



## *Erythrococca kaokoensis* (Euphorbiaceae), a new species from Namibia and Angola

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### Abstract

*Erythrococca kaokoensis*, here described as a new species, is only known from the mountains along the Kunene River in the Kaokoveld Centre of Endemism, southwestern Angola and northwestern Namibia. These shrubs or small trees grow among rocks of anorthosite, gneiss or limestone. Diagnostic characters for *E. kaokoensis* include the leaves that are subcordate or lanceolate to ovate, rarely elliptic, drying dark green, yellow-green, blue-green or violet to black, and the interruptedly racemose or subpaniculate inflorescences with flowers in clusters along the axis. A comparison of some of the more prominent morphological features to differentiate between *E. kaokoensis* and its possible nearest relative, *E. trichogyne*, is provided.

**Keywords:** endemism, flora, taxonomy, Zebra Mountains

### Introduction

At present four described species of *Erythrococca* Benth in Hooker (1849: 506) are recognized in the *Flora of southern Africa* region (South Africa, Namibia, Botswana, Swaziland and Lesotho) (Germishuizen & Meyer 2003): *E. berberidea* Prain (1911a: 92), *E. menyharthii* (Pax 1901: 877) Prain (1911b: 616), *E. natalensis* Prain (1911a: 91) and *E. trichogyne* (Müller Argoviensis 1864: 334) Prain (1911b: 617). Only *E. menyharthii* has been recorded for Namibia (Curtis & Mannheimer 2005) (Fig. 1). In this contribution, a rare new species of *Erythrococca* endemic to the Kaokoveld Centre of Endemism, a biogeographical region rich in restricted-range plants and animals in northwestern Namibia and adjacent southwestern Angola (Van Wyk & Smith 2001), is described.

During a botanical expedition to the Otjhipa Mountains in May 2014, the author encountered an unfamiliar *Erythrococca* with subcordate and lanceolate to ovate leaves, but sterile at the time. On a subsequent expedition to the remote Zebra Mountains in December 2014, the same taxon was encountered, this time in flower and fruit, enabling material to be collected on which the description in the present contribution is based. The taxon has since been found at various other locations in the Kaokoveld of northern Namibia and also in the continuation of the Zebra Mountains on the northern side of the Kunene River in Angola. The new species seems to be closely related to *E. trichogyne* due to similarities in leaf and flower morphology. A study of the *Erythrococca* holdings in PRE and WIND revealed no earlier collections of the new species.

