Phytotaxa 405 (4): 203–209
https://www.mapress.com/j/pt/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.405.4.4

Ocimum sebrabergensis (Lamiaceae), a new species from Namibia

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Abstract

Ocimum sebrabergensis, here described as new species, has a restricted range and is only known from the Zebra Mountains within the Kaokoveld Centre of Endemism, northwestern Namibia. These shrubs grow on clayey soil among greyish black rocks of anorthosite. Diagnostic characters for *O. sebrabergensis* include the mauve-coloured corolla with four orbicular lobes on the posterior lip and the calyx which has the lateral lobes of the anterior lip asymmetric lanceolate. *Ocimum sebrabergensis* is placed in *Ocimum* subg. *Ocimum* sect. *Hiantia* subsect. *Hiantia* ser. *Serpyllifolium*. A comparison of some of the more prominent morphological features to differentiate between *O. sebrabergensis* and its possible nearest relatives, *O. burchellianum* and *O. fimbriatum*, are provided. Based on IUCN Red List categories and criteria, a conservation assessment of Vulnerable (VU D1) is recommended for the new species.

Keywords: Kunene Region

Introduction

At present ten described species of *Ocimum* Linnaeus (1753: 597) are recognized in the *Flora of southern Africa region* (South Africa, Namibia, Botswana, Eswatini and Lesotho), three of which occur in Namibia (Germishuizen & Meyer 2003, Klaassen & Kwembeya 2013). *Ocimum*, a genus with more than 65 species (which includes annuals and perennials), is an Old and New World genus of economic importance and the generic name according to Jackson (1990) derives from the ancient Greek plant name *okimum*, related to *ozein* = to smell, referring to sweet basil *Ocimum basilicum* Linnaeus (1753: 597), the most well-known member recognized in the genus. *Ocimum* is at once recognized by the basal attachment of two upper filaments near the base of the corolla tube and which is kneed, crested or articulated shortly above the point of attachment (Paton *et al*. 1999, 2013).

In this contribution, a new species of *Ocimum* endemic to the Kaokoveld Centre of Endemism, a biogeographical region rich in range-restricted plants and animals in northwestern Namibia and adjacent southwestern Angola (Van Wyk & Smith 2001) is described. During a botanical expedition to the remote Zebra Mountains in May 2012, the authors encountered an unfamiliar, sterile woody shrub thought to be a member of the Lamiaceae with narrowly ovate to ovate and subcordate aromatic leaves. During a subsequent visit by one of the authors (WS) in November 2014, the plants were in flower and fruit, enabling material to be collected and the plants to be identified as an undescribed species of *Ocimum* subg. *Ocimum* sect. *Hiantia* (Bentham 1848: 35) Paton (1999: 15) subsect. *Hiantia* ser. *Serpyllifolium* (Sebald 1987: 10) Paton (1999: 15). The new species seems to be closely related to *O. burchellianum* Bentham (1832: 8) and *O. fimbriatum* Briquet (1894: 161) from South and southern tropical Africa respectively, due to similarities in calyx morphology (lateral lobes of anterior lip separated from median lobes by a distinct sinus). A study of the *Ocimum* holdings in South African herbaria and WIND revealed no earlier collections of the new species.

Accepted by Jesús González-Gallegos: 29 May 2019; published: 6 Jun. 2019

Taxonomic treatment

Ocimum sebrabergensis Swanepoel & van Jaarsv., *sp. nov.* (Figs. 1–4)

A woody shrub 1–2 m tall, related to *Ocimum burchellianum* and *O. fimbriatum*, differing from *O. burchellianum* by being several-stemmed from base (*vs*. soft shrub, single-stemmed from base), leaves petiolate, lamina subcordate or ovate to narrowly ovate (*vs.* subsessile, lamina subspatulate to oblanceolate); from *O. fimbriatum* by the shrubby habit (*vs*. annual stems arising from a thick woody rootstock).

Type:—NAMIBIA. Kunene Region: Zebra Mountains, hill south of Okau, between boulders, 1713BC, 980 m, 12 November 2014, *Swanepoel 339* (holotype WIND!; isotypes PRE!, PRU!).

