



Article

***Euphorbia melanohydrata* subsp. *conica* (Euphorbiaceae), a new subspecies from Namibia, with notes on the identification of similar medusoid euphorbias**

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Abstract

Euphorbia melanohydrata subsp. *conica*, here described as a new subspecies, is only known from a small area within the Gariiep Centre of Endemism, southwestern Namibia. Diagnostic characters for subsp. *conica* include a distinctly conical or ovoid habit, a thickened main root usually without rhizomatous branches (plants not clump-forming), tuberculate lateral branches that often rebranch and persistent, stellate peduncles. A comparative table with diagnostic morphological features to distinguish between the two subspecies of *E. melanohydrata* and three other medusoid euphorbias (*E. friedrichiae*, *E. multiceps* and *E. namibensis*) is provided.

Introduction

Several species of dwarf succulent *Euphorbia* Linnaeus (1753: 450) with stout, partly buried main stems, covered with numerous tuberculate lateral branches are presently known from the *Flora of southern Africa* region. Popularly known as "miniature medusoid euphorbias", at least ten species of this group are known from the Richtersveld and Sperrgebiet (southern Namib Desert), quite a few of which are endemic to these areas (Williamson 1996, 2010, Germishuizen & Meyer 2003). The Richtersveld and Sperrgebiet form part of the Gariiep Centre of Endemism in the Northern Cape and southern Namibia, a cross-border biogeographical region rich in restricted range plants and animals (Van Wyk & Smith 2001). In this contribution, yet another new taxon of *Euphorbia* endemic to the Namibian part of the Gariiep Centre is described.

In 2006 during a botanical expedition to the Namus-Huns Mountain complex in southwestern Namibia, the author encountered an unusual dwarf succulent *Euphorbia*, with a conspicuous conical habit. At first it was thought to represent *E. multiceps* Berger (1905: 182), but careful examination showed that it differs from this species in several characters and is in fact most closely related to *Euphorbia melanohydrata* Nel (1935: 31). More plants with this conical habit were subsequently found on two separate plains in the Namus Mountains, and they are here proposed as representing a distinct new subspecies of *E. melanohydrata*. A study of the *Euphorbia* holdings in PRE and WIND revealed no other collections of the taxon.

Populations of the new subspecies and the typical form of *E. melanohydrata* were studied in the field and morphological states presented in the present contribution are based on living plants, fresh flowering material and mature fruits. For *E. multiceps*, *E. namibensis* Marloth (1909: 318) and *E. friedrichiae* Dinter (1914: 29), diagnostic features were obtained from field observations and/or the literature (White *et al.* 1941, Williamson 1996, 2010, Court 2010).

Taxonomic treatment

Euphorbia melanohydrata Nel subsp. *conica* Swanepoel, subsp. nov. (Fig. 1)