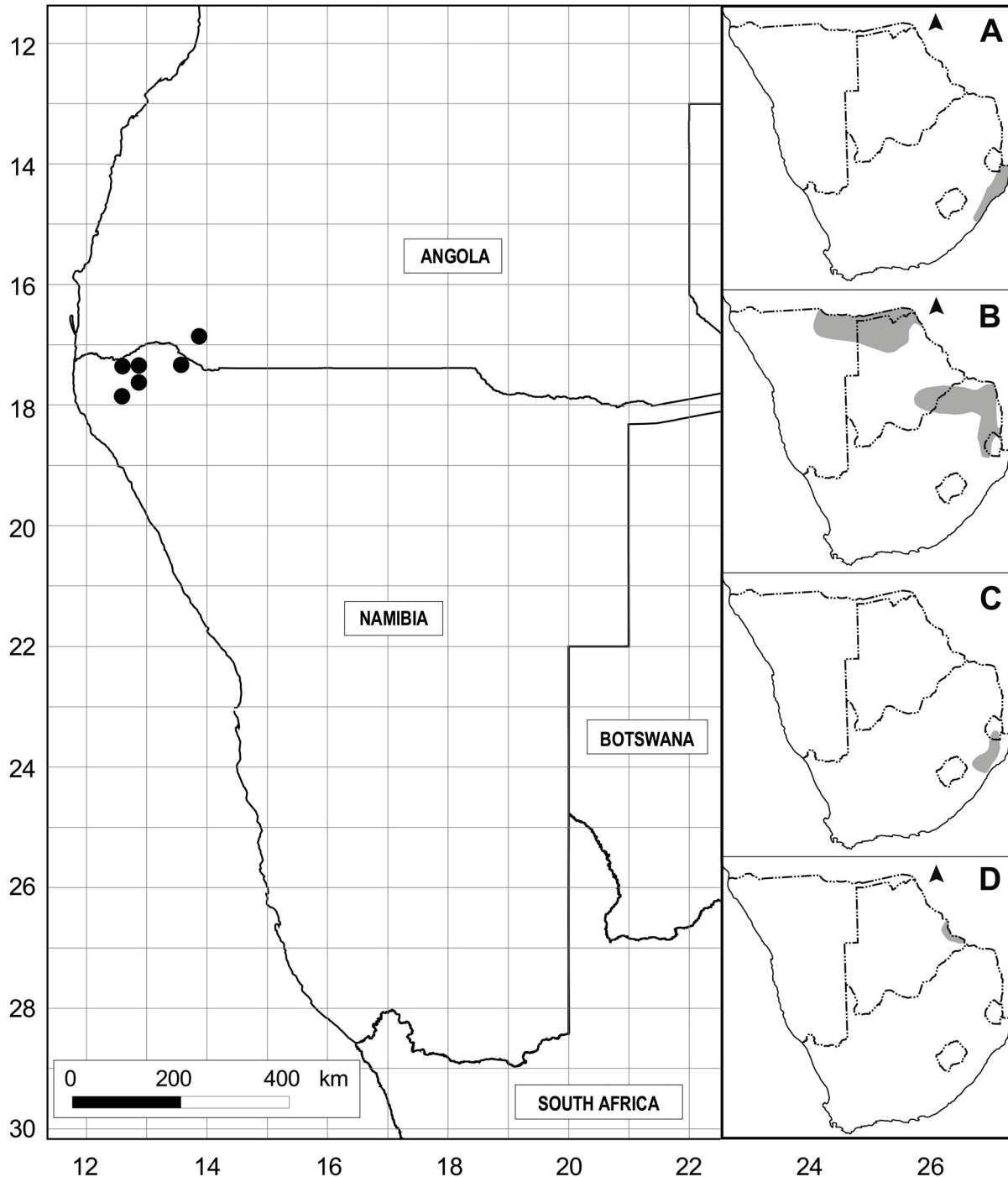
### Taxonomic treatment

*Erythrococca kaokoensis* Swanepoel, *sp. nov.* (Figs. 2 & 3)

**Diagnosis:**—A woody shrub to small tree 1.5–2.5 m tall, related to *E. trichogyne*, from which it differs in having the leaf lamina subcordate, lanceolate to ovate or rarely elliptic (vs. ovate, ovate-lanceolate, elliptic-lanceolate or elliptic to elliptic-ovate), drying dark green, yellow-green, blue-green or violet to black (vs. not drying markedly different); inflorescences racemose or subpaniculate with flowers in clusters along axis (vs. inflorescences racemose), female peduncle not accrescent in fruit (vs. accrescent); male flower ovoid in bud (vs. subglobose), number of stamens 20–33 (vs. 9–25); glands compressed reniform-crescentic or boomerang-shaped (vs. compressed ovoid or broadly ovate), glabrous (vs. evenly to densely adpressed sericeous-pubescent), stigmas papillose, papillose-lobulate or proximally smooth, distally papillose or papillose-lobulate (vs. fimbriate to fimbriate-lobulate); glabrous (vs. subglabrous

or sparingly to evenly adpressed-pubescent), not pendulous (vs. pendulous); seed reticulate (vs. foveolate- or scrobiculate-reticulate), aril dull orange to bright orange-red at first, drying dull orange, lemon or ashen (vs. bright orange-red), testa dark brown (vs. black).

