly intended to base his new name on the Linnean concept, referring to 'Linn Syst. 374' and 'Lin. herb.'.

Willdenow (1799) once again reinstated *L. conglomerata*, sinking *P. glomerata* Thunb. Wikström (1818) retained *P. conglomerata*, citing both *P. glomerata* and *L. conglomerata* in synonymy. Wikström's concept is clearly illustrated by two specimens from the Bergius Herbarium (SBT) bearing the inscriptions *Lachnaea conglomerata* Linn. and *Passerina conglomerata* Thunb. Adding to the confusion about the concept of the taxon, he referred to 'Hautbay', today Hout Bay, as the locality for the species, which is the known habitat of both *P. paleacea* and *P. ericoides* L. Thunberg (1825) accepted Wikström's concept of *P. glomerata*, citing *P. ericoides* in synonymy. This confusion is reflected by many

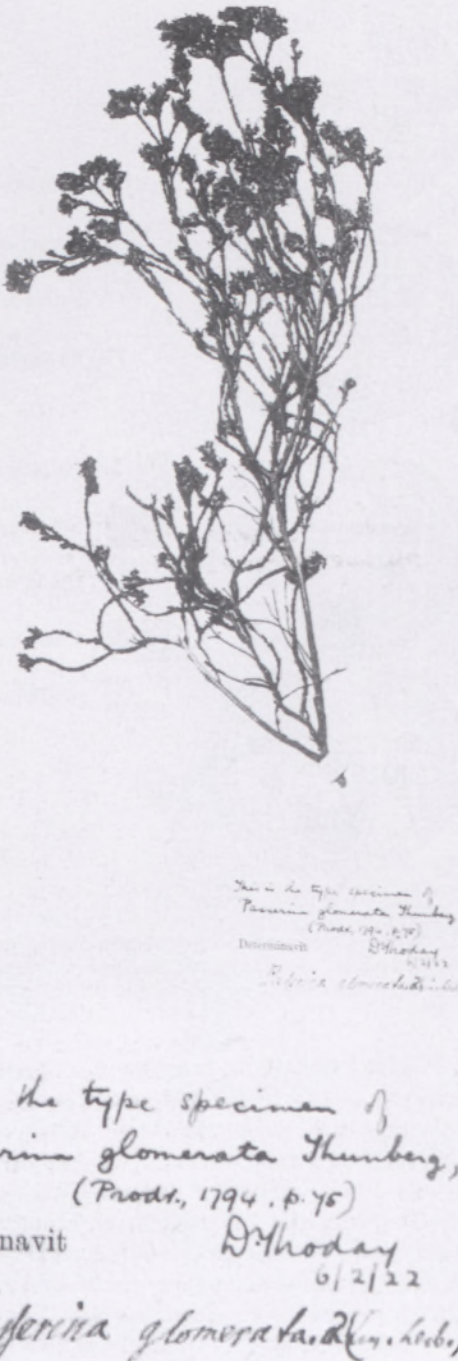


FIGURE 5.—The specimen Herb. Thunberg 9577 (UPS), bearing inscription 'Passerina glomerata α (Lin. herb.)' and determined by Thoday as the type of *P. glomerata* Thunb.

herbarium specimens, e.g. Thunberg s.n. (S), presently identified as *P. glomerata* Thunb., misidentified as *P. ericoides* (= *Lachnaea conglomerata*); the specimen Herb. Thunberg 9596D (UPS), identified as *P. paleacea* by Thoday in 1922, with inscriptions '*P. ericoides* Linn.' and '*L. conglomerata* (Linn.)'. Recognizing the continuous confusion, Meisner (1857) cited both *P. glomerata* and *L. conglomerata* in synonymy under *P. ericoides*.

In the interest of nomenclatural stability, the proposal by Cafferty & Beyers (1999) to reject the name *Lachnaea conglomerata* L. was recommended by the Committee for Spermatophyta (Brummitt 2000). Article 56.1 of the International Code of Botanical Nomen-

clature (Greuter *et al.* 2000) states that combinations based on *nomina rejicienda* should be similarly rejected. As Thunberg clearly indicated that his concept of *P. glomerata* was based on the Linnean concept of *L. conglomerata*, the name *P. glomerata* is also rejected.

