Flowering Plants of Africa

Volume 67

June 2021

Celebrating 100 years: 1921–2021

Flowering Plants of Africa

Since its inception in 1921, this serial, modelled on the former *Curtis's Botanical Magazine*, has published well over 2 000 colour plates of African plants prepared by some 80 artists.

The object of the journal is to convey to the reader the beauty and variety of form of the African flora, to stimulate an interest in the study, conservation and cultivation of African plants, and to advance the science of botany, as well as botanical art.

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Volume 1 (1921) to Volume 24 (1944):
The Flowering Plants of South Africa

Volume 25 (1945–1946) to Volume 26 (1947):
The Flowering Plants of Africa

Volume 27 (1948–1949) to Volume 52 (1992–1993):
The Flowering Plants of Africa
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Volume 53 (1994) to Volume 67 (2021):
Flowering Plants of Africa

Cover illustration: *Adenia repanda* (Plate 2373)

Flowering Plants of Africa

A peer-reviewed journal containing colour plates with descriptions of flowering plants of Africa and neighbouring islands

Edited by

Alicia Grobler

with assistance of

Gillian Condy

Volume 67

SANBI
Biodiversity for Life
South African National Biodiversity Institute

Pretoria
2021

All maps produced: H.M. Steyn, South African National Biodiversity Institute, Pretoria, RSA
Design and layout: E. Fouché, South African National Biodiversity Institute, Pretoria, RSA
Printed by: Harry's Printers Tshwane, 69 Pretorius Street, Pretoria, 0002 South Africa; tel. no. +27 12 326 4514

Date of publication of volume 66

Plates 2341–2360 . . . . . 1 June 2019

Next volume
Volume 68 is likely to appear in 2023.—The Editor
ISSN 0015-4504

ISBN 978-1-928224-48-8

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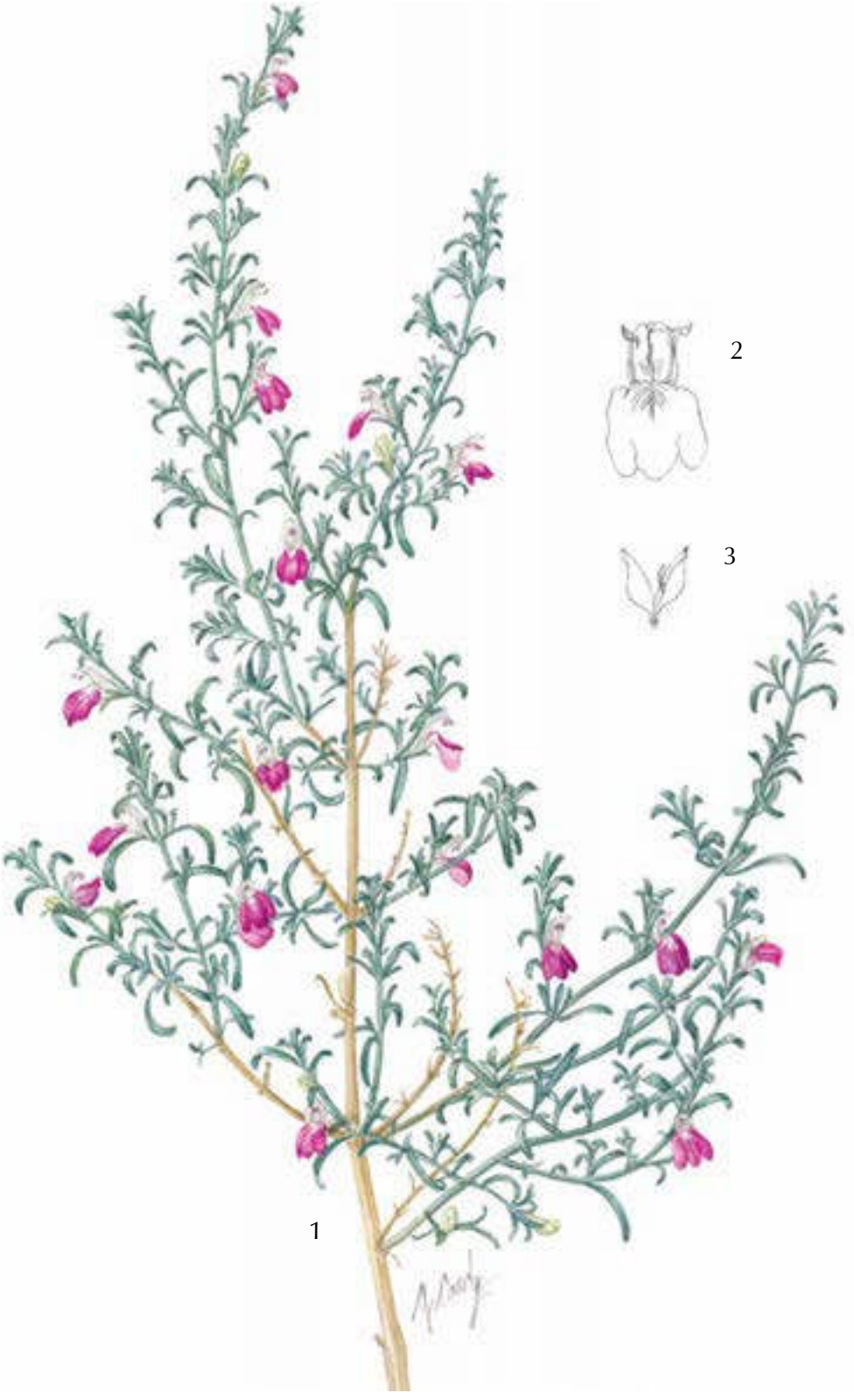