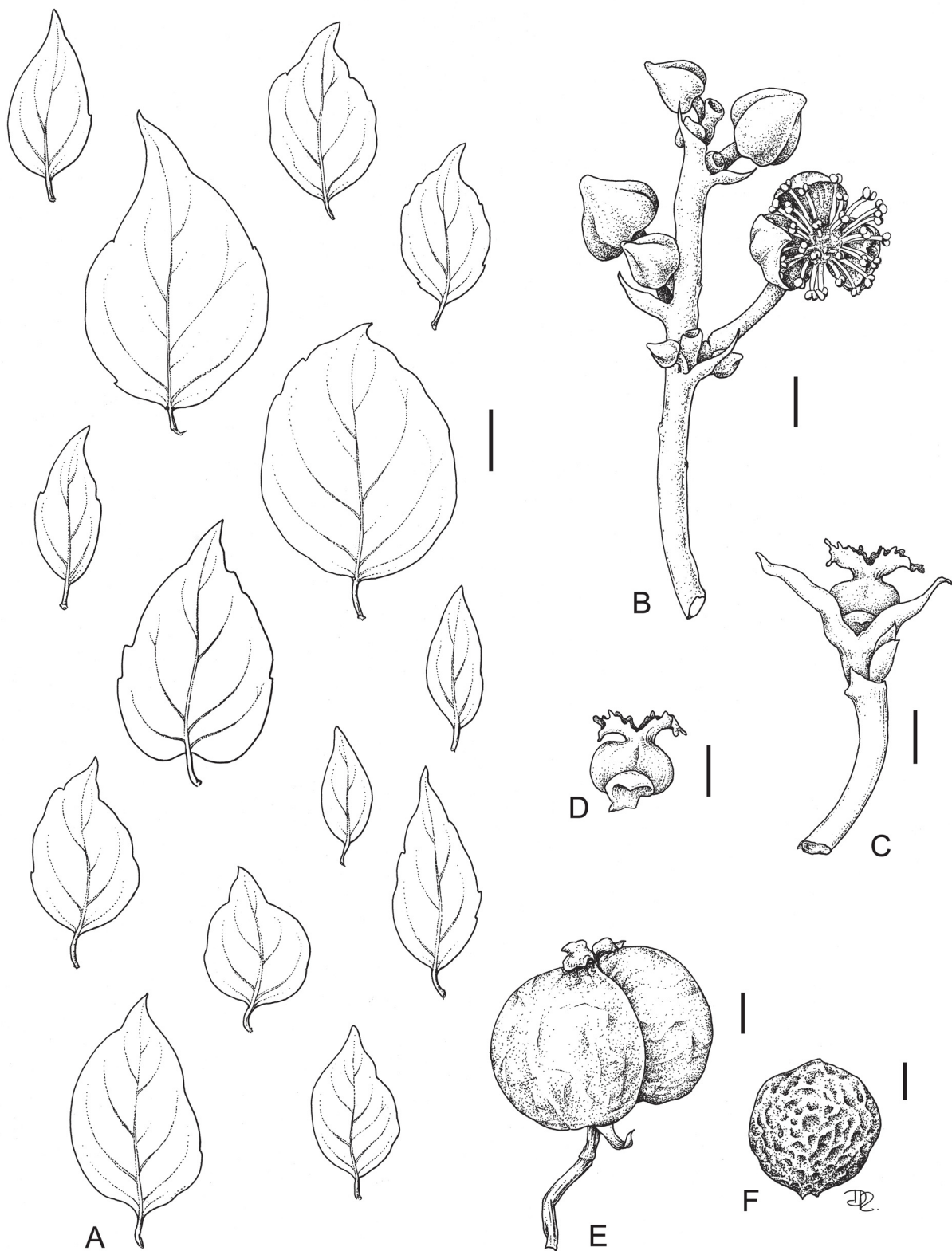
**Type:**—NAMIBIA. Kunene Region: Zebra Mountains, hill south of Okau, between boulders, 1713BC, 980 m, 13 December 2014, *Swanepoel 337* (holotype WIND!; isotype PRE!).



**FIGURE 1.** Known distribution of *Erythrococca kaokoensis* (black dots). The insert of small maps depicts the distribution ranges (grey) of the other known members of *Erythrococca* in the Flora of southern Africa (FSA) region: A. *E. berberidea*. B. *E. menyharthii*. C. *E. natalensis*. D. *E. trichogyne*. A black arrow head indicates that the range of the particular taxon extends beyond the borders of the FSA region.



**FIGURE 2.** *Erythrococca kaokoensis*. A. Plant in natural habitat (Zebra Mountains, Namibia) among greyish black boulders of anorthosite, growing as a shrub about 2 m tall. Associated shrub with smaller leaves and yellow flowers in background is a species of *Grewia*. B. Male flowers. C. Female flowers and immature fruit. Photographs: W. Swanepoel.



