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Petalidium matupaense (Acanthaceae), a new species from Angola

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Abstract

Petalidium matupaense, first collected in May 2019, is here described as a new species. It is a range-restricted species, only known from the mountainous region bordering the Cunene River in southwestern Angola in the Kaokoveld Centre of Endemism. The species grows amongst boulders on hillsides of the Kunene Igneous Complex, along ephemeral riverbeds and in intermontane valleys. Diagnostic characters for *P. matupaense* include its slender stems and the dense white indumentum of mainly short-stalked dendritic trichomes on the vegetative parts (glabrescent with age) and inflorescences, giving a matted appearance. The flowers are distinctive in having all lobes similarly coloured adaxially, carmine, peach, vermillion (orange-red), or mauve, the anterior lobe with two yellow narrowly triangular nectar guides, and all lobes discolorous in being abaxially paler or cream-brown. A comparison of key morphological features distinguishing *Petalidium matupaense* from *P. cirrhiferum* and *P. sebrabergense*, its morphologically most similar relatives, is provided. Based on IUCN Red List criteria, the species is provisionally assessed as Endangered (EN).

Keywords: Cunene Province, endemism, Kunene Anorthosite Complex, Oncocua, Ruellieae, Serra Matupa, taxonomy, ultramafic rocks, Zebra Mountains

Introduction

Currently, 48 described species of *Petalidium* Nees von Esenbeck (1832: 75) are recognised in Africa. The primary centre of diversity for this genus is located in northwestern Namibia and neighbouring southwestern Angola. Namibia is home to 38 species, while 16 species are recorded in Angola, six in South Africa, and 40 species are noted in the *Flora of southern Africa region*, which includes South Africa, Namibia, Botswana, Eswatini, and Lesotho (Germishuizen & Meyer 2003, Figueiredo & Smith 2008, Swanepoel 2020, Swanepoel & Manzitto-Tripp 2022, Swanepoel *et al.* 2022, 2023, 2024, 2025a, b, Dexter *et al.* 2023, Swanepoel & Van Wyk 2023a, b, 2024, 2025a, b, 2026). In the present contribution a new species of *Petalidium* is described. According to available distribution records, this new entity is restricted to the Kaokoveld Centre of Endemism, a biogeographical region rich in range-restricted plant species in northwestern Namibia and adjacent southwestern Angola (Van Wyk & Smith 2001).

In May 2019, during a botanical expedition to the remote southwestern corner of the Angolan Kaokoveld, in the mountainous region bordering the Cunene River, one of us (WS) collected a species of *Petalidium* that was initially identified as a form of *P. cirrhiferum* Moore (1902: 307), based on its matted indumentum, which consists predominantly of dendritic trichomes. However, closer examination revealed distinctive differences in both the indumentum and flower colour, confirming that the specimen represents a distinct species.

The newly collected plant was characterised by its shrubby habit, slender stems and a similar, matted indumentum on both new vegetative growth and inflorescence parts, consisting predominantly of dendritic trichomes. The flowers were carmine, peach, vermillion (orange-red), or mauve, with yellow nectar guides on the anterior corolla lobe. In June

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2025, WS collected additional specimens from the same general region, south and southeast of Oncocua on substrates underlain by rocks of the geological Kunene Igneous Complex (also known as the Kunene Anorthosite Complex), corresponding to the Zebra Mountains in Namibia. The plants were in flower and fruit, enabling the taxon to be recognised as an undescribed species. The new species is most likely to be confused with *Petalidium cirrhiferum* and *P. sebrabergense* Swanepoel & Van Wyk (2025b: 19), its closest apparent relatives. It shares several morphological similarities with these species, particularly in the indumentum, leaves, inflorescences, and flowers. Examination of the *Petalidium* holdings in the Herbs LUBA, PRE, PRU, and WIND revealed no earlier collections attributable to the new species.

The Kaokoveld Centre is a pronounced centre of diversity and endemism for *Petalidium* (Craven 2009, Tripp *et al*. 2017, Dexter *et al.* 2023, Loiseau *et al*. 2023) and related Acanthaceae (e.g., Tripp & Dexter 2012, Darbyshire *et al*. 2020). The Centre is botanically still underexplored, hence the identification of yet another new species in this region is not unexpected. In recent years, the Kunene Igneous Complex (Zebra Mountains) have been recognised as a distinct subcentre of plant endemism within the Kaokoveld Centre. Over the past 10 years, at least five new endemic woody species have been described from this area: *Maerua sebrabergensis* Swanepoel (2015: 123), *Ocimum sebrabergensis* Swanepoel & Van Jaarsveld (2019: 204), *Carissa sebrabergensis* van Jaarsv. & Swanepoel in Van Jaarsveld *et al*. (2021: 150), *Petalidium sebrabergense*, and *Premna sebrabergensis* Swanepoel, van Jaarsv. & A.E.van Wyk in Swanepoel *et al*. (2025c: 156). The Kunene Igneous Complex is notable for being one of the largest known outcrops of anorthosite, with associated mafic-ultramafic rock types, on Earth (Maier *et al.* 2013, Lehmann *et al.* 2023, Swanepoel & Van Wyk 2025b, 2026). Soils derived from mafic-ultramafic rocks are typically rich in heavy metals, which are often linked to high levels of plant endemism (Siebert *et al.* 2001, Van Wyk & Smith 2001, Adhikari *et al.* 2022).