Meisner (1857) placed both *P. glomerata* and *L. conglomerata* in synonymy under *P. ericoides*. Furthermore, he described two new varieties under *P. rigida*, namely var. *tetragona* and var. *truncata*. Both these varieties included authentic material later cited by Thoday (1924) in his description of *P. glomerata*. Based on the specimen Herb. Thunberg 9577 (UPS) (Figure 5) as the type, Thoday (1924) reinstated *P. glomerata* Thunb. and placed Meisner's two varieties in synonymy, unaware of the fact that Thunberg (1794) had made the illegitimate combination *P. glomerata*, in error. The rejection of *L. conglomerata* (Cafferty & Beyers 1999; Brummitt 2000) and *P. glomerata*, implied the choice of a new name for the existing species. As all the specimens included in *P. rigida* var. *truncata* are delineated by '*foliis ramulo adpressis vel semipatulis truncatis*' and their distributions coincide perfectly with the distribution of the previously known *P. glomerata sensu* Thoday, the var. *truncata* was consequently selected and is here raised to the species level. The var. *tetragona* included Drège 2971 (K, P) from Ezelsbank in Western Cape, presently placed in synonymy under *P. truncata*, and Drège s.n. from Stormberg in the Eastern Cape, presently identified as *P. montana*.

1a. subsp. *truncata*

Diagnostic characters and relationships: the typical subspecies may easily be distinguished by its decussate, imbricate, four-ranked leaves, spreading at an angle of 15°. The leaves are abaxially laterally compressed and glabrous, narrowly oblong to oblong, with a dilated base and a truncate, keeled apex, appearing humped on the back. Inflorescences are reduced spikes, terminally subcapitulate. Bracts are obovate to widely obovate. The lamina is villous on the inside and glabrous on the outside. It is thickly coriaceous, ribbed and reticulately veined on each side of the main vein, which extends into an obtuse apex. Bracts are greyish green in colour, senescing to yellowish brown. *P. truncata* could be confused with *P. quadrifaria* Bredenkamp & A.E. van Wyk ined., which is characterized by shortened leaf-bearing branchlets with closely arranged nodes, very short internodes and leaves spreading at an angle of 45°. The abaxial surface is convex and tomentose in young leaves and the leaf apex is rounded.

Etymology: the specific epithet is from the Latin *truncatus* = ending very abruptly, as if cut straight across. It describes the truncate apex of the leaves.

Distribution and habitat: subspecies *truncata* is confined mainly to the Fynbos (Rebello 1998) and Succulent Karoo Biomes (Hoffman 1998) of the Northern and Western Cape. It occurs in the Northwestern, Southwestern, Karoo Mountain and Southeastern centres of endemism (Goldblatt & Manning 2000) within the Cape Floral Region. In the Northern Cape, it is distributed from Steinkopf, through Namaqualand, Nieuwoudtville and

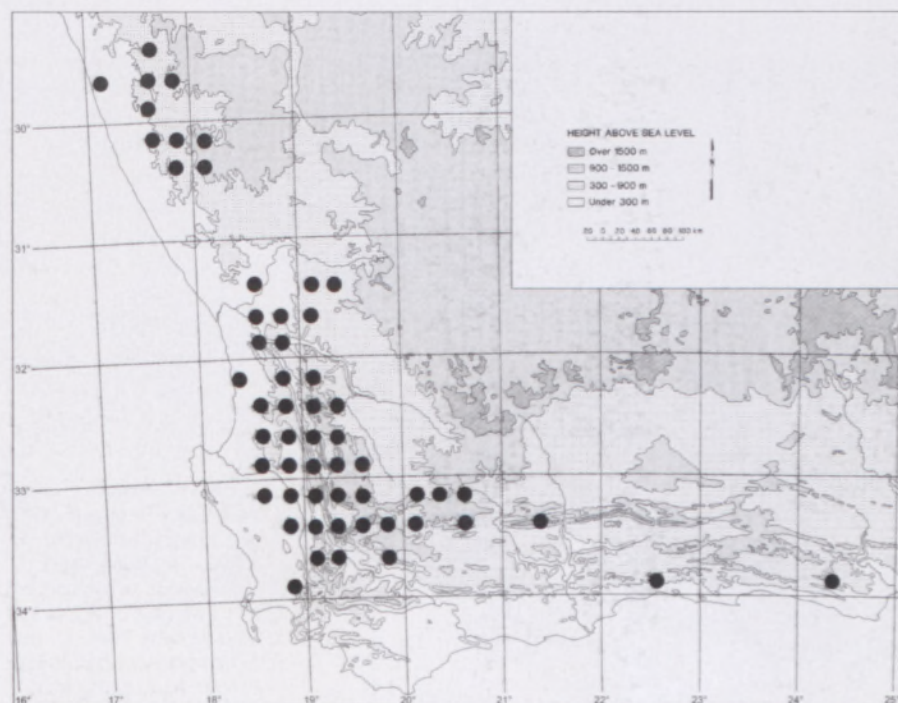


FIGURE 6.—Known distribution of *P. truncata* subsp. *truncata*.