PLATE 2378 *Justicia divaricata*

Justicia divaricata Acanthaceae

Angola, Botswana, Mozambique, Namibia, South Africa, Eswatini, Zambia, Zimbabwe

Justicia divaricata *Licht. ex Roem. & Schult.* in Systema vegetabilium 1: 163 (1817); Dietrich: 211 (1818); Anderson: 42 (1864) [as '(Nees) T. Anderson']; Vollesen: 216 (2015) [as '(Nees) T. Anderson']; Van Rooyen & Van Rooyen: 92 (2019). *Gendarussa incana* Nees var. *villosa* Nees: 367 (1841). *Adhatoda divaricata* Nees: 391 (1847). *Adhatoda capensis* (Thunb.) Nees var. *arenosa* Nees: 391 (1847); *Justicia mossamedea* S.Moore: 312 (1880). *Justicia nepeta* S.Moore: 312 (1880). *Justicia namaensis* Schinz: 202 (1890); *Justicia divaricata* (Nees) T.Anderson: 42 (1864) 'nom. superfl.'. *Monechma floridum* C.B.Clarke: 219 (1900). *Monechma nepeta* (S.Moore) C.B.Clarke: 219 (1900). *Monechma spissum* C.B.Clarke: 219 (1900). *Monechma fimbriatum* C.B.Clarke: 72 (1901). *Monechma divaricatum* (Licht. ex Roem. & Schult.) C.B.Clarke: 72 (1901) [as '(Nees) C.B.Clarke']; *Monechma nepetoides* C.B.Clarke: 73 (1901). *Monechma namaense* (Schinz) C.B.Clarke: 73 (1901). *Monechma angustissimum* S.Moore: 137 (1903). *Monechma eremum* S.Moore: 231 (1907). *Monechma terminale* S.Moore: 75 (1908).

TYPE.— [South Africa, Northern Cape], Grootrivierspoort prope fluvium tkaigarieb s. Oranjerivier ad montes, [1805], *Lichtenstein s.n.* (No. 355 in Herb. WILLD) (holotype B-W 00355 -01 0, scan!).

