

A new long-tubed subspecies of *Pelargonium dipetalum* (section *Hoarea*) (Geraniaceae) from the Albertinia-Swellendam area in Western Cape Province, South Africa

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Background: Field studies confirmed that unusually long-tubed populations of *Pelargonium dipetalum* from between Swellendam and Albertinia, Western Cape Province, South Africa, are a distinct ecotype adapted to pollination by the long-proboscid fly, *Prosoeca longipennis*. The geographical and morphological isolation of these populations suggests that they are reproductively isolated from short-tubed populations, which are pollinated by bees.

Objectives: To determine and describe the floral variation in *P. dipetalum*, with a view to recognising the long-tubed populations at some taxonomic level.

Method: All available collections were measured and compared.

Results: Populations of *P. dipetalum* were segregated into a short-tubed form with hypanthium 3 mm – 24 mm long and mostly pink petals that occurs from Betty's Bay to Knysna, and a long-tubed form with the hypanthium 34 mm – 54 mm long and consistently white petals that is restricted to a small area east of Swellendam between Suurbraak and Albertinia. We described the long-tubed form as the new subspecies *P. dipetalum* subsp. *stenosiphon*.

Conclusion: The new subspecies increases our understanding of the diversity in *P. dipetalum* and represents a new taxon of conservation concern.

Introduction

The genus *Pelargonium* L'Hér. ex Aiton (Geraniaceae) includes approximately 280 species distributed amongst 16 sections (Bakker *et al.* 2004). Section *Hoarea* (Sweet) DC., with ± 85 species occurring mainly in the winter rainfall region of South Africa (Marais 2014), is one of the largest sections in the genus. It comprises deciduous geophytes with carrot-shaped or turnip-shaped tubers covered with papery bark and a highly condensed stem with the leaves in a radical tuft and often dry at flowering (Marais 1994, 2014).

The section includes seven species with only the posterior two petals present, as opposed to the full complement of five petals commonly found in the genus (Manning & Goldblatt 2012; Marais 1994). *Pelargonium dipetalum* L'Hér. is the only member of this alliance occurring along the southern coast in Western Cape Province and extends from Betty's Bay to Knysna. The hypanthium in *P. dipetalum* typically varies between 7 mm and 18 mm in length, but the species also includes a few populations east of Swellendam with exceptionally long hypanthia, 35 mm – 50 mm long. These populations were not recognised as a separate taxonomic entity by Marais (1994), who made no correlation between their distribution and their distinctly longer hypanthium. This variant was, however, identified by Manning and Goldblatt (2005) as representing a distinct morph adapted to pollination by the long-proboscid fly *Prosoeca longipennis* Loew (Nemestrinidae).

A recent study of the *P. longipennis* pollination syndrome by Newman, Manning and Anderson (2014) defined the guild (Fenster *et al.* 2004) as including mainly autumn-flowering species with unscented, white to pink flowers with long floral tubes. A population of the long-tubed morph of *P. dipetalum* included in the study confirmed that it is adapted to pollination by *P. longipennis*, whereas the short-tubed morph of the species is visited by bees.

We document the distribution and variation in hypanthium length and petal colour in *P. dipetalum* and confirm that the long-tubed populations represent a variant that is morphologically and geographically discontinuous from the typical populations. We recognise these populations as the new subspecies *P. dipetalum* subsp. *stenosiphon*.

Research method and design

Fieldwork was conducted in the Langeberg area (Western Cape Province, South Africa) and herbarium specimens from the Bolus Herbarium (BOL), Compton Herbarium (NBG) (including the South African Museum [SAM]) and the Pretoria National Herbarium (PRE) were studied (abbreviations according to Holmgren, Holmgren & Barnett 1990).

Hypanthium length and petal colour were recorded for all specimens (Appendix 1). The shortest and longest values for hypanthium length were recorded for each herbarium collection, as well as the mean hypanthium length for all short-tubed and long-tubed collections, respectively.

The distribution map was compiled using the quarter degree reference system (Leistner & Morris 1976).