Vanrhynsdorp to Wolfberg. This subspecies is common in the Western Cape, where it is distributed from Vanrhynsdorp, the Koue Bokkeveld, Clanwilliam, the Olifants River Valley, Citrusdal, along the Cederberg Mountains, to Malmesbury, Ceres, Tulbagh, Matjiesfontein and Seven Weeks Poort. The most southeasterly known locality is Baviaanskloof near Patensie (Bayliss 546). Subsp. *truncata* is adapted to a wide range of habitats. It occurs on low-lying plains as well as on several mountain ranges, where it is common on level ground, rocky slopes and along watercourses. Subsp. *truncata* is one of the most dominant taxa between Tulbagh and Clanwilliam, where the size of the shrubs varies from 0.4–1.5(–2.0) m on flat areas and plains. They grow prolifically, and during flowering time yellow, yellowish pink and red flowers can often be seen on the same plant, representing various stages of maturation. This subspecies is also common in the arid Karoo environment of the Witteberg Mountains near Matjiesfontein, where it grows in rocky areas. In extremely dry areas of Namaqualand, the Ceres-Karoo and on top of the Skurweberg and Cederberg Mountains, the growth form of the subsp. *truncata* changes to a hardy, skeletal, less-branched, sclerophyllous shrublet, with yellow, coriaceous leaves, closely arranged on the stem, but with each growing point protected by a pair of conspicuous, coriaceous bracts. Figure 6.

1b. subsp. *monticola* Bredenkamp & A.E. van Wyk, subsp. nov., a subspecies typica praecipue habitu differt. *Frutices* vel *fruticuli* in habitu montano in fissuris rupium radicanter. Ramuli adscendentes, laxi, arcuati. Folia ad angulum 45° divergentia, anguste oblonga, carinata, apice truncato vel rotundato. Bractee adscendentes, obovatae ad late obovatae, coriaceae, utrinque costae costatae, pallide virides.

TYPUS.—Western Cape, 3319 (Worcester): Robertson Division, Omklaar, (–DD), 1923, *Stokoe* 22330 (PRE!, holo.; K!, iso.).

Shrubs or low stunted shrublets 0.2–1.5 m high, often rooted in rock crevices. *Stems* often stunted, branching profusely on younger growth, branchlets ascending, arcuate; younger branchlets densely whitish tomentose; cork fissured between yellowish leaf scars. *Leaves* diverging at $\pm 45^\circ$, narrowly oblong in outline, length $\times$ depth (2.4–)2.6(–3.0) $\times$ 0.6–1.7 mm; abaxial surface laterally compressed and glabrous; apex truncate to rounded; base dilated. *Inflorescences* subcapitate, $\pm$ ellipsoid, pale green. *Bracts* ascending, obovate to widely obovate; lamina adaxially concave, villous, abaxially convex, glabrous, coriaceous, ribbed, pale green, base cuneate; main vein extending into obtuse to acute apex; length $\times$ depth (2.5–)2.9 $\times$ 1.5 mm. *Flowers*: floral envelope $\pm$ 4.9 mm long. *Hypanthium*: apex of ovary tomentose, neck tomentose, $\pm$ 0.7 mm long. *Calyx*: outer lobes concave ovate, apex adaxially tomentose, abaxially glabrous; inner lobes widely obovate, adaxially tomentose, abaxially glabrous. *Androecium*: filaments of antipetalous whorl $\pm$ 1.2 mm and antisepalous whorl $\pm$ 1.4 mm long; anthers 0.9 $\times$ 0.4 mm. *Ovary* 2.5 $\times$ 0.9 mm. *Conservation status*: Not Threatened (IUCN Species Survival Commission 1994). Figure 7.