The Acanthaceae are an angiosperm family of about 220 genera and over 4 500 species in the order Lamiales (APG IV) (Heywood et al. 2007; Mabberley 2008; Vollesen 2008, 2013). Members of the family are mostly represented by annual and perennial herbs, shrubs and climbers, with relatively few trees (Darbyshire & Luke 2016). The family is mainly distributed in tropical and subtropical regions of the world and is seldom found in temperate areas (Heywood et al. 2007; Vollesen 2008, 2013). The highest diversity within southern Africa is found in the northeastern parts of the region with relatively high summer rainfall (Koekemoer et al. 2013; SANBI 2020). Acanthaceae are one of the 20 largest plant families in southern Africa, represented by ca. 40 genera and 379 species (SANBI 2020). Subfamilial relationships within the Acanthaceae have been problematic since Lindau's (1895) classification. According to Stevens (2001 onwards) the family is divided into four subfamilies with subfamily Acanthoideae divided into six tribes. The tribe Justicieae (subfamily Acanthoideae) is the most taxonomically difficult group in the family (Kiel et al. 2017) with tricolporate hexapseudocolpate pollen a synapomorphy for the group.

According to Van Wyk & Gericke (2000) and Awan et al. (2014), many members of Acanthaceae contain compounds with anti-fungal, cytotoxic, anti-inflammatory, insecticidal or anti-viral activity. In southern and eastern Africa, the family has a variety of medicinal uses including treatment for coughs, diarrhoea, fevers, toothache, infertility, muscular pains, and antidotes for snakebite (Watt & Breyer-Brandwijk 1962; Van Wyk & Gericke 2000). The Acanthaceae are an ecologically important plant family in sub-Saharan Africa (Kroon 1999; Vollesen 2000; Wahlberg 2001; Darbyshire et al. 2020) as it provides important

PLATE 2378.—1, flowering stem, × 0.75; 2, corolla, × 2; 3, capsule, × 2. Voucher specimen: *Condy 346* in National Herbarium, Pretoria. Artist: Gillian Condy.

ecosystem services and are of economic importance as fodder for livestock and wildlife (Vollesen 2000; Mannheimer et al. 2008; Tripp et al. 2017; Darbyshire et al. 2019b).

The genus *Justicia* (tribe Justicieae) was named after James Justice (1698–1763), a Scottish horticulturist (Munday 1995). The circumscription of the genus has historically followed one of two divergent trends – the adoption of a broad view of the genus, or the recognition of smaller, relatively homogenous segregate genera (Manning & Goldblatt 2014; Kiel et al. 2017). Graham (1988) retained *Monechma* Hochst. as distinct from *Justicia* based on its two-seeded capsules containing smooth, compressed seeds; whereas, *Justicia* was characterised by having mainly four-seeded capsules containing weakly compressed, mostly rugose (rarely smooth) seeds (Clarke 1901; Balkwill & Immelman 1995; Manning & Goldblatt 2014). The currently accepted circumscription of *Justicia* (Stevens 2001; Vollesen 2010, 2015; Manning & Goldblatt 2014; Kew 2020) includes well-established genera like *Adhatoda* Miller, *Aulojusticia* Lindau, *Duvernoia* E.Mey. ex Nees, *Monechma* and *Siphonoglossa* Oersted. Recent molecular phylogenetic studies on *Justicia* and related genera, however, have demonstrated that *Justicia* s.l. is paraphyletic with several major, morphological distinct lineages embedded within it (Kiel et al. 2017). Instead of treating the entire Justicioid lineage (Kiel et al. 2017) as a single genus as currently the case, an alternative would be to subdivide *Justicia* s.l. into a number of segregate genera (Darbyshire et al. 2019a, 2020). Therefore, several *Justicia* species, including *J. divaricata,* may undergo a name change in future.

Justicia s.l. is the largest genus in the family Acanthaceae and is estimated at about 600–700 species worldwide (Graham 1988; Vollesen 2010, 2015; Manning & Goldblatt 2014) with ca. 53 species indigenous to southern Africa (SANBI 2020). The southern African members of the genus are placed in eight sections mainly based on the structure of the inflorescences, the number of seeds per locule and pollen characteristics (Manning & Goldblatt 2014). Many species of *Justicia* are described as being heavily browsed and the roots of *J. odora* are used by the Zulus to make scented beads (Munday 1995). *Justicia capensis* is traditionally used to attract customers or improve chances of employment (Viljoen 2008), while several species are cultivated as garden ornamentals.