Results

Populations of *P. dipetalum* are separable into two groups based on hypanthium length and petal colour. The common form corresponding with the type of the species has short-tubed flowers, with the hypanthium 3 mm – 23 mm long

(9.7 mm \pm 3.1 mm s.d.; $n = 144$) (Appendix 1; Figure 1), mostly pink petals (rarely white in populations near Knysna and Bredasdorp) (Figure 2) and a widespread distribution along the coast from Betty's Bay to Knysna (Figure 3). Three populations from slightly further inland between Suurbraak and Albertinia have consistently white petals and a significantly longer hypanthium 34 mm – 54 mm long (41.1 mm \pm 9.0 mm s.d.; $n = 8$) (Figures 1–3; Appendix 1). There is no overlap in hypanthium length between the two variants.

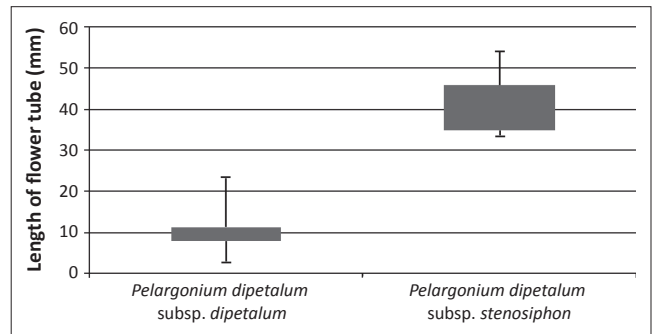
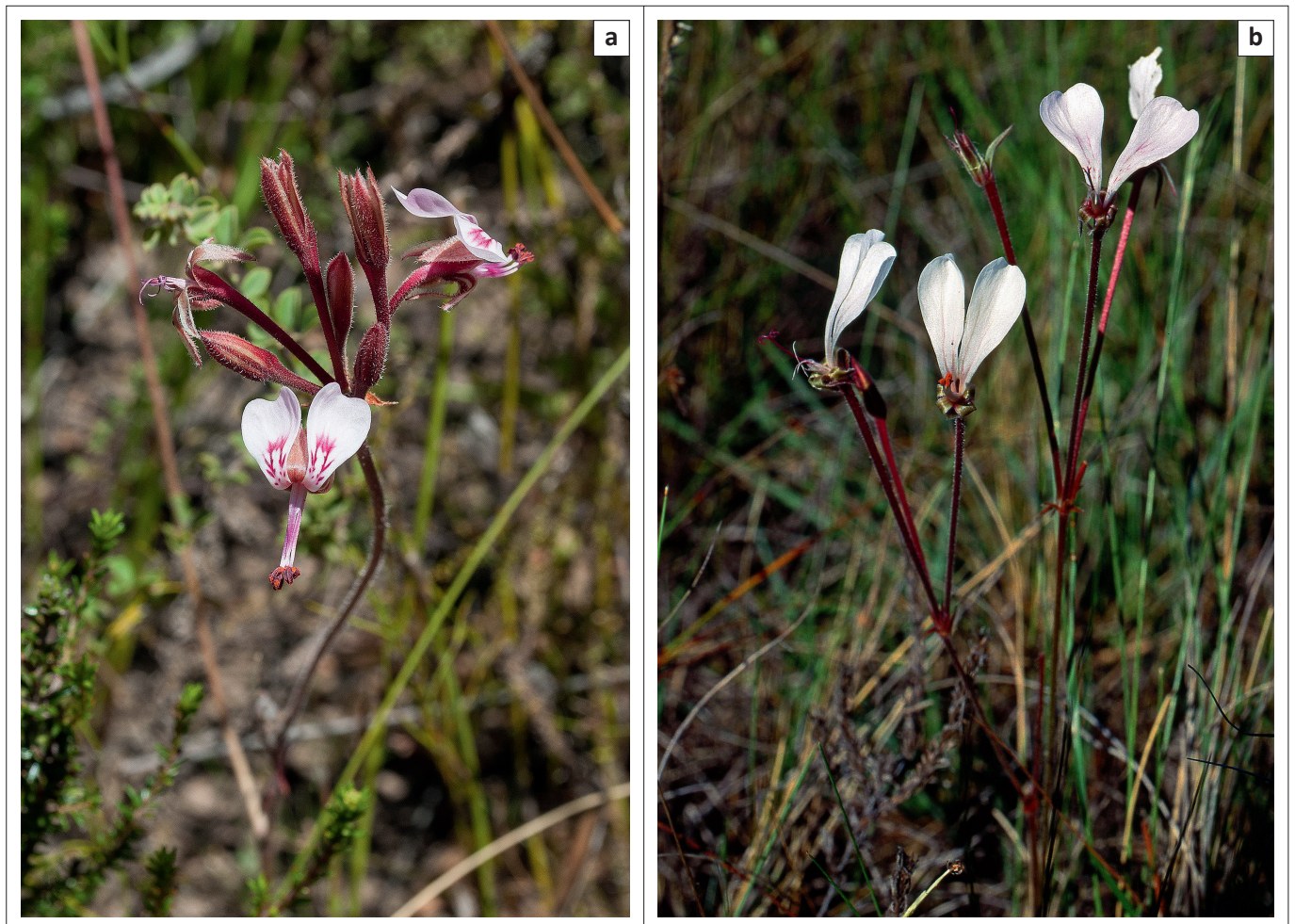
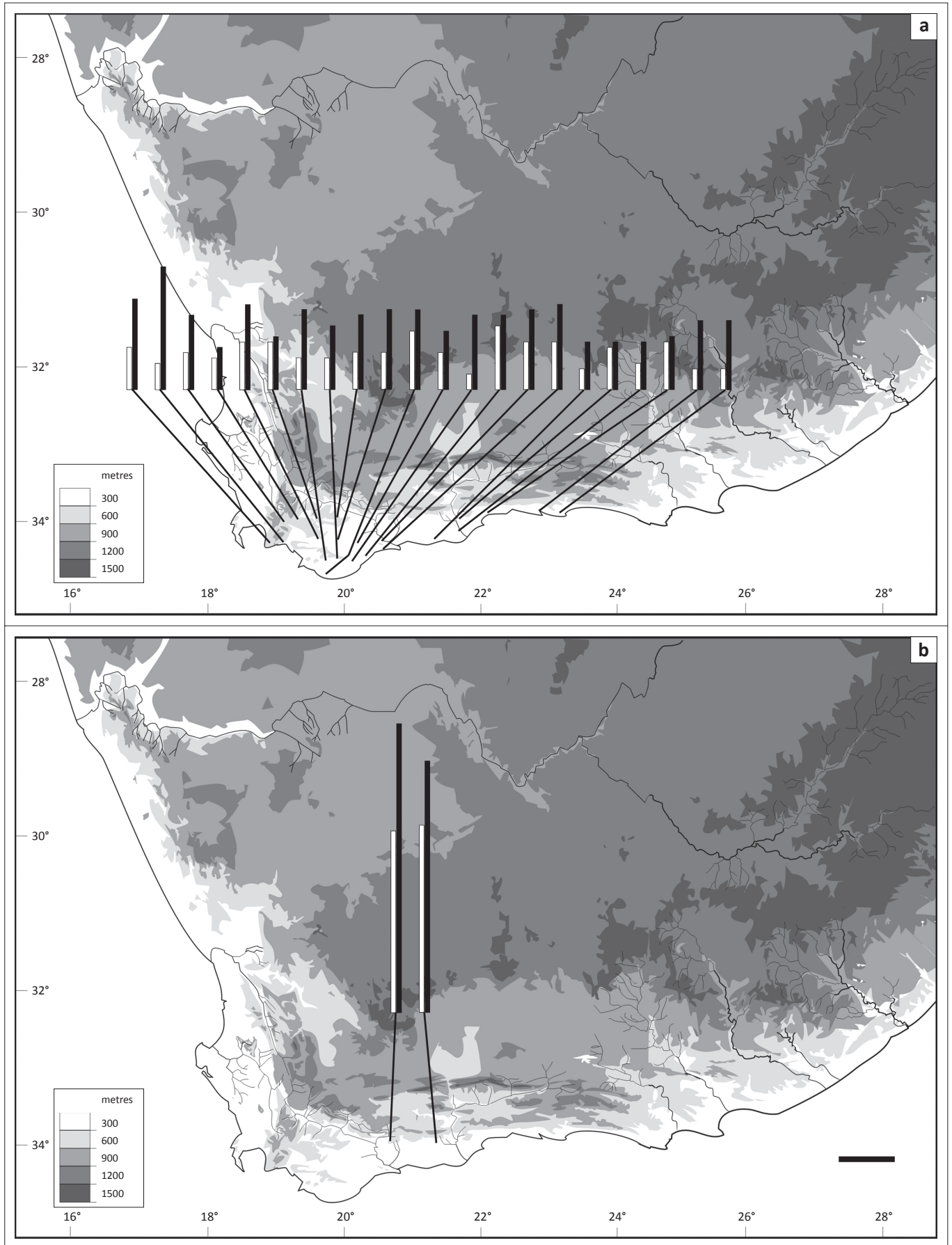


FIGURE 1: Hypanthium length in the two subspecies of *Pelargonium dipetalum*, showing the shortest and longest values plus the range in average shortest to average longest values per herbarium collection.