Diagnostic characters and relationships: *Passerina truncata* subsp. *monticola* can easily be distinguished from the typical subspecies by its growth form. The plants are often low shrublets rooted in rock crevices on mountain peaks. The stems are stunted, branching profusely on younger growth, the branchlets are ascending, lax and arcuate. The leaves spread at 45° , are narrowly oblong and the apex is truncate to rounded and keeled. The bracts retain the characteristic shape of subsp. *truncata*, but are ascending, smaller and pale green. The characteristic lax, arcuate branchlets of this subspecies also distinguish it from *P. quadrifaria*.

Etymology: the subspecific epithet *monticola* = mountaineer, referring to the mountainous habitat of the subspecies.

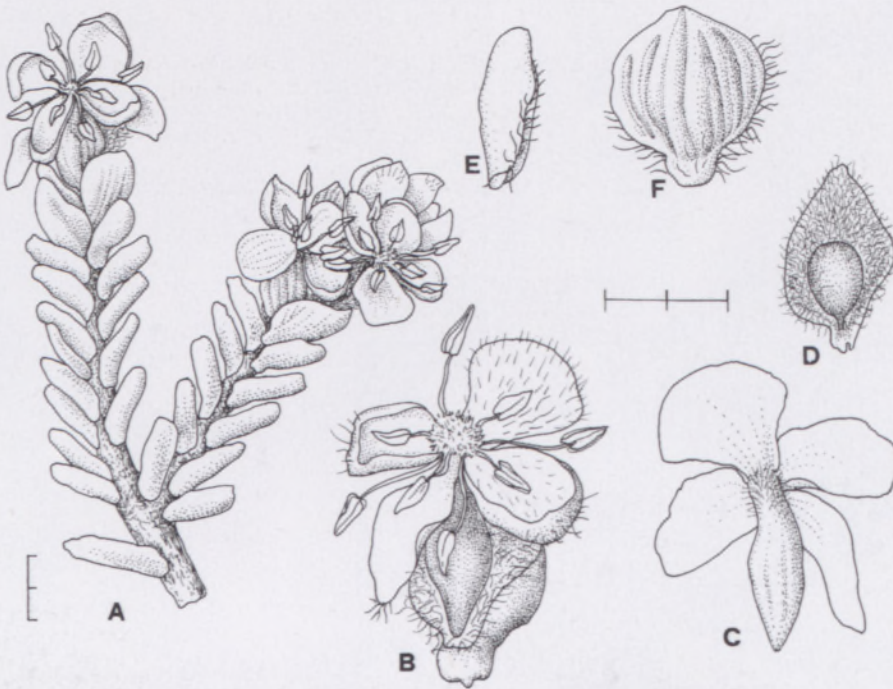


FIGURE 7.—*P. truncata* subsp. *monticola*, Esterhuysen 28587. A, flowering branch; B, flower clasped by bract; C, indumentum of hypanthium tube and glabrous abaxial surfaces of calyx lobes; D, fruit in tomentum of bract; E, leaf; F, bract. Scale bars: 2 mm.

Distribution and ecology: subspecies *monticola* is distributed south of 32°S latitude and between 18°E and 20° longitude. It occurs in the Northwestern, Southwestern, and Agulhas Plain centres of endemism (Goldblatt & Manning 2000) of the Cape Floristic Region. It grows in mountainous areas and is distributed from Clanwilliam, along the Cederberg Mountains, southwards along mountain ranges and summits to Table Mountain, Helderberg, Kogelberg, the Hex River Mountains and the Riviersonderend Mountains.

Plants are often found in rock crevices or in damp sheltered gullies. They also occur on western, southwestern and eastern slopes and on shale bands at an altitude of 1 667–2 000 m, on Sneekop (Goudini). The most common habitat is on mountain summits, e.g. Sneeuberg, Slanghoek Pile, Zebra Kop, Jonaskop and Buffelshoek, as well as on mountain peaks, e.g. Milner, Du Toits, Uitkyk and Bailey's Peaks, at altitudes of $\pm$ 2 000 m. Figure 8.