Justicia divaricata, currently included in section *Monechma*, formerly included in the genus *Monechma*, is a monophyletic species, albeit with significant phylogenetic diversity, confirmed by its long list of synonyms. It occurs widely in southern Africa and is commonly known as wild lucerne; *wilde lusern* or *maklikbreek* (Afrikaans) and is favoured by game and livestock (Munday 1980). *Justicia divaricata* is easy to distinguish from the rest of *Justicia* sect. *Monechma* and from most other members of *Justicia* s.l. through the absence of a fifth calyx lobe, and each lobe with a distinctive green midstripe with pale margins. *Justicia divaricata* differs from *J. minima* (section *Tyloglossa*), the only other member of the genus with a four-lobed calyx occurring in southern Africa, in having a two-seeded capsule (vs. four-seeded capsule) with seeds glabrous, ± flat on one surface and curved and somewhat ridged centrally on the other side (Darbyshire et al. 2020) (vs. seeds tuberculate, ovate to elliptic).

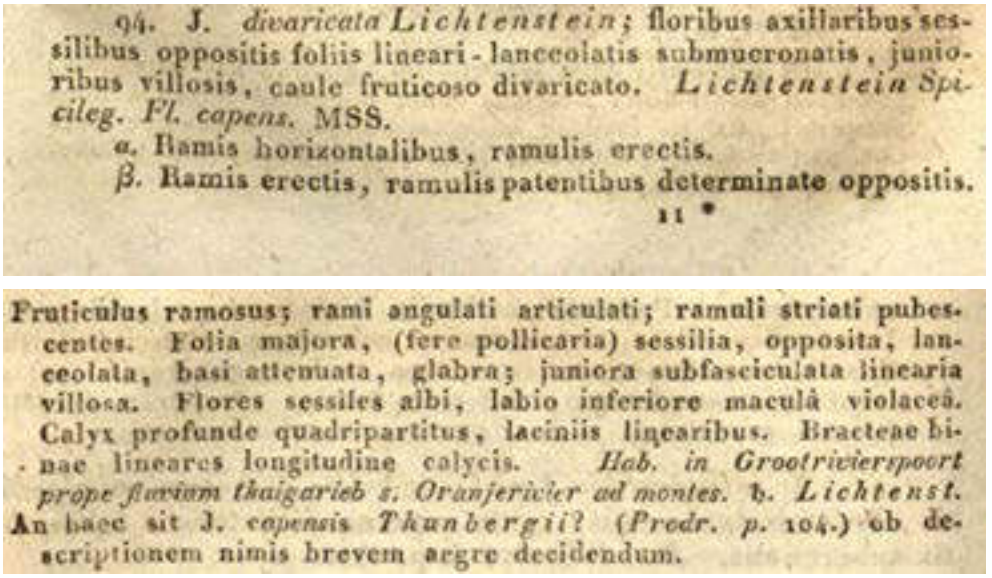
The oldest known specimen of *Justicia divaricata* is the one housed in the herbarium of the Botanic Garden and Botanical Museum Berlin-Dahlem (B) (Vollesen 2015) (Figure 1). This specimen was almost certainly collected by Martin Hinrich Carl Lichtenstein

FIGURE 1.—Scanned image of holotype of *Justicia divaricata* Licht. ex Roem. & Schult. (*Lichtenstein s.n.*, B -W 00355 -01 0). Curators Herbarium B (2000+). Digital specimen images at the Herbarium Berolinense. [Dataset]. Version: 06 Apr 2020. Data Publisher: Botanic Garden and Botanical Museum Berlin. http://ww2.bgbm.org/herbarium/ [https://herbarium.bgbm.org/object/BW00355010, image ID: 237139].