**FIGURE 3.** *Erythrococca kaokoensis*. A. Leaves (viewed from above) showing a range of sizes and shapes. B. Male inflorescence; note ovoid flower buds with slight indentations between calyx lobes. C. Female flower. D. Ovary with disc glands. E. Capsule. F. Seed. Scale bar = 10 mm (A), or 1 mm (B–F). All from *Swanepoel 337 & 338*. Artist: Daleen Roodt.

Dioecious multi-stemmed, much-branched, woody shrub to small tree, commonly 1.5–2.5 m tall. Bark on stems rough, fissured, grey-brown; on branches cream with many longitudinal lenticels, older branches grey and fissured revealing cream underbark, young growth green, glabrous. Perulae persistent, green at first, later stramineous. Leaves simple, petiolate, stipulate, alternate, fascicled on older branches, glabrous or sparingly pilose (hairs sometimes tortuous) on margin and midrib, rugose or scabridulous-rugose in herbarium material, immature leaves pilose; lamina lanceolate to ovate, subcordate, rarely elliptic, often somewhat conduplicate and or undulate, (10–)25–62(–100) × (5–)15–45(–72) mm, membranaceous (not translucent) to coriaceous, discolorous, green adaxially, paler abaxially, drying dark green, yellow-green, blue-green or violet to black, apex acute or attenuate, often asymmetric, usually apiculate, base subcordate, rounded or truncate, sometimes oblique and/or asymmetric, often with 1 or 2 globose, stalked glands at base, margin entire or glandular finely to coarsely serrate or crenate-serrate, often undulate towards apex; midrib and lateral veins conspicuous abaxially, prominent, especially abaxially, lateral veins in 3–6 pairs or alternate, ascending, looped or not; petiole pulvinate at point of stem attachment, shallow to deeply grooved adaxially, abscission joint clearly visible, 2–18 mm long, glabrous or sparingly pilose, pulvinus persistent, green at first, later stramineous; stipules conical-cylindric, 0.4–1.0 mm long, persistent. Inflorescences axillary, solitary. Male inflorescences 5- to 16-flowered, 6–20 mm long, peduncles 1–6 mm long, interruptedly racemose or subpaniculate, flowers in 3–7 clusters along axis, glabrous or sparingly pilose, bracts narrowly triangular, up to 1.5 mm long, glabrous, persistent. Male flowers: pedicels 1.0–3.4 mm long at anthesis, slender, glabrous, jointed near the base; buds ovoid, apiculate, base truncate, 2.0–2.2 mm diam., glabrous; calyx closed in bud, slightly grooved between sepals, lobes (2–)3(–4), valvate, elliptic to broadly elliptic, ovate or suborbicular, acute or obtuse, glabrous, green, 1.5–2.5 × 2.4–2.6 mm; extrastaminal disk glands absent, interstaminal disk glands numerous, clavate, erect, much shorter than stamens, ca. 0.3 mm long, glabrous or tipped with 1–3 hairs; stamens 20–33, filaments 0.9–1.3 mm long, 0.15 mm diam., anthers ellipsoid, ovoid, obovoid or subglobose. Female inflorescences 2- to 8-flowered in 1–4 clusters, 6–18 mm long, peduncles 3–6 mm long, not accrescent; otherwise as in male. Female flowers: pedicels 0.3–1.3 mm long, extending to 3 mm in fruit, jointed near the base, glabrous; calyx lobes 2 or 3(–4), ovate, obovate or triangular, conduplicate, apiculate, glabrous, green, persistent, accrescent, ca. 2.2 × 1.2 mm; disk glands 2(–3), compressed reniform-crescentic or boomerang-shaped, apex rounded or obtuse, glabrous, green, 0.8 mm × 0.4 mm; ovary ± 1.4 mm across, 2(–3)-lobed, glabrous, green; styles 2(–3), united at base, spreading, 0.8–1.0 mm long, persistent, extending to 2 mm in fruit, stigmas papillose, papillose-lobulate or proximally smooth, distally papillose or papillose-lobulate, white. Fruit dicocous or by abortion monococous, occasionally tricocous, glabrous, green at first, drying chestnut, dark brown, dark purple-brown or black, spreading to suberect, 8–10 × 4–5 mm. Seeds globose 3–4 mm diam., reticulate, aril not sticky, dull orange to bright orange-red at first, drying dull orange, lemon or ashen, testa dark brown.