FIGURE 1. *Ocimum sebrabergensis.* Plant in natural habitat among greyish black boulders of anorthosite, growing as a shrub about 1.8 m tall. Photograph: W. Swanepoel.

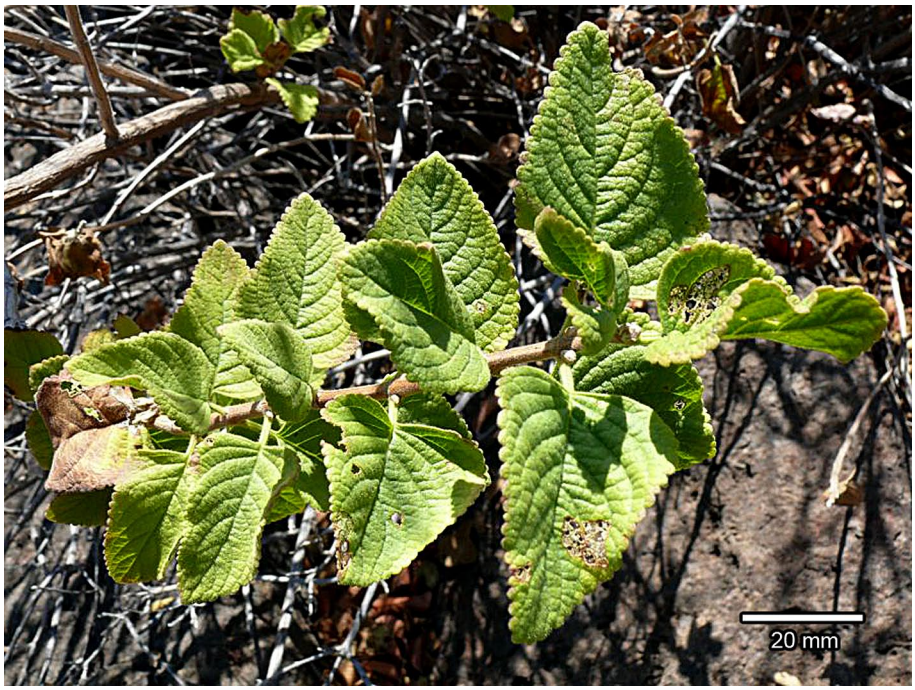

FIGURE 2. *Ocimum sebrabergensis.* Leaves, photographed from lower north-facing slope of Ombuku peak, along stream. Photograph: E.J. van Jaarsveld.

FIGURE 3. *Ocimum sebrabergensis.* Inflorescences. Photograph: W. Swanepoel.

Perennial woody shrub, several-stemmed from base, 1–2 m tall and of nearly equal diam., branching sparingly above; stems slender, erect or arcuate, round-quadrangular, but quadrangular towards apex, older parts glabrous, but densely hairy with simple 5–7-celled eglandular and copious sessile glandular trichomes towards apex; bark on older stems longitudinally fissured, peeling in thread-like strips especially on angles, brown, younger stems beige, darker on angles. Leaves simple, petiolate, opposite, decussate, indumentum similar to stems, aromatic, deciduous; leaf scars conspicuous, prominent, concave, crescentic, semi-circular or reniform; lamina subcordate or narrowly ovate to ovate, often bullate, green, paler abaxially, often thick-textured, 10–48 × 8–30 mm, apex acute, emarginated or obtuse, base rounded, truncate or subcordate, inclined or not, indumentum especially dense on veining abaxially, margin serrate, dentate, crenate or crenate-serrate, venation anastomosing and reticulate, prominent abaxially; petiole channeled adaxially, 4–10 mm long. Inflorescences lax, terminal or axillary thyrses 35–110 mm long, composed of 2–11 verticils of two opposite 3-flowered cymes, flowers in a cyme opening successively, lower 2 or 3 verticils 10–25 mm apart, upper ones 7–15 mm apart, peduncle 6–15 mm long, axis magenta, flowers pedicellate, indumentum on axis, bracts and pedicels similar to that on leaves and stem; bracts caducous, leaving conspicuous shallow, oblong-elliptic scar, bracts subtending lower verticils vertical, leaf-like, green or green to mauve, lanceolate, narrowly elliptic or ovate 6–23