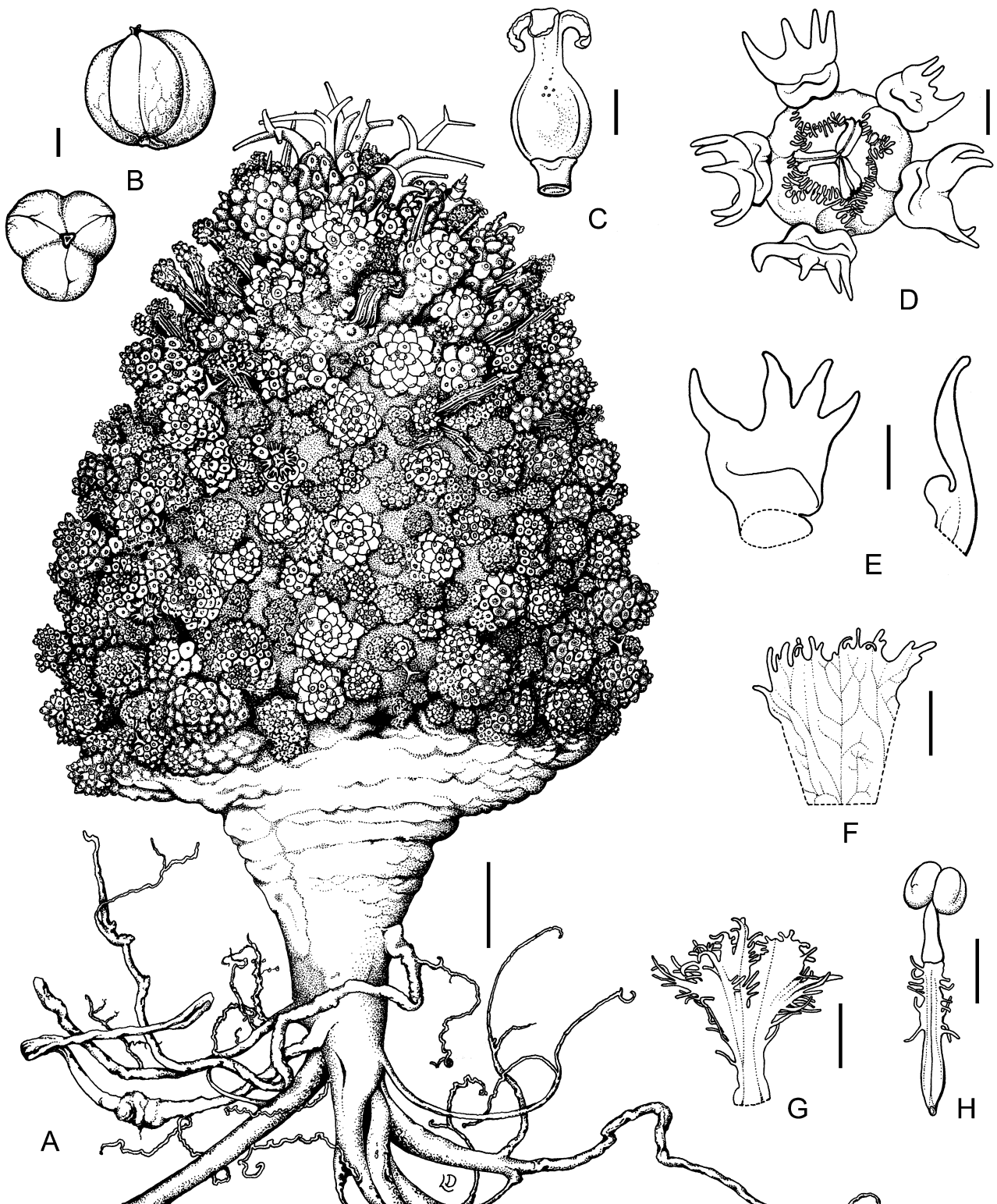


FIGURE 1. *E. melanohydrata* subsp. *conica*: (A) habit; (B) fruit, lateral and apical views; (C) female flower; (D) bisexual cyathium from above (male flowers still immature); (E) involucre gland, dorsal view (left) and lateral view in transverse section (right); (F) involucre lobe; (G) fascicular bract; (H) male flower. Voucher: *Swanepoel 263*. Scale bar 10 mm (A) or 1 mm (B–H). Illustration by Lesley Deysel.

Differs from the typical subspecies in the plants being distinctly conical or ovoid and nearly always solitary (not clump-forming); lateral branches usually shorter (15–30 mm); peduncular bracts elliptic or obovate; involucre glabrous inside, involucre lobes glabrous, gland apices not bifid; style apices dilated.

Type:—NAMIBIA. Karas Region: Plain below Namuskluft Mountain, 2716DB, 1340 m, 18 November 2006, *Swanepoel 263* (holotype WIND!; isotype PRE!).