This paper forms part of a long-term project, led by one of us (WS), aimed at conducting extensive fieldwork on *Petalidium* in botanically underexplored regions, particularly in Namibia and Angola. The aim is to discover and document any remaining undescribed species of the genus. The ultimate goal is a comprehensive monograph of *Petalidium*, a major undertaking expected to take considerable time. In the meantime, newly discovered species are being formally described as they are encountered. This approach ensures that their existence and taxonomic identity are placed on record without unnecessary delay, thereby making the species known to the scientific community and, importantly, to conservation authorities. Early formal recognition also provides a basis for assessing their distribution, conservation status, and potential threats, particularly where they are known from restricted or vulnerable habitats.

Material and methods

Morphological descriptions and ecological information presented here are based primarily on field observations and material collected following extensive fieldwork in Angola and Namibia. Diagnostic features for the new species, *P. cirrhiferum*, and *P. sebrabergense* were determined through examination of fresh material, as well as high resolution images of the type material of *Petalidium cirrhiferum*, available on JSTOR Global Plants (https://plants.jstor.org/). This was supplemented by the study of the protologues and available herbarium collections in the National Botanical Research Institute in Namibia (WIND): *Petalidium cirrhiferum* (*Burke 3053*, *Meyer 1291*, *Meyer 1292*, *Schulte 1028*, *Van Jaarsveld 16489*); *P. sebrabergense* (*Swanepoel 647*, *653*), and the Instituto Superior de Ciências de Educação da Huíla, Angola (LUBA) (herbarium codes follow Index Herbariorum 2026). A 6.5–45.0× magnification stereo microscope was used for studying morphological features. Descriptive terminology follows Beentje (2016), Manktelow (2000), and for the distinction between the various trichome types, we followed the terminology of Hewson (2019), who provides definitions and illustrations for the different types. Locality information for specimens cited also provides the quarter degree grid squares based on the degree reference system of Edwards & Leistner (1971). The distribution map was compiled from specimen data using ArcView 3.1 software. A preliminary conservation assessment was conducted using the standard procedures based on IUCN guidelines (IUCN 2012, IUCN Standards and Petitions Committee 2024), and the online GeoCAT tool (Bachman *et al*. 2011).

Taxonomic treatment

Petalidium matupaense Swanepoel & A.E.van Wyk, *sp. nov.* (Figs 1–3 & 5A, B)



FIGURE 1. *Petalidium matupaense*. Habitat and habit. **A.** Dwarf shrub ca. 900 mm tall with long, slender stems. **B.** Dwarf shrub with flowers ca. 700 mm tall, growing among dark leucotroctolite rocks in a seasonal drainage line; distal flower-bearing stem portions with foliaceous bracts and appear white due to a dense, matted indumentum consisting predominantly of short-stalked dendritic trichomes. **C.** Dwarf shrub ca. 700 mm tall with mostly older glabrescent leaves, growing in whitish anorthosite-derived soil. Photographs by W. Swanepoel.



FIGURE 2. *Petalidium matupaense*. **A, B.** Flowering shoots with foliaceous bracts, bracteoles and flowers; axes and bracts densely clothed in a white, matted indumentum. **C.** Mature foliage leaves becoming glabrescent and appearing greenish in contrast to the dense whitish indumentum of a flowering shoot bearing foliaceous bracts and persistent bracteoles. Photographs by W. Swanepoel.