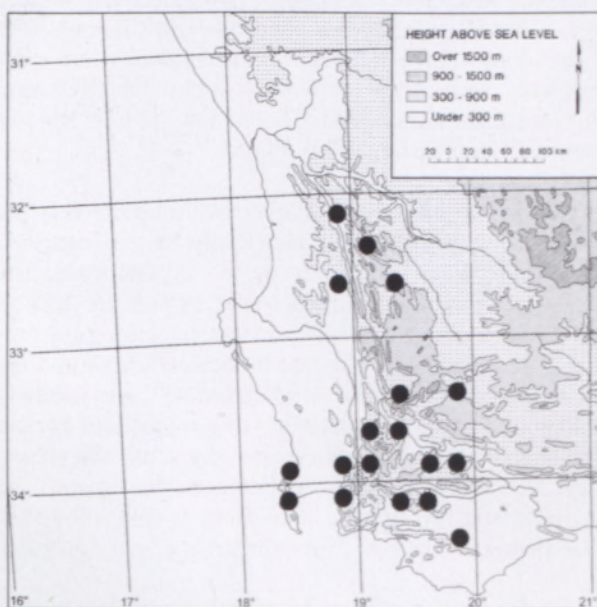


FIGURE 8.—Known distribution of *P. truncata* subsp. *monticola*.

ACKNOWLEDGEMENTS

The authors would like to thank Ms Gill Condy for the line drawings, Dr O.A. Leistner for translating the diagnosis into Latin and Ms A. Romanowski for printing the photograph.

SPECIMENS EXAMINED

Acocks 1002, 1004, 3045, 3214 (1a) S; 17234 (1a) K, PRE; 19397 (1a) K, M, PRE; 23678 (1a) PRE. *Almborn* 475 (1a) MO; 539 (1a) M. *F. Archer* 120 (1a) NBG, PRE.

Barker 5751, 9217, 10286 (1a) NBG. *Bayliss* 577 (1a) M, MO, PRE; 591, 1105, *BRI-B591* (1a) K, MO, PRE; *BRI-B546* (1a) PRE. *Bellamy* 2 (1a) PRE. *Bolus* 9507 (1a) BOL, K. *Boucher* 1983 (1a) NBG; 2872 (1a) K, NBG, PRE; 2880 (1a) PRE; 3177 (1a) C, K, NBG, PRE. *Bredenkamp* 972, 973, 977, 978, 983, 985, 986, 988–994, 1004–1011 (1a) PRE. *Bremer* 264 (1a) PRE, S. *Buchell* 387 (1a) PRE.

Compton 519 (1a) NBG, S; 1404 (1b) NBG; 2800 (1a) BOL, NBG; 3327 (1a) BOL, K; 3743 (1a) NBG; 4894 (1a) BOL; 4901, 5890 (1a) BOL, NBG; 6347 (1b) NBG; 6546, 6902, 9537 (1a) NBG; 9970 (1a) MO, NBG; 11701, 11718, 12237, 15020, 18781 (1a) NBG; 19949 (1a) NBG, MO; 22821 (1a) S; 24331 (1a) NBG, MO.

Dahlgren & Peterson 257 (1a) K. *Davis s.n.* (1a) NBG, PRE, SAM. *Drège* 2971 (1a) K, P; *s.n.* (1a) K.

Ecklon & Zeyher s.n. (1a) BREM, MO, S. *Emdon* 197 (1a) C, K, PRE. *Esterhuysen* 1327 (1a) BOL; 1744 (1b) BOL; 2273 (1a) BOL; 3638 (1b) BOL; 3703 (1a) K; 7380, 8416, 9542, 9822, 9921 (1b) BOL; 10886 (1a) BOL; 11046 (1b) BOL; 11255 (1b) BOL, K; 26859 (1a) K; 27451 (1b) BOL; 28555 (1b) BOL, K; 28574, 28587, 30573, 30910 (1b) BOL; 32195 (1a) MO. *Evrard* 9001 (1a) MO, PRE, UPS.

Forrester 114, *s.n.* (1a) NBG.

Galpin 11209, 11210, 11218 (1a) BM, C, PRE, UPS. *Gillett* 397 (1a) NBG; 4012 (1a) BOL, K, PRE. *Alice Godman* 527 (1a) BM. *Goldblatt* 2757 (1a) M, NBG, PRE, S; 2802 (1a) C, PRE, M, MO; 7264 (1a) MO, PRE, S. *Greuter* 21765 (1a) PRE. *Guthrie s.n.* (1b) NBG.