Source: (a) Photographed by A. Johns; (b) photographed by J. Manning

FIGURE 2: Photographs of *Pelargonium dipetalum* showing flowers of the two subspecies, (a) *Pelargonium dipetalum* subsp. *dipetalum* from Kogelberg with pink flowers and short hypanthium and (b) *Pelargonium dipetalum* subsp. *stenosiphon* from Albertinia with white flowers and long hypanthium.



Scale bar, 10 mm.

FIGURE 3: Geographical distribution of hypanthium length in *Pelargonium dipetalum*, showing the shortest (white bar) and longest (black bar) hypanthium length recorded for each quarter degree grid, with (a) depicting, *Pelargonium dipetalum* subsp. *dipetalum* and (b) depicting *Pelargonium dipetalum* subsp. *stenosiphon*.

The two variants are geographically separated and are morphologically distinct in hypanthium length and partially in petal colour, but we were unable to find any other differences between them. We accordingly treated the long-tubed populations as comprising a separate subspecies representing a distinct ecotype adapted to pollination by the long-proboscid fly *P. longipennis*.

Taxonomic treatment

Pelargonium dipetalum L'Hér., Geranologia, seu Erodii, Pelargonii, Monsoniae et Grieli historia iconibus illustrata: t. 43 (1792). *Geranium dipetalum* (L'Hér.) Poir.: 744 (1812). *Geranospermum dipetalum* (L'Hér.) Kuntze: 95 (1891). *Seymouria l'heritieri* Sweet: 77 (1824–1826), nom. illegit. superfl. pro *P. dipetalum* L'Hér. *Pelargonium l'heritieri* (Sweet) Don: 731 (1831). Type: Illustration in L'Héritier: t. 43 (1792) (icono!).

Hoarea erythrophylla Eckl. & Zeyh.: 60 (1835). *Pelargonium erythrophyllum* (Eckl. & Zeyh.) Steud.: 285 (1841). Type: South Africa, [Western Cape], 'Rivier Zonder Einde apud villam Knoblauch (Zwellendam)', Ecklon & Zeyher 457 [S, lecto., designated by Marais: 245 (1994)—JSTOR image!; S, isolecto.—JSTOR image!] (JSTOR 2011a, 2011b).

Pelargonium nivenii Harv.: 271 (1860). *Geranospermum nivenii* (Harv.) Kuntze: 95 (1891). Type: South Africa, [Western Cape], 'elevated places in Sweetmilk Valley [Soetmelksvallei]', *Niven s.n.* [S, holo.—JSTOR image!] (JSTOR 2012).

Description

Geophytic herb up to 350 mm; tuber round to elongate, sometimes with a moniliform root. *Stipules*: subulate and adnate to petioles for two thirds of their length, 12 mm – 37 mm × 1 mm – 2 mm, ciliate. *Leaves*: erect; petioles 30 mm – 200 mm long, rigid, hirsute with appressed or patent hairs; blades green or occasionally purple beneath, simple to irregularly pinnatisect to bipinnatisect, elliptic in outline, 20 mm – 120 mm × 13 mm – 30 mm, acuminate, bases cuneate, lamina hirsute above and appressed-hirsute beneath. *Inflorescence*: 30 mm – 200 mm long, scape with 2–3(5) pseudo-umbels, each with (3)4–8(12) flowers; peduncles 25 mm – 150 mm long, with glandular hairs interspersed with bristle-like hairs; bracts subulate, 3 mm – 7 mm × 1 mm – 2 mm, hirsute beneath with distally appressed hairs; pedicels c. 0.5 mm long. *Hypanthium*: 3 mm – 54 mm long, reddish-brown, densely covered with glandular hairs interspersed with bristle-like hairs. *Sepals*: 5, lanceolate, acute, 5.0 mm – 11.5 mm × 1.2 mm – 4.0 mm, reflexed, green to reddish-brown, indumentum as for peduncle. *Petals*: 2 in posterior position, pink to white, usually with darker-coloured nectar guides, obovate to spatulate, 12 mm – 19 mm × 3 mm – 7(–10) mm, emarginate, bases cuneate, recurved