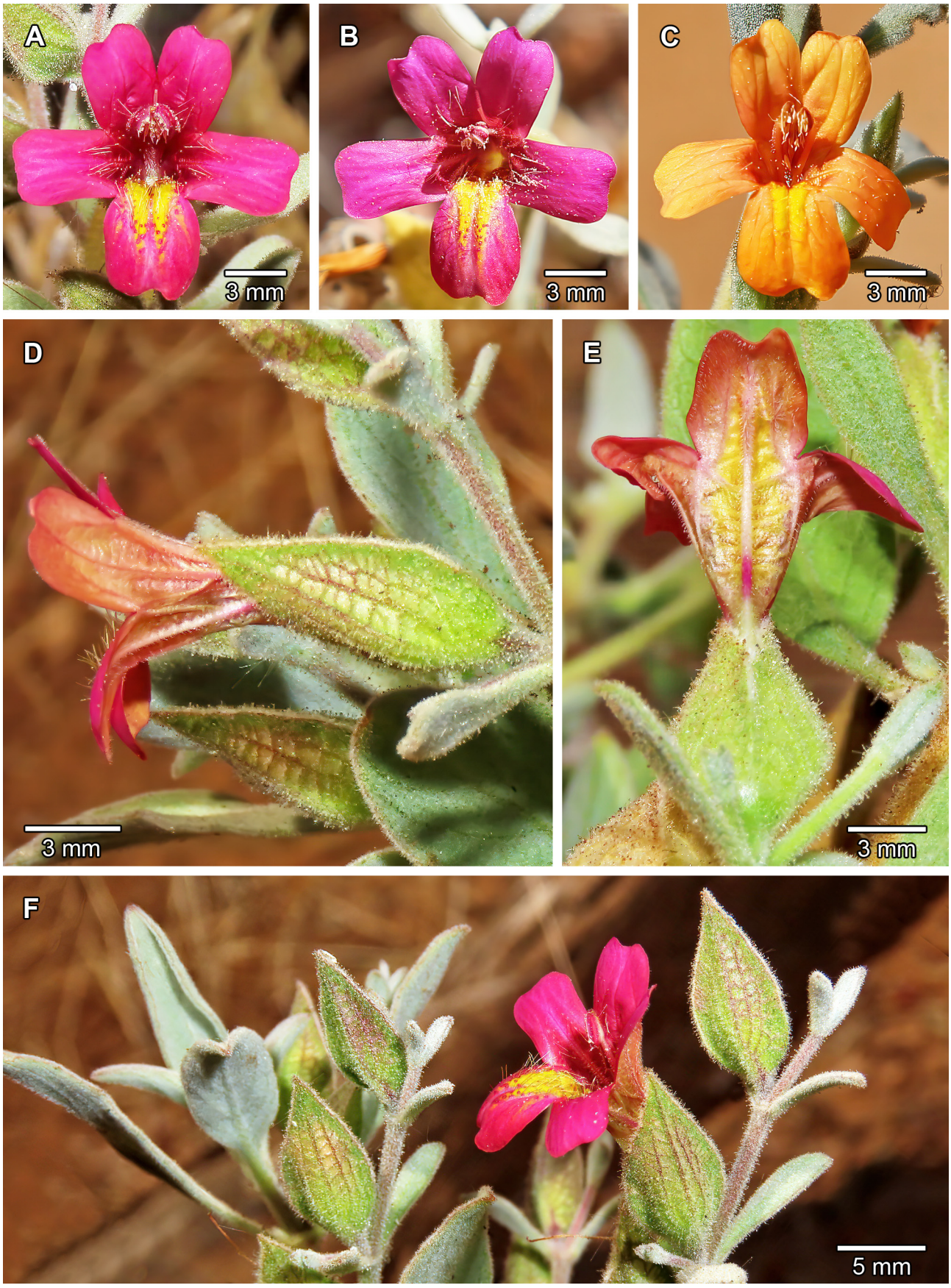


FIGURE 3. *Petalidium matupaense.* Morphology of flowers. **A–C.** Flowers in front view. Colour of corolla lobes varies adaxially: carmine, peach, vermillion (orange-red), or mauve. **D.** Flower with bracteole in side view. Corolla lobes abaxially paler or cream-brown. **E.** Flower and bracteoles viewed from below. **F.** Flower in oblique side view, with leaves, foliaceous bracts, and bracteoles; note dense white indumentum of leaves and bracts. Photographs by W. Swanepoel.

Diagnosis:—A woody dwarf shrub up to 1.2 m tall, morphologically most similar to *Petalidium cirrhiferum* and *P. sebrabergense*, differing by having the indumentum on new vegetative growth and inflorescences similar, matted (*vs*. indumentum on vegetative parts and inflorescences dissimilar [*P. cirrhiferum* & *P. sebrabergense*], matted or floccose [*P. cirrhiferum*], scattered [*P. sebrabergense*]), mainly consisting of dendritic trichomes (*P. matupaense* & *P. cirrhiferum*) (*vs*. mainly consisting of stalked glandular trichomes [*P. sebrabergense*]); bracteoles with all dendritic trichomes short-stalked, not visible to the naked eye (*vs*. some very long-stalked, up to 5 mm long, clearly visible to the naked eye [*P. cirrhiferum*]); flowers with corolla lobes adaxially carmine, peach, vermillion (orange-red) or mauve (*vs*. heliotrope, magenta or purple-red [*P. cirrhiferum*], lilac or mauve [*P. sebrabergense*]).

Type:—ANGOLA. Cunene Province: Serra Matupa, intermontane valley in ephemeral riverbed, ca. 3 km north-northwest of Muolo, 1613DC, 842 m a.s.l., 17 June 2025, *Swanepoel 711* (holotype LUBA!; isotypes PRE!, PRU!).