× 2–15 mm, bracts subtending remaining verticils petal-like, mauve, sometimes green towards apex, ovate, obovate, elliptic or suborbicular, 3–7 × 2–5 mm, distal 4 often forming an apical coma; pedicels spreading or spreading-porrect, 2.5–6 mm long. Flowering calyx infundibular, ± straight, ± horizontal, 4.5–6.2 mm long including teeth, indumentum of scattered 5–7-celled eglandular trichomes on outside and on interior towards apex of posterior lip, copious sessile and stalked trichomes on both sides; decurrent posterior lip narrowly obovate, apiculate or not, green or green-magenta, 4.4–6 × 2.1–3.7 mm including teeth, wings inconspicuous; anterior lip slightly longer, green, slightly constricted over median lobes in lateral view, teeth lanceolate, lateral lobes asymmetric, with deep sinus between the lateral and median lobes. Fruiting calyx: horizontal or pointing downwards, enlarged, 6.9–11.2 mm long including lanceolate-acicular median lobes, tube slightly constricted above mericarps, throat open, not constricted, lacking hairy annulus; lobe of posterior lip patent-reflexed. Corolla ± 12 mm long, mauve adaxially, mauve to whitish-mauve abaxially, nectar guides on posterior lip darker, in bud abaxially sparsely hairy with 3–7-celled eglandular and stalked glandular trichomes, glabrous at anthesis except basally, tube straight, dorsally gibbous at ± midpoint, dilating towards mouth; lip margins entire to irregularly denticulate or crenulate, entire to the naked eye, posterior lip ± 8 × 8 mm, lateral edges slightly recurved, equally 4-lobed, lobes orbicular, entire, lateral lobes subequal to median lobes; anterior lip ± 6 mm long, horizontal, deeply concave. Stamens free, unequal, exserted 2–6 mm, all fertile: filaments, posterior pair attached near base of corolla tube, basally bent with conspicuous appendage, pubescent at base, whitish mauve, 15–17 mm long, anterior pair attached near corolla mouth, 12–14 mm long; anthers 1–1.3 mm long. Disk equally 4-lobed. Ovary divided into 4 lobes, glabrous; style 14–17 mm long, apex bifid, lobes equal, subulate, 0.8–1.1 mm long. Mericarps brown or dark brown with darker spots, ellipsoid or obovoid, slightly flattened, smooth and not mucilaginous when wet, 1.8–2.3 × 0.9–1.3 mm, often 1–3 mericarps underdeveloped.

FIGURE 4. *Ocimum sebrabergensis.* Flowers. Photograph: W. Swanepoel.

Phenology:—Flowers were recorded during midsummer (November to January).

Distribution and habitat:—At present *Ocimum sebrabergensis* is only known from two localities, in the botanically poorly explored Zebra Mountains, northwestern Namibia (Fig. 5), where it is localized and rare with less than 25 plants recorded. The species may, however, eventually prove to be more widespread in the Zebra Mountains and its continuation in Angola as what appears to be suitable habitat is not limited to the specific localities where it was found. The Zebra Mountains is one of the largest outcrops of anorthosite and anothositic rocks on Earth (Maier *et al.* 2013), ultramafic rock types known to give rise to substrates often associated with high levels of plant endemism (Siebert *et al.* 2001, Van Wyk & Smith 2001). *Ocimum sebrabergensis* grows on clayey soil derived from weathered anorthosite of the Kunene Complex (Miller & Schalk 1980, Mendelsohn *et al.* 2002). It occurs in *Colophospermum-Commiphora* woodland at elevations of 900–1000 m, 165–195 km from the Atlantic Ocean. Average annual rainfall in the area is 250–300 mm (Mendelsohn *et al.* 2002).