during anthesis. *Stamens*: white to pale pink, papillate; fertile stamens 5, posterior filament shortest, 6.5 mm – 11.0 mm long, lateral and anterior filaments 7.5 mm – 12.0 mm long, free filaments wine-red; staminodes 2.0 mm – 5.5 mm long; anthers dark red, 1.5 mm – 2.5 mm long, pollen orange. *Gynoecium*: pink; ovary 3 mm – 6 mm long; style 1.5 mm – 6.0 mm long, lengthening during anthesis; stigma branches 1 mm – 3 mm long, wine-red. *Fruit*: bases of mericarps 5 mm – 8 mm long, eglandular, tails 20 mm – 31 mm long. Description based on Marais (1994, 2000).

Pelargonium dipetalum subsp. *dipetalum*

Diagnosis

Petals pale to dark pink, rarely white; hypanthium 3 mm – 17(–23) mm long (Figure 2a).

Distribution

Subsp. *dipetalum* occurs from Betty's Bay eastwards to Belvedere near Knysna (Figure 3a).

Additional specimens seen

WESTERN CAPE.—**3418** (Simonstown): Kogelberg Forest Reserve above road to Oudebosch farm, (-BD), 30 Mar. 1971, *Boucher 1487* (NBG); Kogelberg State Forest, halfway between first turn and first bridge, left of road to Oudebos, (-BD), 02 Mar. 1992, *Kruger 407* (NBG, PRE); Fairy Glen, firebreak, (-BD), 12 Mar. 1970, *Boucher 1186* (NBG); Hangklip, Betty's Bay, north-east corner of plot 3009 near boundary with school plot 2759, (-BD), 04 Mar. 1999, *Forrester 1310* (PRE); Betty's Bay, (-BD), 05 Feb. 1963, *Levyms 11417* (BOL); Betty's Bay, lower mountain slopes above Anna's Hof, (-BD), 21 Feb. 1989, *Rourke 1924* (NBG). **3419** (Caledon): Central koppie, Haasvlakte, Houhoek, (-AA), 29 Jan. 1988, *Boucher & Stindt 5373* (NBG); Houhoek, Houtech terrain, (-AA), 13 Apr. 1988, *Boucher & Stindt 5395* (NBG); Houhoek, Houtech terrain, (-AA), 16 Apr. 1988, *Boucher & Stindt 5396* (NBG); Elgin, Caledon, (-AA), 24 Apr. 1943, *Compton 14523* (NBG); Houhoek, at hotel, (-AA), 04 Apr. 1892, *Guthrie 2225* (NBG); near Palmiet River, Oudeburg, (-AA), 26 Apr. 1943, *Leighton 503* (PRE); Houhoek, (-AA), 12 Apr. 1896, *Schlechter 667* (PRE); Houhoek, (-AA), 12 Apr. 1896, *Schlechter 7561* (BOL); Elgin, at the Bridge, Caledon, (-AA), 06 Mar. 1926, *Smith 2539* (PRE); Caledon, hill north of Baths, (-AB), 31 Mar. 1922, *Marloth 11085* (NBG, PRE); Kleinmond, kloof north-west of Heuningklip, (-AC), 28 Apr. 1948, *De Vos 941* (NBG); Driebosch, Kleinmond, Caledon, (-AC), 01 Mar. 1943, *Marais s.n.* (NBG); Suikerboskop east of Bot River Lagoon, (-AC), 25 Apr. 1975, *Oliver 5798* (NBG, PRE); Kleinmond, (-AC), 22 Apr. 1922, *Stokoe 1327* (BOL); Groot Hagelkraal near Pearly Beach, (-AC), 16 Mar. 1983, *Van Wyk 1154* (NBG); Happy Valley, Riviersonderend Mountains, (-BA), 12 Apr. 1941, *Compton 10665* (NBG); flats at foot of

BOX 1: Key to subspecies of *Pelargonium dipetalum*.