Woody dwarf shrub up to 1.2 m tall; new vegetative growth and inflorescence parts with dense white matted indumentum, glabrescent, consisting of mainly short-stalked dendritic trichomes with lateral branches relatively short, tapering and straight, in addition also bifurcate, trifurcate and stalked glandular trichomes, some dendritic and stalked glandular trichomes slightly longer and more robust, especially abaxially on bracteoles, the more robust dendritic ones sometimes rebranching and/or with an apical gland, some of the additional trichomes sometimes absent. *Stems* slender, multi-stemmed from just below or above ground level from thick rootstock up to 150 mm in diam., bark on main stem(s) shallowly fissured, showing as longitudinal lines, ashy grey, grey or grey-brown, older distal stems cylindrical, bark smooth, yellow-green, brown-green or brown, young stems and branches quadrangular, pale green or green-white (due to white indumentum) or maroon, cystoliths circular, elliptic, oblanceolate or linear. *Leaves* opposite and decussate on new shoots, fascicled on older stems; subsessile or petiole up to 13 mm long; lamina oblanceolate, broadly lanceolate, lanceolate [*sensu* Lindley's definition (Beentje 2016)] or elliptic, flat or sub-conduplicate, slightly recurved towards apex, 10–65 × 8–31 mm when flattened, pale green, green or white-green; apices acute, attenuate, acuminate or obtuse; bases attenuate or acuminate onto petiole; margins entire, crenate or crenate-serrate; midrib slightly prominently raised both sides, 4–6 lateral veins each side, cystoliths visible on veining. *Inflorescences* axillary and terminal racemose dichasia, axis 30–450 mm long; bracts foliaceous, linear-oblanceolate or oblanceolate, 10–34 × 2–8 mm, midrib without lateral veins; petiole up to 5 mm long or subsessile; pedicels (below bracteoles; "peduncle" of some authors) ca. 1.5 mm long; bracteoles narrowly ovate or obovate, symmetrical, midrib curved towards apex or straight, deeply concave, coriaceous, 11–16 mm long, connate proximally for ca. 2 mm, apex attenuate to acute, pale green, brownish yellow when dry, venation reticulate, prominent, pale green or maroon, strigose adaxially, margin lanate towards apex, cystoliths visible adaxially, dense, linear or curved. *Calyx* ca. 8.7 mm long including basal tube of ca. 1.6 mm deep, lobes 4, regular, narrowly triangular, lanceolate when flattened, acute, unequal, 5.6–6.9 mm long, anticous lobe distinctly bifid, notch ca. 0.4 mm deep; adaxially strigose, dense linear cystoliths visible, abaxially strigose with in addition simple, bifurcate, few-branched dendritic and stalked glandular trichomes, margins with irregular simple trichomes in addition. *Corolla* with narrow unexpanded portion of tube cylindrical, laterally slightly flattened, 17.3–20.3 mm long with lobes straightened, narrow portion 7.8–9.1 mm long, ca. 2.8 mm diam., expanded portion at slight angle to anterior side of narrow portion, 3–6 mm long, corolla exserted part (from bracteole pair) outside strigose-puberulous, included part glabrous, inside towards mouth with few patent long stiff white simple trichomes, inside otherwise glabrous, anterior lobe obovate (broadly obovate or subcircular when flattened), ca. 4.9 × 4.6 mm, spreading or recurved, lateral lobes rectangular (narrowly obovate when flattened), ca. 5.9 × 4.6 mm, spreading, upper lobes rectangular (narrowly obovate when flattened), ca. 6.2 × 4.7 mm, in plane of tube axis or ascending-spreading, connate for ca. 33% of their length, all lobes with margins entire, apices widely retuse, lobes discolorous, adaxially carmine, peach, vermillion (orange-red) or mauve, abaxially paler or cream-brown, anterior lobe adaxially with two narrowly triangular yellow nectar guides, other lobes with triangular maroon nectar guides, lobes glabrous adaxially except for few long stiff white simple trichomes towards bases, abaxially strigose-puberulous; palate inside slightly prominently transversely 4- or 5-ribbed, yellow and maroon, glabrous. *Stamens* didynamous, inserted dorsally in throat, fused portion 1.4–1.7 mm long, puberulous, free parts slightly tapering towards apex, long filaments with small, stalked glandular trichomes, long filaments ca. 3.3 mm long, short filaments ca. 1.9 mm long, outer filament with basal ridge from point of insertion on corolla vein decurrent to 5.4–6.6 mm from base of tube, puberulous; filament curtain reduced (*sensu* terminology of Manktelow 2000); anthers 2-thecous, thecae oblong, equal, ca. 1.7 mm long excluding short basal spur, with scattered small stalked glandular trichomes and few simple ones. *Gynoecium* ca. 15.8 mm long; ovary ovoid, laterally compressed, ca. 2.2 × 1.4 mm, inserted in fleshy disc, glabrous; style filiform, ca. 13.6 mm long with widely spaced small simple trichomes, stigma lobes linear, unequal, longer lobe ca. 0.7 mm long, shorter lobe ca. 0.4 mm long; ovules ovoid, ca. 0.8 mm long. *Capsule* flattened ellipsoid or ovoid, 8.2–10.6 × 4.1–4.8 mm, tawny, glossy, glabrous; seeds cordate, ca. 3.5 × 2.8 mm, densely covered with white hygroscopic trichomes.