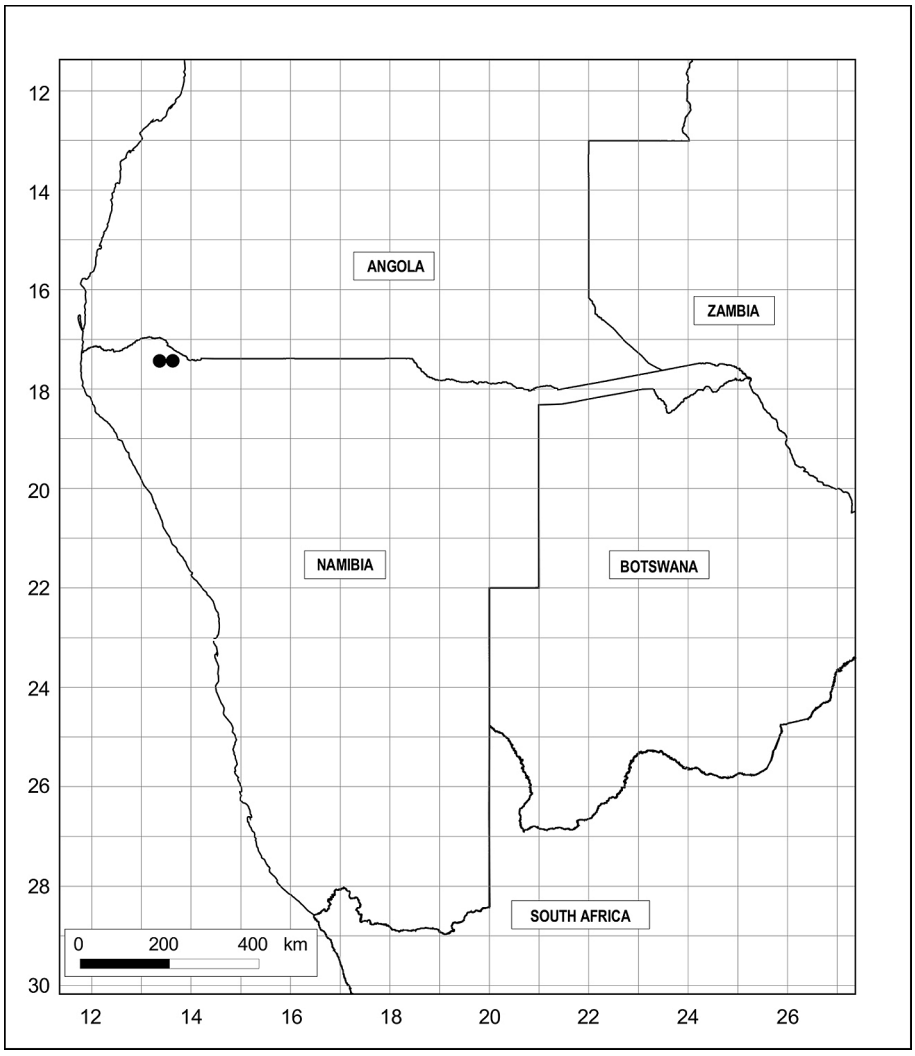

FIGURE 5. Known distribution (black dots) of *Ocimum sebrabergensis*.

The plants were noticed on northern, western and southern aspects, amongst boulders and in the one location next to a seasonal stream. The associated vegetation is clearly semi-arid savannah and although sometimes growing among huge boulders where fires are not likely to reach, is subject to occasional fire after a period of good rainfall. The multi-stemmed habit from an underground rootstock clearly indicates that *Ocimum sebrabergensis* is also fire-adapted, resprouting after fires.

Conservation status:—*Ocimum sebrabergensis* is rare and localised with only two subpopulations known from uninhabited to sparingly inhabited parts of the Zebra Mountains. The species was unknown to a local Ovahimba herdsman who was raised in the area and whom accompanied the first author on one of his visits to the type locality. *Ocimum sebrabergensis* does not seem to be utilised by humans or domestic animals. It should be considered as Vulnerable (VU D1) due to the small population size (IUCN 2012).

Etymology:—The specific epithet refers to the "Sebraberge" (Afrikaans for "Zebra Mountains") in the Kaokoveld of northwestern Namibia, the type locality of the new species.

Notes:—*Ocimum sebrabergensis* differs from *O. burchellianum* and *O. fimbriatum* in habit, leaf, and flower characters. Apart from the differences in habit and morphological characters, the distribution of the three taxa differs with *O. sebrabergensis* being confined to the Kaokoveld Centre of Endemism in Namibia and *O. burchellianum* to the Eastern Cape Province of South Africa, whilst *O. fimbriatum* has a wide distribution in tropical Africa. Some of the more prominent morphological features to differentiate amongst *O. sebrabergensis*, *O. burchellianum* and *O. fimbriatum* are supplied in Table 1. Diagnostic features for *O. sebrabergensis* were determined through examination of fresh material and for *O. burchellianum*, and *O. fimbriatum* from the literature (Codd 1985, Paton 1995, Van Wyk & Malan 1997, Paton *et al.* 1999, 2013).