- | | |
|---|---|
| 1A. Hypanthium 3 mm – 17(–23) mm long; petals pink, rarely white..... | <i>P. dipetalum</i> subsp. <i>dipetalum</i> |
| 1B. Hypanthium 35 mm – 54 mm long; petals white..... | <i>P. dipetalum</i> subsp. <i>stenosiphon</i> |

Riviersonderend Mountains near Neethlings Farm, (-BA), 29 Apr. 1950, *Wilman 978* (PRE); Riviersonderend Mountains, (-BB), Apr. to May 1950 [without day], *Lewis SAM63209* (PRE); Zonderend near Olifantsbos, (-BB), 01 Apr. 1922, *Marloth 11090* (PRE); Riviersonderend, (-BB), 30 Apr. 1950, *Middlemost 1509* (NBG); foothills of Riviersonderend Mountains, (-BB), Apr. to May 1950 [without day], *Stokoe 63208* (PRE); Sandies Glen near Sandfontein, north-east sandstone slope of Koueberg, (-BC), 18 Mar. 1977, *Hugo 908* (NBG, PRE); 4 km north-west of Napier, near Quarry Kop, (-BD), 31 May 1995, *Dreyer 525* (PRE); Skoenmakers River, ± 10 km west of Napier, (-BD), 18 Mar. 1977, *Thompson 3487* (NBG); Koks River, near entrance to farm, (-DA), 11 Mar. 1979, *Hugo 1606* (NBG); Groot Hagelkraal, Hagelkraal River area, north-east of farmstead, (-DA), 18 Apr. 1975, *Oliver 5895* (NBG); beacon 147, hills just north-west of Elim, (-DA), 29 Mar. 1971, *Oliver 3344* (NBG); Hagelkraal, poort near Hagelkraal River, (-DA), 10 Mar. 1979, *Thompson 3917* (NBG); on road from Elim to 'Die Dam', (-DA), 22 Mar. 1982, *Van Wyk 801* (NBG); flats north-west of Soetanyberg, Rietfontein Private Nature Reserve, (-DB), 25 Feb. 1994, *Beyers 224* (NBG); Bredasdorp, Rietfontein, (-DB), 13 Apr. 1978, *Esterhuysen 34910* (BOL); near Mierkraal, south-west of Bredasdorp, (-DB), 14 Mar. 1977, *Hugo 823* (NBG); 4 miles [6.44 km] west of Elim, Bredasdorp, (-DB), 18 Feb. 1951, *Maguire 845* (NBG); Vogel Valley, (-DB), 23 Apr. 1897, *Schlechter 1867* (PRE); Koks River, north-west of Buffeljagts Mountain, (-DC), 17 Mar. 1978, *Hugo 1197* (NBG). **3420** (Bredasdorp): De Hoop Nature Reserve, flats north of station, (-AD), 17 Mar. 1977, *Hugo 881* (NBG); De Hoop Farm, (-AD), 1971 [without day or month], *Van der Merwe 2015* (NBG); De Hoop, Potberg Nature Reserve, (-BC), 16 Feb. 1979, *Burgers 1810* (NBG); De Hoop, Hamerkop, (-BC), 29 Jan. 1985, *Fellingham 869* (NBG); Zoetendal's vlei, east of Soetanyberg, (-CA), 25 Mar. 1982, *Fellingham 398* (NBG), Uyshoek, 7 km due north of Arniston, (-CA), 15 Mar. 1977, *Hugo 840* (NBG, PRE); Eiland's Valley between Bredasdorp and Skipskop, (-CA), 16 Mar. 1978, *Hugo 1174* (NBG); hill near Bredasdorp, (-CA), [without date], *Leighton NBG 671/33* (BOL); De Hoop, Moerasfontein at second gate from main road, (-CA), 31 Jan. 1985, *Van Wyk 2171* (NBG); De Hoop, Buffelsfontein, along road to Ryspunt, (-CB), 18 Mar. 1985, *Van Wyk 2208* (PRE); Uitvlugt, south slopes of Bredasdorp, (-DA), 16 Mar. 1978, *Boucher 3775* (NBG). **3421** (Riversdale): Still Bay ridge north of rifle range, (-AD), 15 Feb. 1979, *Bohnen 5071* (NBG, PRE); Schoemanshoek in Albertinia, the Fisheries Road, (-BA), 14 Mar. 1978, *Boucher 3720* (NBG); Cauca se Laagte, south of Albertinia, (-BC), 20 Mar. 1975, *Oliver 5717* (NBG, PRE); Albertinia, Gouriqua/Ystervarkpunt, (-BC), 20 Jan. 1987, *Willemsse 65* (NBG). **3422** (Mossel Bay): Mossel Bay, near new town extension at Golden Rendezvous Hotel, (-AA), 29 Mar. 1987, *Vlok 1855* (NBG); Knysna, Belvidere, (-BB), Feb. 1921 [without day], *Duthrie 500* (BOL, PRE, SAM). **3423** (Knysna): Knysna, (-AA), 20 Feb. 1955, *Adamson D331* (PRE); Knysna, (-AA), Mar. 1921 [without day], *Breyer 25210* (PRE); Knysna, (-AA), Feb. 1921 [without day], *Breyer 23973* (PRE); Knysna Heads, (-AA), Feb. 1922 [without day], *Fourcade 2018* (BOL).