Phenology:—Flowers and fruit have been recorded in May and June (autumn and early winter).

Distribution and habitat:—Currently, *Petalidium matupaense* is only known to occur in the Kaokoveld Centre of Endemism, southwestern Angola, specifically between Otchive and Muolo in the intermontane valleys between the Viluoviaengua, Onongoengoe, and Matupa mountain ranges to the south and southeast of Oncocua (Fig. 4). It typically inhabits plains, hillsides, and ephemeral riverbeds and drainage lines, primarily thriving in clay soils derived from the Kunene Igneous Complex, which includes dark leucotroctolite, olivine-bearing anorthosite, dunite, gabbro, and norite (Miller & Schalk 1980, Maier *et al.* 2013). The species is found at elevations of 800–920 m a.s.l., 170–190 km inland from the Atlantic Ocean. However, it is possible that the species has a wider distribution within the Kunene Igneous Complex, as many areas remain difficult to access. The region receives an average annual rainfall of 200 to 300 mm, mainly during the summer months (Mendelsohn & Huntley 2023).

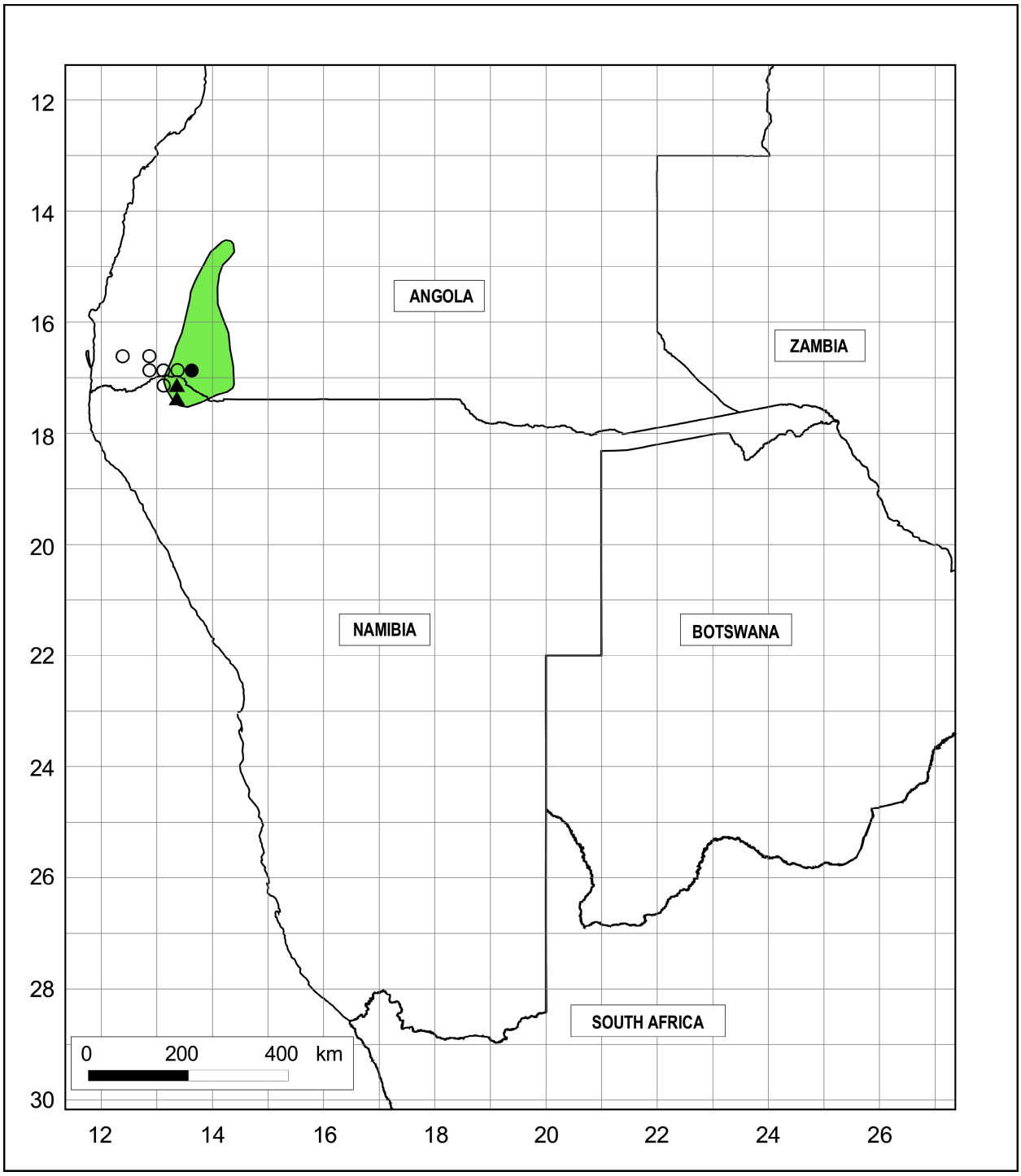


FIGURE 4. Known distribution of *Petalidium matupaense* (black dot), *P. cirrhiferum* (open circles), and *P. sebrabergense* (black triangles). Based on herbarium specimens in Herbs LUBA and WIND, and duplicates in Herbs PRE and PRU. The green shaded area indicates the general extent of rocky outcrops associated with the Kunene Igneous Complex, adapted from Lehmann *et al.* (2023).