**Phenology:**—Flowers were recorded from November to January.

**Distribution and habitat:**—At present *E. kaokoensis* is only known from the Otjihipa, Okakora and Zebra Mountains (Fig. 3) where it is localized and rare. *Erythrococca kaokoensis* grows on soil derived from weathered gneiss of the Epupa Complex (Otihipa Mountains), limestone of the Otavi Group (Okakora Mountains) and anorthosite of the Kunene Complex (Zebra Mountains) (Miller & Schalk 1980, Mendelsohn *et al.* 2002). It occurs on hillsides and at the base of rocky outcrops amongst boulders in *Colophospermum-Commiphora* woodland at elevations of 800–1640 m, 82–226 km from the Atlantic Ocean. Average annual rainfall in the area is 150–300 mm (Mendelsohn *et al.* 2002).

**Conservation status:**—*Erythrococca kaokoensis* is rare and localised with only a few plants at each locality. It was unknown to a local Ovahimba herdsman who was raised in the area and who accompanied the author on one of his visits to the type locality. *Erythrococca kaokoensis* is not in danger since it occurs at several localities and does not seem to be utilised by humans or animals. It should be considered as Vulnerable (VU D) due to the small population size (IUCN 2012).

**Etymology:**—The specific epithet refers to the Kaokoveld in northwestern Namibia, a region forming part of the Kaokoveld Centre of Endemism (Van Wyk & Smith 2001). This biogeographically well-defined region extends into southwestern Angola.

**Notes:**—The nearest relative of *E. kaokoensis* appears to be *E. trichogyne*, a species from which it differs in leaf, flower, and fruit characters. Distribution of the two species does not overlap; *E. trichogyne* occurs from Ethiopia south to Angola, Botswana and northeastern South Africa. Some of the morphological features to distinguish between these two species are provided in Table 1. Diagnostic features for *E. kaokoensis* were determined through examination of fresh material and for *E. trichogyne* from herbarium material and the literature (Radcliffe-Smith 1987, 1996).

**TABLE 1.** Morphological differences between *Erythrococca kaokoensis* and *E. trichogyne*.

Character	<i>E. kaokoensis</i>	<i>E. trichogyne</i>
<b>Habit</b>	Shrub or small tree up to 2.5 m tall	Shrub or small tree up to 6.0 m tall
<b>Leaves</b>	Lamina broadly lanceolate to ovate, subcordate or rarely elliptic; 1.4–2.0 times longer than broad, (10–)25–62(–100) × (5–)15–45(–72) mm; base subcordate, rounded or truncate	Lamina ovate, ovate-lanceolate, elliptic-lanceolate or elliptic to elliptic-ovate; twice longer than broad, (10–)20–100(–140) × (5–)10–50(–70) mm; base rounded to cuneate
Indumentum	Glabrous or sparingly pilose on margin and midrib	Sparingly pubescent to subglabrous adaxially, evenly to densely pubescent abaxially especially on midrib and main veins
Colour	Green, discolorous, drying dark green, yellow-green, blue-green or violet to black	Green, not drying purplish or markedly different
Lateral veins	In 3–6 pairs or alternate; prominent, especially abaxially	In 4–6 pairs; scarcely prominent adaxially, slightly so abaxially
<b>Inflorescences</b>	Racemose or subpaniculate with flowers in clusters along axis; female not accrescent in fruit	Racemose; female accrescent in fruit
Bracts	Narrowly triangular, up to 1.5 mm long, glabrous, persistent	Male: absent or minute, linear, fugaceous. Female: narrowly lanceolate, 0.5 mm long, pubescent or glabrous
<b>Flowers</b>	Male in bud ovoid, glabrous	Male in bud subglobose, subglabrous
Calyx lobes	Male: 2–4; elliptic to broadly elliptic, ovate or suborbicular. Female: 2–4; ovate, obovate or triangular; ± 2.2 × 1.2 mm	Male: 3–4; ovate to ovate-lanceolate. Female: 2 or 4; triangular-ovate to triangular-lanceolate or lanceolate; 1.0–1.5 × 0.5–0.7 mm
Number of stamens	20–33	9–25
Disk glands (female)	2 or 3; compressed reniform-crescentic or boomerang-shaped, apex rounded or obtuse	2; compressed ovoid or broadly ovate; apex subacute, obtuse, rounded or truncate
Ovary	2- or 3-lobed, glabrous	2-lobed; evenly to densely adpressed serocious-pubescent
Styles	2 or 3	2
Stigmas	papillose, papillose-lobulate or proximally smooth, distally papillose or papillose-lobulate	Fimbriate to fimbriate-lobulate
<b>Fruit</b>	1- to 3-coccos; glabrous; spreading to suberect	1- or 2-coccos; subglabrous or sparingly to evenly adpressed-pubescent; pendulous
<b>Seeds</b>	Reticulate; aril dull orange to bright orange-red at first, drying dull orange, lemon or ashen; testa dark brown	Foveolate- or scrobiculate-reticulate; aril bright orange-red; testa black