Hanekom 943 (1a) NBG, PRE; 1249 (1a) K, PRE. *Hardey* 448, 449 (1a) PRE, BM, K, M. *Herb Swartzii s.n.* (1a) S. *Herb Thunberg s.n.* (1a) UPS. *Hiendlmayr s.n.* (1a) M. *Howes* 225 (1a) K, PRE. *Hugo* 545, 679 (1a) K, PRE. *Hugo & Mauve* 4 (1a) K, MO, NBG, PRE. *Hutchinson* 416 (1a) BM, GRA, K, PRE; 834 (1a) GRA, K, PRE.

Johnson 519 (1a) NBG. Jordaan 545 (1a) NBG.

Kerfoot K5061 (1b) NBG. Kotze 45 (1a) NBG. Kruger 911 (1a) NBG, PRE; 1754 (1b) PRE.

Le Roux 2310 (1a) PRE. Levyns 1232, 1335, 1370, 1377, 1808, 1941, 2165, 2382, 2415a, 4108 (1a) BOL. Lewis 2730, 4061, 4062 (1a) NBG; 62671 (1a) MO; SAM67057, SAM67058 (1a) NBG, PRE; Lewis s.n. (1a) NBG. Linscherg s.n. (1a) S. Loubser 598 (1a) NBG.

Maguire 2025 (1a) C, NBG. Marloth 4238 (1a) K, PRE; 6626 (1b) NBG, PRE; 6873, 6957 (1a) PRE; 10668 (1a) NBG; 10798, 11426, 11686, 12943 (1a) PRE; 13006, 13007 (1a) NBG, PRE; 13144 (1a) PRE. Merxmüller & Giess 3832 (1a) M, PRE. Metelerkamp 562, 562a (1a) BOL. Meyer 74 (1a) NBG. Morley 250 (1a) NBG, PRE. Museum Botanicum Hauniense (1a) C.

Nortje 17 (1a) NBG.

Pappe s.n. (1a) K. Pearson 5709, 6256 (1a) BOL, K; 6765 (1a) K; 6773 (1a) BOL; 6782 (1a) K. Pearson & Pillans 5928 (1a) K. Phillips 2057 (1a) NBG. Pillans 7298 (1a) K; 7298, 7769 (1b) BOL; 8021 (1a) BOL; 9606, 10705 (1a) MO; 63799 (1a) BOL, MO, PRE. Pocock 770 (1a) NBG, PRE.

Rauh 3553 (1a) M. Rourke 961 (1b) MO, NBG.

Salter 1568 (1a) K. Schlechter 10627 (1a) BM, K, MO, PRE, S; 10660 (1a) BM, K, PR, PRE, S. Solomon 92 (1a) NBG. Stehle 309 (1b) NBG. Stephens 7226, 7264 (1a) K. Stirton 10148 (1a) PRE. Stokoe 1460 (1a) PRE; 2520 (1b) PRE; 8040 (1b) BOL; 8041 (1a) BOL; 8042 (1a) BOL, GRA, NBG, PRE; 8225 (1b) BOL; 17574 (1b) BOL, PRE; 22330 (1b) K, PRE; 22331 (1a) BOL, PRE; 64616 (1b) PRE; s.n. (1a) NBG; s.n. (1b) BOL, NBG. Stokoe & Davis s.n. (1a) NBG. Story 4303 (1a) K, GRA, PRE. Strid 37832 (1a) C, NBG.

Taylor 2865 (1a) NBG, S; 3921 (1a) PRE; 4011 (1a) NBG; 6145 (1b) PRE; 6495 (1a) NBG, PRE; 8664 (1a) K, NBG, PRE, S; 9293 (1a) PRE; 10483, 10618 (1a) NBG, PRE. Thoday 213 (1a) NBG; 1921 (1a) BOL. Thompson 1278, 1519 (1a) NBG; 2823 (1a) K, MO, NBG, PRE. Thunberg s.n. (1a) S, SBT. Tyson 318 (1a) NBG; 1452 (1a) PRE; 2318 (1a) K.

Van Breda 198 (1a) PRE. Van Rooyen 2401, 2626 (1a) M. Van Rooyen, Steyn & De Villiers 618 (1a) NBG. Van Son TRV36623 (1a) PRE. Van Wyk 6485 (1a) PRE. Van Zyl 3295 (1a) K, MO, PRE.

Wagener 259 (1a) NBG. Whitehead s.n. (1a) TCD.

Zeyher 43 (1a) K, NBG, MO, S; s.n. (1a) M. Zietsman & Zietsman 925, 1151 (1a) PRE.

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