Without precise locality: Caledon division, *Purcell 45919* (SAM).

Pelargonium dipetalum* subsp. *stenosiphon
J.C.Manning & M.M.le Roux, subsp. nov.

Type: SOUTH AFRICA. Western Cape: (3421) Riversdale: 2 km west of Dekriet siding on main road, (-AB), 10 Apr. 1979, *Bohnen 5551* (NBG, holo.).

Diagnosis

Petals white; hypanthium 35 mm – 54 mm long (Figure 2b).

Distribution

Subsp. *stenosiphon* is localised along the southern foothills of the Langeberg west of Swellendam, between Suurbraak and Albertinia (Figure 3b).

Conservation

Unlike subsp. *dipetalum*, which is relatively widespread and partially protected in nature reserves, subsp. *stenosiphon* has a much more limited range. The taxon is recorded from an area 90 km × 20 km in extent, much of which is under pressure from agricultural activity. No known populations are formally protected and the conservation status of the subspecies needs to be assessed.

Additional specimens seen

WESTERN CAPE.—**3420** (Bredasdorp): Swellendam, Zuurbraak [Suurbraak], (-BA), 01 Mar. 1930, *Thode A2301* (NBG, PRE). **3421** (Riversdale): flats west of Dekriet siding west of Albertinia, (-AB), 19 Mar. 1975, *Oliver 5692* (NBG).

Discussion

The two subspecies of *P. dipetalum* are distinguished by hypanthium length and mostly also by petal colour (Figure 1 and Figure 2). The flowers in subsp. *dipetalum* are usually pale to dark pink, but two populations, one near Bredasdorp and the other at Belvedere near Knysna, have white flowers, and the hypanthium ranges from 3 mm to 23 mm long. The petals in subsp. *dipetalum* are always marked with dark nectar guides. In contrast, the petals in subsp. *stenosiphon* are consistently white with only faint nectar guides and the hypanthium is 35 mm – 54 mm long.

The floral differences between the two subspecies of *P. dipetalum* are associated with a shift in pollination system from bee-pollination in the typical ecotype to pollination by the long-proboscid fly *P. longipennis* in subsp. *stenosiphon*.

In an analogous situation, Becker and Albers (2010) recently described *P. alternans* subsp. *longicalcar* M.Becker & F.Albers (2010) for populations from the Outeniqua Mountains in the Little Karoo differing from the other two subspecies in having a longer hypanthium [(12–)18 mm – 36 mm long in *P. alternans* subsp. *longicalcar* versus 3 mm – 9 mm in subsp. *alternans* and subsp. *parviinflorescens* M.Becker & F.Albers (2010)]. The long-tubed subspecies in this species

is also thought to be pollinated by a long-proboscid fly and has undergone evolutionary changes similar to those documented for *P. dipetalum* subsp. *stenosiphon*.

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Amida Johns kindly provided the image of *P. dipetalum* subsp. *dipetalum*, taken in the Kogelberg Nature Reserve.

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

M.M.I.R. (South African National Biodiversity Institute) and J.C.M. (South African National Biodiversity Institute) collectively performed the research. J.C.M. conducted the fieldwork and provided input during the compilation of the manuscript; M.M.I.R. compiled the manuscript.

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Appendix 1

APPENDIX 1: Hypanthium length in *Pelargonium dipetalum* subsp. *dipetalum* and *stenosiphon*. Measurements are for the shortest and longest hypanthium represented on each herbarium collection studied.