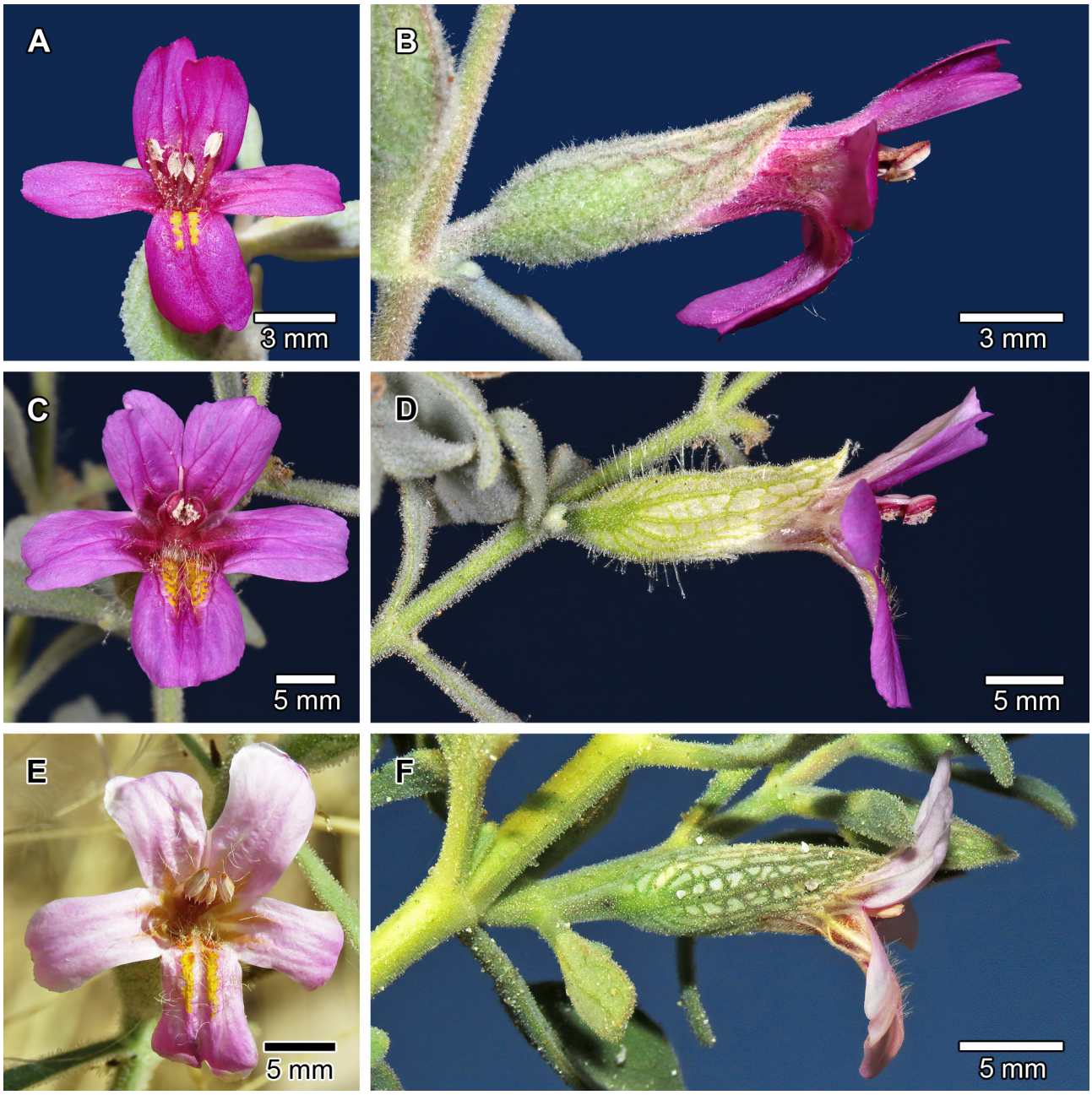


FIGURE 5. *Petalidium matupaense* (**A, B**); flowers (for more images see Figure 3), compared with those of *P. cirrhiferum* (**C, D**) and *P. sebrabergense* (**E, F**) with which it shares morphological similarities. **A.** *P. matupaense*, flower in front view; corolla lobes adaxially carmine, peach, vermillion (orange-red), or mauve. **B.** *P. matupaense*, flower in side view; bracteoles abaxially with all dendritic trichomes short-stalked, not visible to the naked eye. **C.** *P. cirrhiferum*, flower in front view; corolla lobes adaxially heliotrope, magenta, or purple-red. **D.** *P. cirrhiferum*, flower in side view; bracteoles abaxially with some dendritic trichomes very long-stalked, clearly visible to the naked eye. **E.** *P. sebrabergense*, flower in front view; corolla lobes adaxially lilac or mauve. **F.** *P. sebrabergense*, flower in side view; bracteoles abaxially with simple multi-cellular stalked glandular trichomes, but lacking dendritic trichomes. Photographs by W. Swanepoel.

Conservation status:—*Petalidium matupaense* has been recorded in the mountainous area to the south and southeast of Oncocua in Angola at three sites within 20 km from each other where it is occasional to locally common. Although a brief search at various other sites with seemingly suitable habitat did not reveal any plants, it is probably more widespread than currently known. The extent of occurrence (EOO) has been calculated as 112 km² and the area of occupancy (AOO) as 84 km², based on a cell width of 2 km as recommended by the IUCN Standards and Petitions Committee (2024). Due to its limited geographical range (EOO < 5 000 km²), with only one known locality and habitat under pressure from prolonged drought conditions, *Petalidium matupaense* is here provisionally ranked as Endangered (EN) B1ab(iii) (IUCN 2012).

Etymology:—The specific epithet refers to Serra Matupa [Matupa Mountain] in southwestern Angola, which is the type locality.

Notes:—*Petalidium matupaense* is morphologically most similar to *P. cirrhiferum* and *P. sebrabergense* (see Fig. 4 for their distribution), which is likely its closest relatives. Consequently, these three species are compared in the diagnosis above. Selected morphological features that distinguish *P. matupaense* from *P. cirrhiferum* and *P. sebrabergense* are summarised in Table 1 and illustrated in Fig. 5.

All the mentioned taxa are from the group composed of plants with irregular, four-parted calyces (Obermeijer 1936, Tripp *et al*. 2017).