FIGURE 2.—Willdenow's handwritten description of *Justicia divaricata* as seen in Herbarium Berolinense (B).

(1780–1857) in 1805 and not by Count von Hoffmannsegg as indicated in Vollesen (2015). Lichtenstein arrived in Cape Town on 23 December 1802 as a German tutor to the son of the newly appointed Dutch Governor, General Jan Willem Janssens and took part in five expeditions into the interior of South Africa between 1803 and 1806 (Näf-Gloor 2019). On his return to Germany, Lichtenstein handed his herbarium to Count von Hoffmannsegg (a renowned botanist and entomologist) to be later incorporated into the Willdenow Herbarium (Näf-Gloor 2019). The annotation 'Hoffmannsegg' in the bottom right corner of the specimen indicates that the specimen was received from Hoffmannsegg and 'W' is the mark of the Willdenow Herbarium (Hiepko 1972). Both these annotations are in Schlechtendal's handwriting as well as the name 'Lichtenstein' in brackets (Figure 1). According to Hiepko (1972: III), 'very often Schlechtendal noted the name of the writer of the labels between parentheses. When they were available, the descriptions by Willdenow were put on the outside of the folder along with the serial numbers. To facilitate the filming of the herbarium, the sheets were placed on the folders so that the handwritten Willdenow descriptions appear at the bottom right' (Hiepko 1972: III, IV) (see Figure 2).

Until recently, *Adhatoda divaricata* Nees has been erroneously accepted as the basionym for *Justicia divaricata*. In De Candolle's Prodromus, Nees (1847) overlooked the



94. J. *divaricata Lichtenstein*; floribus axillaribus sessilibus oppositis foliis lineari-lanceolatis submucronatis, junioribus villosis, caule fruticoso divaricato. *Lichtenstein Spicileg. Fl. capens.* MSS.

α. Ramis horizontalibus, ramulis erectis.

β. Ramis erectis, ramulis patentibus determinate oppositis.

11 *

Fruticulus ramosus; rami angulati articulati; ramuli striati pubescentes. Folia majora, (fere pollicaria) sessilia, opposita, lanceolata, basi attenuata, glabra; juniora subfasciculata linearia villosa. Flores sessiles albi, labio inferiore maculâ violaceâ. Calyx profunde quadripartitus, laciniis linearibus. Bracteae binae lineares longitudine calycis. *Hab. in Grootrivierspoort prope fluvium thaigarieb s. Oranjerivier ad montes.* ♄. *Lichtenst.* An haec sit J. *capensis Thunbergii?* (*Prodr. p.* 104.) ob descriptionem nimis brevem aegre decidendum.

FIGURE 3.—Protologue of *Justicia divaricata* (Roemer & Schultes (1817: 163–164)).

publication of Roemer & Schultes (1817) and described *A. divaricata* with two syntypes: the above-mentioned specimen from Willdenow's herbarium and a specimen collected at Winterhoeksberg by Ecklon & Zeyher, housed in the University of Graz, Institute of Plant Sciences Herbarium (GZU). The latter specimen is the holotype of *Gendarussa incana* Nees var. *villosa* Nees (Nees 1841). Roemer and Schultes had access to Lichtenstein's *Spicilegium Florae Capensis* (never published) as they thanked him for the use of the information in his unpublished manuscript (Roemer & Schultes 1817: xviii) and they used 'Lichtenstein' as author citation in their protologue of *J. divaricata* (Figure 3) and referred to his unpublished manuscript. The correct author citation of *J. divaricata* is, therefore, Licht. ex Roem. & Schult.