Subspecies	Collector(s) and number	Herbarium	Hypanthium length (mm)	
			Shortest	Longest
<i>Pelargonium dipetalum</i> subsp. <i>dipetalum</i>	Boucher 1487	NBG	12	17
	Boucher 1186	NBG	11	11
	Forrester 1310	PRE	8	8
	Kruger 407	NBG	10	15
	Kruger 407	PRE	9	15
	Levyns 11417	BOL	13	14
	Rourke 1924	NBG	10	13
	Boucher and Stindt 5373	NBG	11	12
	Boucher and Stindt 5396	NBG	9	11
	Boucher and Stindt 5395	NBG	12	13
	Compton 14523	NBG	10	12
	Guthrie 2225	NBG	8	12
	Leighton 503	PRE	9	13
	Schlechter 667	PRE	10	14
	Schlechter 7561	BOL	7	9
	Smith 2539	PRE	8	9
	Marloth 11085	NBG	7	8
	Marloth 11085	PRE	6	7
	De Vos 941	NBG	10	23
	Marais s.n.	NBG	9	11
	Oliver 5798	NBG	6	8
	Oliver 5798	PRE	5	8
	Stokoe 1327	BOL	10	13
	Van Wyk 1154	NBG	8	13
	Compton 10665	NBG	9	10
	Wilman 978	PRE	9	10
	Lewis SAM 63209	PRE	7	10
	Marloth 11090	PRE	7	14
	Middlemost 1509	NBG	8	13
	Stokoe 63208	PRE	7	13
	Hugo 908	NBG	11	13
	Hugo 908	PRE	9	16
	Dreyer 525	PRE	7	9
	Thompson 3487	NBG	10	15
	Hugo 1606	NBG	10	15
	Oliver 5895	NBG	6	11
	Oliver 3344	NBG	8	11
	Thompson 3917	NBG	7	10
	Van Wyk 801	NBG	8	9
	Beyers 224	NBG	8	10
	Esterhuysen 34910	BOL	9	12
	Hugo 823	NBG	8	10
	Maguire 845	NBG	7	12
	Schlechter 1867	PRE	6	9
	Hugo 1197	NBG	11	15
	Hugo 881	NBG	7	9
	Van der Merwe 2015	NBG	9	11
	Burgers 1810	NBG	14	15
	Fellingham 869	NBG	9	10
	Fellingham 398	NBG	3	7
	Hugo 840	NBG	10	14
	Hugo 1174	NBG	4	5
	Hugo 840	PRE	7	9
	Leighton NBG 671/33	BOL	7	11
	Van Wyk 2171	NBG	8	9
	Van Wyk 2208	PRE	12	14
	Boucher 3775	NBG	9	16
Bohnen 5071	PRE	4	5	

Source: Herbaria names abbreviated according to Holmgren, P.K., Holmgren, N.H. & Barnett, L. (eds.), 1990, *Index herbariorum. Part 1: The herbaria of the world*, 8th edn., New York Botanical Garden, New York
 NBG, Compton Herbarium; PRE, the Pretoria National Herbarium; BOL, the Bolus Herbarium; SAM, the South African Museum.

Appendix 1 continues on the next page →

APPENDIX 1 (Continues...): Hypanthium length in *Pelargonium dipetalum* subsp. *dipetalum* and *stenosiphon*. Measurements are for the shortest and longest hypanthium represented on each herbarium collection studied.

Subspecies	Collector(s) and number	Herbarium	Hypanthium length (mm)	
			Shortest	Longest
	Bohnen 5071	NBG	8	9
	Boucher 3720	NBG	8	9
	Oliver 5717	NBG	8	9
	Oliver 5717	PRE	8	9
	Willemse 65	NBG	5	8
	Vlok 1855	NBG	9	10
	Duthrie 500	SAM	6	9
	Duthrie 500	PRE	4	13
	Duthrie 500	BOL	7	9
	Adamson D331	PRE	8	9
	Breyer 25210	PRE	10	13
	Breyer 23973	PRE	6	9
	Fourcade 2018	BOL	4	8
	Purcell 45919	SAM	4	8
<i>Pelargonium dipetalum</i> subsp. <i>stenosiphon</i>	Thode A2301	NBG	34	54
	Thode A2301	PRE	34	54
	Bohnen 5551	NBG	35	36
	Oliver 5692	NBG	35	47

Source: Herbaria names abbreviated according to Holmgren, P.K., Holmgren, N.H. & Barnett, L. (eds.), 1990, *Index herbariorum. Part 1: The herbaria of the world*, 8th edn., New York Botanical Garden, New York
 NBG, Compton Herbarium; PRE, the Pretoria National Herbarium; BOL, the Bolus Herbarium; SAM, the South African Museum.