*Erythrococca kaokoensis* can be distinguished from *E. menyharthii*, which occurs in northeastern Namibia, by the young growth that is glabrous (vs. softly puberulous or pilose), the leaves being glabrous or sparingly pilose on the margin and midrib (vs. sparingly pubescent adaxially, more evenly so abaxially), the presence of subcordate leaves, the ovoid (vs. ovoid-conic), larger buds in male flowers, 2.0–2.2 mm diam. (vs. 1.0 mm diam.), the absence of extrastaminal glands (vs. 8 or 9) and the much higher number of stamens, 20–33 (vs. 2–5, rarely more) (Radcliffe-Smith 1987, 1996). *Erythrococca kaokoensis* can also be confused with *E. pauciflora* (Müller Argoviensis 1864: 333) Prain (1911b: 618) due to similarities in the leaves and flowers. However, the latter lacks subcordate leaves, the petiole is usually shorter, 4–5 mm long (vs. 2–18 mm long) and the young leaves are purple (green in the new species). Inflorescences in *E. pauciflora* are 2- to 5-flowered and seeds are smooth, whereas in *E. kaokoensis* inflorescences are 5- to 16-flowered in male and 2- to 8-flowered in female plants and seeds are reticulate (Pax in Pax & Hoffman 1914: 95).

**Additional specimens examined (paratypes):**—ANGOLA, Cunene Province:—1613: Zebra Mountains (Angola), 35 km north of Chitado, (–DD), 917 m, 25 April 2016, *Swanepoel 353* (PRU!). NAMIBIA, Kunene

Region:—1712: Ezorotuu Peak, Otjihipa Mountains, 15 km southeast of Otjinhungwa, (–BC), 1640 m, 19 April 2018, *Swanepoel 357* (WIND!); Okakora Mountains, 4.5 km west of Otjipemba, (–BD), 1510 m, 16 May 2018, *Swanepoel 356* (WIND!); 13 km south-southeast of Otjitanda along track to Etanga on rocky outcrop east of track, (–DB), 1400 m, 30 April 2017, *Swanepoel 354* (WIND!); Ongutu, rocky outcrop on river bank, (–DC), 800 m, 29 May 2014, *Swanepoel 352* (WIND!); Otjihipa Mountain, 2.5 km south of Ongutu, (–DC), 1180 m, 1 May 2017, *Swanepoel 355* (WIND!).—1713: Zebra Mountains, hill south of Okau, between boulders, (–BC), 980 m, 13 December 2014, *Swanepoel 338* (WIND!, PRU!).

### Key to Namibian species of *Erythrococca*

1. Young growth puberulous or pilose; lamina ovate, ovate-lanceolate or elliptic-ovate, never subcordate, sparingly pubescent adaxially especially on midrib and main nerves, more even abaxially; male buds ovoid-conic, 1.0 mm diam.; extrastaminal glands 8 or 9, interstaminal glands 0–2 (rarely more); number of stamens 5–8.....*E. menyharthii*
2. Young growth glabrous; lamina of at least some leaves subcordate, glabrous or sparingly pilose on the margin and midrib; male buds ovoid, 2.0–2.2 mm diam.; extrastaminal glands absent, interstaminal glands numerous; number of stamens 20–33 .....*E. kaokoensis*

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