Additional specimens examined (paratypes):—ANGOLA, Cunene Province: Intermontane valley between Serra Matupa and Serra Onongoengoe in ephemeral riverbed, 3 km north-northwest of Muolo, 1613DC, 844 m, 17 June 2025, *Swanepoel 712* (LUBA!); Serra Viluoviaengua, ca. 6.5 km northwest of Muolo in drainage line, 1613DC, 883 m, 17 June 2025, *Swanepoel 713* (LUBA!, PRU!); Serra Viluoviaengua, ca. 9 km northwest of Muolo, 1613DC, 905 m, 16 May 2019, *Swanepoel 710* (LUBA!).

TABLE 1. Morphological differences between *Petalidium matupaense*, *P. cirrhiferum*, and *P. sebrabergense*.

Character	*P. matupaense*	*P. cirrhiferum*	*P. sebrabergense*
Indumentum (composition)	Short-stalked dendritic trichomes; also bifurcate, trifurcate, stalked glandular and simple appressed trichomes (strigose); some dendritic and stalked glandular ones slightly longer and more robust, these sometimes rebranching and/or with an apical gland; trichomes not visible to the naked eye	Short-stalked dendritic trichomes; also bifurcate, stalked glandular, simple appressed trichomes (strigose) and long-stalked dendritic ones up to 5 mm long with few to many lateral branches towards apex, these trichomes clearly visible to the naked eye	Stalked-glandular trichomes (short and fine to longer and robust); also simple, bifurcate, dendritic and simple appressed trichomes (strigose); stalked glandular trichomes up to 2 mm long, not or barely visible to the naked eye
Indumentum on leaves (main component; appearance)	Short-stalked dendritic; matted	Short-stalked dendritic; matted or floccose	Stalked glandular; scattered
Dendritic trichomes on leaves (morphology)	More robust ones sometimes rebranching and/or with an apical gland	Not rebranching; apical glands lacking	Not rebranching; sometimes with an apical gland
Leaves (shape)	Oblanceolate, broadly lanceolate, lanceolate (*sensu* Lindley) or elliptic	Ovate or narrowly ovate, rarely lanceolate (*sensu* Lindley)	Oblanceolate, lanceolate (*sensu* Lindley) or elliptic
Leaves (lamina conformation)	Flat or sub-conduplicate, slightly recurved towards apex	Sub-conduplicate to conduplicate, sometimes undulate	Flat or sub-conduplicate, sometimes undulate, often recurved towards apex
Lamina (base)	Attenuate or acuminate onto petiole	Cuneate or truncate	Attenuate
Leaves (lamina size) (mm)	10–65 × 8–31	10–70 × 4–54	12–50 × 4–18
Inflorescence	Axillary and terminal racemose dichasia, 30–450 mm long	Axillary and terminal racemose dichasia, 50–250 mm long	Axillary racemose dichasia, 35–140 mm long
Bracteoles (indumentum (abaxially)	Dendritic trichomes present, short-stalked	Dendritic trichomes present, some robust, long-stalked, up to 5 mm long	Dendritic trichomes lacking