Justicia divaricata is widely distributed in southern Africa (Figure 4) at altitudes of 100–1 200 m and extends northwards into Angola, Mozambique, Zimbabwe and Zambia. According to the original description of the species, the Lichtenstein specimen was collected in 'Grootrivierspoort prope fluvium tkaigarieb s. Oranjerivier ad montes' (Roemer & Schultes 1817: 164), which is in the vicinity of the current Prieskapoort, ca. 12 km southwest of Prieska in the Northern Cape, South Africa. The oldest specimen of *J. divaricata* in a SANBI herbarium was collected by H.W.R Marloth in 1886 at Kuil (in the Barkly West District, Northern Cape). *Justicia divaricata* is mainly found on plains, hillslopes, in dry watercourses and along edges of pans, with large populations often found under trees and bushes. The species prefers sandy areas, particularly red sand overlying limestone (Munday 1995) (Figure 5a). Munday (1980, 1995) reported that *J. divaricata* acts as a calcrete indicator in southeastern Botswana. *Justicia divaricata* has two flowering periods within a year; a profusion of flowers in autumn and a lesser flush in spring (Munday 1980).

The specific epithet *divaricata* (Latin, meaning 'spreading at a wide angle') refers to the general habit of the species (Figure 5b). The species is not threatened and is categorised as Least Concern (Raimondo et al. 2009) based on the IUCN Red List Category and Criteria (IUCN 2012). It can occasionally become weedy in disturbed areas (Munday 1995; Vollesen 2015).

Description (based on Munday (1995) and Vollesen (2015)).—Much-branched annual, or short-lived perennial shrublet; erect, straggling or semiprostrate, up to 1 m high; stems subglabrous to densely puberulous when young or sericeous, often also with longer pilose hairs and/or stalked capitate glands. *Bark* (if present) cracked, fissured and flaky. *Leaves* subglabrous to variously hairy; petiole not clearly defined; lamina linear to lanceolate or oblanceolate to narrowly obovate, often folded with recurved tips; size very variable, 10–20 (–50) × 1–8(–10) mm; apex subacute to rounded, occasionally emarginate, base attenuate, decurrent to stem; midrib usually

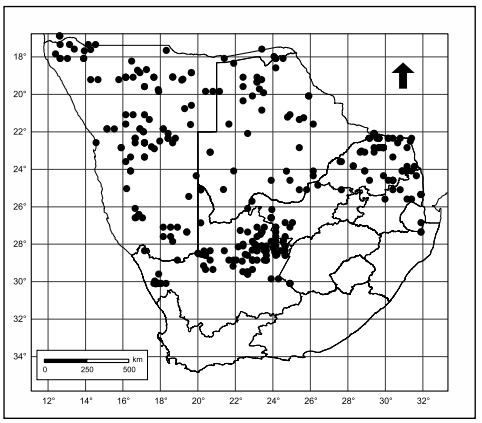


FIGURE 4.—Known distribution of *Justicia divaricata* in southern Africa.