TABLE 1. Prominent morphological differences amongst *Ocimum sebrabergensis*, *O. burchellianum* and *O. fimbriatum*.

Character	*O. sebrabergensis*	*O. burchellianum*	*O. fimbriatum*
Habit	woody shrub, several-stemmed from base, 1–2 m tall, sparingly branched above; stems slender, erect or arcuate	twiggy soft shrub, single-stemmed from base, 0.5–1 m tall, freely branched above	several stems arising annually from thick woody rootstock, 0.2–0.6 m tall, sparsely branching above, sometimes woody below; stems erect, ascending or prostrate
Lamina	subcordate or ovate to narrowly ovate; 10–48 × 8–30 mm; apex acute, obtuse or emarginated; base subcordate, truncate or rounded	subspathulate to oblanceolate; 5–14 × 2–5 mm; apex rounded, base attenuate	linear to broadly elliptic or ovate; 5–140 × 2–55 mm; apex acute or rounded, base cuneate or attenuate
Lamina margin	serrate, dentate, crenate or crenate-serrate	entire	serrate
Pedicels	2.5–6 mm long	2–2.5 mm long	1.5–3 mm long
Calyx	4.5–6.2 mm long at anthesis, enlarging to 6.9–11.2 mm long; upper lip not curving upwards	3 mm long at anthesis, enlarging to 7 mm long; upper lip curving upwards	6–8 mm long at anthesis, enlarging to 11–13 mm long; upper lip slightly curving upwards
Corolla	mauve adaxially, mauve to whitish-mauve abaxially; ± 12 mm long	white to mauve or dull purple; 8–9 mm long	white to pink; 12–22 mm long
Stamens	exserted 2–6 mm	exserted 7–9 mm	exserted 10–20 mm

Ocimum sebrabergensis can also be confused with *O. grandiflorum* Lamarck (1785: 387) from north-eastern Africa and *O. obovatum* Meyer (1838: 226) from southern tropical Africa and Madagascar, due to similarities in the habit, leaves and flowers. However, the latter two species are members of *Ocimum* subg. *Ocimum* sect. *Hiantia* subsect. *Hiantia* ser. *Hiantia*. *Ocimum grandiflorum* usually has a single stem, it lacks subcordate leaves, the lamina bases are cuneate, the pedicels are flattened and the calyx lacks a deep sinus between the lateral and median lobes of the anterior lip. The corolla in *O. grandiflorum* is white marked purple or purplish pink and the median lobes of the posterior lip are toothed or fimbriate, rarely sinuate. In *O. sebrabergensis* the corolla is mauve with darker nectar guides and the lobes of the posterior lip are denticulate or crenulate (entire to the naked eye). In *O. obovatum* the leaves are linear, elliptic, ovate, obovate or almost rotund *vs.* subcordate or ovate to narrowly ovate in *O. sebrabergensis*. The calyx has the lateral lobes of the anterior lip truncate, not separated from median lobes by a distinct sinus *vs*. the calyx in *O. sebrabergensis* which has the lateral lobes of the anterior lip asymmetric with a lanceolate tooth, separated from median lobes by a distinct sinus.

Additional collection (paratype):—NAMIBIA, **Kunene Region:** Zebra Mountains, 4 km SSW of Ombuku, between boulders at foot of mountain, 920 m, (1713AD), 4 November 2017, *Swanepoel 362* (WIND!).

Acknowledgements

We would like to thank Prof. Abraham E. van Wyk, University of Pretoria, for advice and support and Dr Hester Steyn, SANBI, for preparing the distribution map. The curator and staff of the National Herbarium of Namibia are thanked for their assistance during visits to the herbarium. An anonymous reviewer is thanked for suggesting improvements to the manuscript. We are especially grateful to Hannelie Swanepoel, Reghardt Joubert and Freddie Versfeld from Windhoek for assistance and support during field trips.

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