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TABLE 1. (Continued)

Character	*P. matupaense*	*P. cirrhiferum*	*P. sebrabergense*
Bracteoles (indumentum adaxially)	Strigose	Strigose towards apex, with multicellular simple stalked glandular trichomes on veining in addition	Sparsely strigose towards apex
Calyx (indumentum abaxially)	Short-stalked glandular trichomes present; bifurcate and dendritic trichomes present	Short-stalked glandular trichomes present; bifurcate and dendritic trichomes absent	Short-stalked glandular trichomes absent; bifurcate and dendritic trichomes absent
Calyx (length) (mm)	Ca. 8.7	Ca. 10.8	Ca. 6.6
Corolla (length) (mm) (lobes straightened)	17.3–20.3	Ca. 25.0	Ca. 22.7
Corolla lobes (orientation)	Anterior lobe spreading or recurved; lateral lobes spreading; upper lobes in plane of tube axis or ascending-spreading	Anterior lobe spreading or recurved; lateral lobes spreading; upper lobes spreading or in plane of tube axis	Spreading or ascending-spreading
Corolla upper lobes [shape, size (mm) and fusion]	Rectangular (narrowly obovate when flattened), ca. 6.2 × 4.7, connate for 33% of their length	Obovate, apices rounded, retuse or ca. praemorse, ca. 9.7 × 5.6, connate for 27% of their length	Obovate, apices rounded or retuse, ca. 7.9 × 5.2, connate for 20% of their length
Corolla lateral lobes (shape and size) (mm)	Rectangular (narrowly obovate when flattened), retuse, ca. 5.9 × 4.6	Obovate, apices rounded, retuse or ca. praemorse, ca. 9.4 × 5.5	Obovate, apices entire or crenulate, rounded or retuse, ca. 6.6 × 3.9
Corolla anterior lobe (shape and size) (mm)	Obovate (broadly obovate or subcircular when flattened), retuse, ca. 4.9 × 4.6	Obovate or elliptic, apices rounded, retuse or ca. praemorse, ca. 10.1 × 8.9	Obovate, apex entire or crenulate, rounded or retuse, ca. 7.9 × 5.2
Corolla lobes (colour, adaxially)	Carmine, peach, vermillion (orange-red) or mauve	Heliotrope, magenta or purple-red (bright violet or red)	Lilac or mauve (pale violet)
Corolla lobes (colour, abaxially)	Paler than adaxially or cream-brown	Whitish, notably paler than adaxial side	Similar to adaxial side
Corolla nectar guides	Yellow on anterior lobe, conspicuous; maroon on other lobes, inconspicuous	Yellow on anterior lobe, conspicuous; claret or crimson on other lobes, inconspicuous	Yellow on anterior lobe, conspicuous; crimson or peach on other lobes, conspicuous
Filaments (free parts length) (mm)	Long stamen ca. 3.3 Short stamen ca. 1.9	Long stamen ca. 5.4 Short stamen ca. 3.8	Long stamen ca. 4.3 Short stamen ca. 2.1
Filaments (free parts indumentum)	Stalked glandular trichomes present on long stamen only	Stalked glandular trichomes present	Stalked glandular trichomes absent
Outer filament basal ridge	Decurrent to ca. 5.4–6.6 mm from base of tube	Decurrent to ca. 7.2 mm from base of tube	Decurrent to ca. 3.0 mm from base of tube
Anther thecae (shape and length) (mm)	Oblong; ca. 1.7	Elliptic-oblong; 3.0	Ovate-oblong; ca. 2.5
Anther thecae (indumentum)	Short-stalked glandular and simple trichomes	Dorsally with short-stalked glandular trichomes	Puberulent towards base
Style (indumentum)	Widely spaced simple trichomes	Puberulous with scattered short-stalked glandular trichomes in addition	Puberulous with scattered short-stalked glandular trichomes in addition towards base
Ovary (size) (mm)	Ca. 2.2 × 1.4	Ca. 2.0 × 1.9	Ca. 1.6 × 1.1

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TABLE 1. (Continued)

Character	*P. matupaense*	*P. cirrhiferum*	*P. sebrabergense*
Geological substrate	Restricted to areas underlain by rocks of the Kunene Igneous Complex	Occurs on a variety of geological substrates but has not yet been recorded from the Kunene Igneous Complex	Restricted to areas underlain by rocks of the Kunene Igneous Complex
Distribution	Angola: southwestern Cunene Province in mountainous area south-southeast of Oncocua	Angola: Namibe Province in Iona National Park Namibia: Kunene Region from Epupa westwards in mountainous area along Kunene River	Namibia: Kunene Region in the Zebra Mountains east of Epupa

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