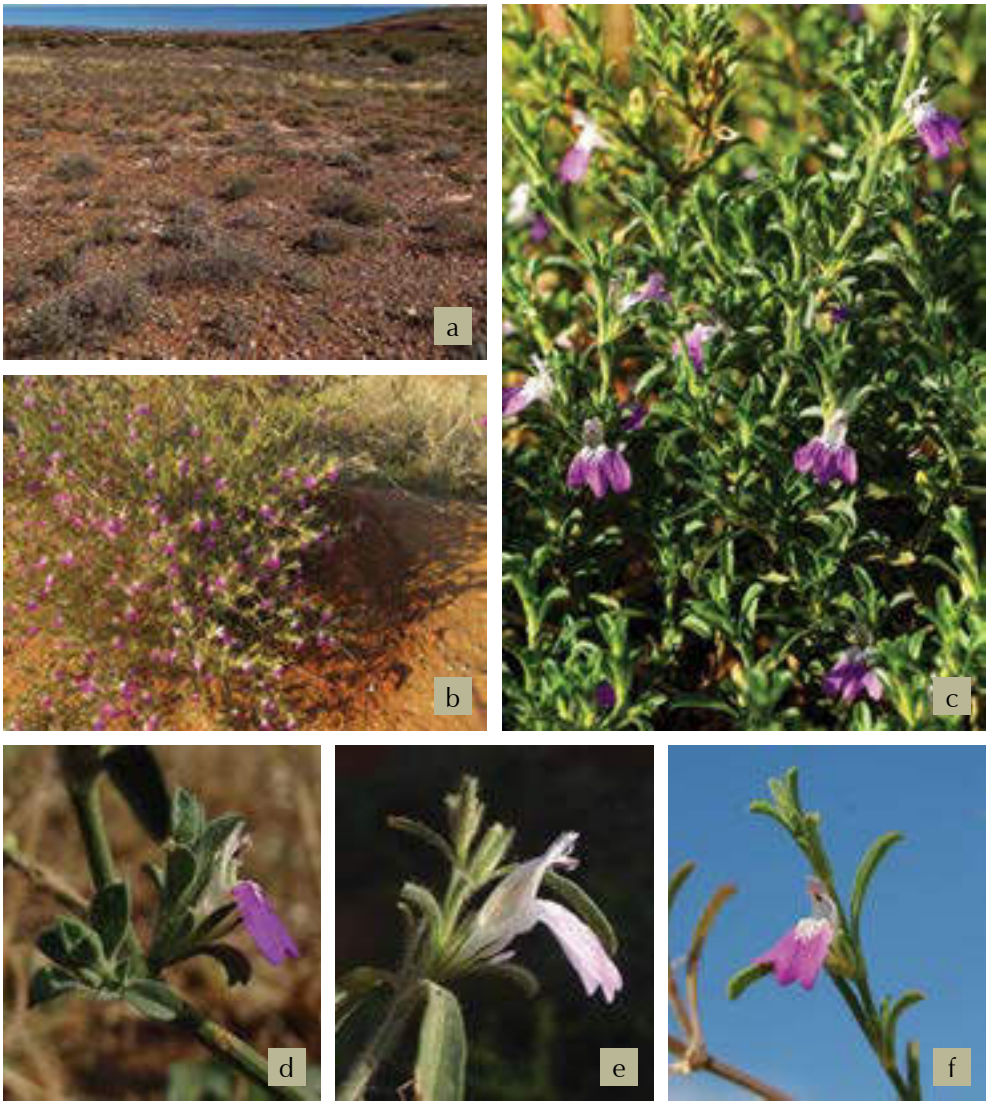


FIGURE 5.—*Justicia divaricata*: a, habitat; b, c, habit; d, e, close-up of flowers showing two-lipped corolla and glandular hairs on bracteoles and calyx; e, f, two-lipped corolla showing rugula. Photographs: a, c, P.C. Zietsman; b, G. Condy; d, M. Koekemoer; e, A. Hankey; f, J. Vahrmeyer.

prominent. *Flowers* subsessile, solitary in axils of foliaceous bracts, sometimes congested towards stem tips; bracteoles linear, green with conspicuous hyaline edges, similar to calyx lobes or slightly longer, oblong to slightly obovate, 5–10(–13) mm long, sparsely to densely puberulous, with or without long pilose hairs and stalked capitate glands. *Calyx* 4-lobed without trace of 5th lobe, green midstripe with conspicuous hyaline edges, 4–6 mm long in flower, lengthening in fruit. *Corolla* often bicoloured, pale mauve to purple (rarely white), with darker lines on lower lip, (7–)10–13 mm long, puberulous; tube 4–7 mm long; upper lip 3–6 mm long, flat; lower lip 5–8 mm long, broadly obovate, lobes rounded. *Filaments*

2–3 mm long; anthers hairy, lower thecae with acute appendage 0.5 mm long. *Capsule* 6–9(–11) mm long, sparsely puberulous or sericeous-puberulous in upper half or near apex only. *Seeds* brown often with intricate patterns (mottled grey and black), glabrous, 2–3 mm in diameter. *Flowering time*: mainly autumn and spring (southern hemisphere). Plate 2378.

ACKNOWLEDGEMENTS

Sincere thanks to Dr Hugh Glen for help with Latin translations; Prof. A.E. van Wyk who greatly improved the manuscript and for his insights regarding Lichtenstein's collections; Elizma Fouché for preparing the photo plates, and the Northern Cape Department of Environment and Nature Conservation for providing plant collecting permits.

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