Erect, spineless, dwarf succulent, conical, smaller plants also ovoid, up to 300 mm high, 210 mm diam. at ground level, often with small, tuberculate, branchless area at apex; plants nearly always solitary, very rarely with one or two rhizomatous stems. *Main stem* single, trullate or ovoid, surface irregularly horizontally folded or with convex projections, folds spaced at 4–10 mm; stem partly buried, broadest at ground level, up to 280 mm long, 170 mm diam., prolonged at base into tap root. *Bark* white-grey, glabrous, smooth. *Branches* perpendicular all over stem at slight intervals from one another, usually cylindrical, few somewhat clavate or terete, tuberculate, glabrous, often with secondary branchlets, especially towards stem base, green with thin whitish waxy coating, often reddish green towards branch apices, 15–30 mm long, 7–20 mm diam., ultimately withering, exposing bare stem, persisting, new replacement branches often developing at exposed areas. *Tubercles* unequally rhombic, penta- or hexagonal, usually longer than broad, laxly helical, rather scattered, glabrous, 3.0–6.6 × 1.7–5.7 mm long, 1.5–5.6 mm wide, prominent; tip slightly recurved, located at centre or from above centre to near apex; leaf scar whitish. *Leaves* simple, borne on tubercles, deciduous, somewhat fleshy, blue-green with whitish bloom, greener abaxially especially on midrib, glabrous; lamina linear, linear-elliptic, rarely oblanceolate, channelled adaxially, apex acute, mucronate, base cuneate, 2–16 × 1.4–2.2 mm long; margin cherry-red, ± pellucid, entire or with irregularly spaced, small, deltoid, pellucid teeth; petiole short, up to 1 mm long. *Inflorescences:* cyathia solitary or in simple cymes, bisexual or male, produced near apex of branches, pedunculate. *Peduncles* in axils of tubercles, simple or branching into 2–5 short, stellate cyme branches, bracteate, straight or curved downwards, cylindrical or terete, fleshy, glabrous, up to 20 mm long, 2.3–3.5 mm diam., ultimately withering, spine-like and persisting with prominent bract scars; *bracts* elliptic or obovate, apex denticulate-fimbriate, glabrous, soon deciduous, ± 1.0 × 1.3 mm. *Involucre* broadly infundibular, pentagonal from below, glabrous outside and within, 1.8–3.2 mm long, 3.6–5.6 mm diam. including the glands; *glands* 5, fleshy, glabrous, distant, spreading, distinctly stalked, transversely rectangular, quadrate or obovate, 0.8–1.3 × 0.8–1.7 mm, with deep transverse depression in front of inner margin, convex towards outer margin, inner margin and sides revolute, outer margin irregular with 1–5 subulate, somewhat recurved, pale green processes, apices not bifid, 0.3–1.6 mm long; upper surface finely pitted, pale pinkish yellow, lower surface pinkish green; *lobes* 5, erect, transversely rectangular, glabrous, 1.3–1.8 × 0.7–0.9 mm, apex irregularly denticulate-fimbriate. *Male flowers* 25, developing in 4 successions, arranged in 5 fascicles subtended by fascicular bracts, 5 flowers per fascicle; *fascicular bracts* fan-shaped, irregularly fimbriate-laciniate, widening towards apex, ± 2 mm long, laterally adnate to involucre; *pedicels* with longish hairs towards joint with filament, cylindrical, pale green or pinkish green, when fully developed ± 2 mm long, 0.4 mm diam.; *filaments* terete, glabrous, pale green or pinkish green, ± 0.8 mm long; *anther thecae* oblong-elliptic from above, reniform in lateral view, green, when fully developed 0.5–0.7 × 0.5 mm, pollen bright yellow. *Female flowers* erect, shortly stipitate, *ovary* 3-locular, obtusely trigonous, elliptic in lateral view, glabrous, 0.8–1.1 mm high, 1.0–1.3 mm diam., included in involucre; pedicel stout with few scattered hairs near joint with ovary, ± 0.8 mm long, ± 0.6 mm diam.; ovary rudimentary in male cyathium, 0.4 mm long, 0.4 mm diam., *perianth* obtusely triangular or circular, ± 0.7 mm diam; *styles* three, exerted from involucre, united at base into column 0.7–0.9 mm long, free portion with inner face deeply grooved, spreading-recurved, 0.7–0.9 mm long, glabrous, dilated at apex, entire. *Capsule* khaki-coloured when dry with slightly prominent veining, otherwise smooth, glabrous, obtusely trigonous, broadly ovate or elliptic-ovate in lateral view, apex obtuse, base emarginate, 4.6–5.1 mm high, 4.3–4.8 mm diam., halfway exerted when mature, on pedicel ± 0.8 mm long. *Seed* ± ovoid, obscurely 4-angled, apex acute, 3.2–3.5 × 2.3–2.6 × 2.0–2.5 mm, smooth or with few slight scattered tubercles, khaki-coloured.

Phenology:—Cyathia were recorded on subsp. *conica* from November to February.

Distribution and habitat:—At present *Euphorbia melanohydrata* subsp. *conica* is only known from the type locality and its immediate vicinity, on two plains, separated by a series of low hills, in the northern part of the Namus Mountains to the northeast of Rosh Pinah, southwestern Namibia (Fig. 2). This area falls within the Gariiep Centre of Endemism (Van Wyk & Smith 2001). The subspecies is found \pm 95 km from the coast at elevations of 1300–1360 m. This is a very arid region with an annual rainfall of 50–100 mm (Mendelsohn *et al.* 2002), most of which is received in winter. Plants are locally uncommon and grow as isolated colonies in open succulent scrubland on stony-sandy soil derived from sedimentary rocks of the Nama Group (Mendelsohn *et al.* 2002).

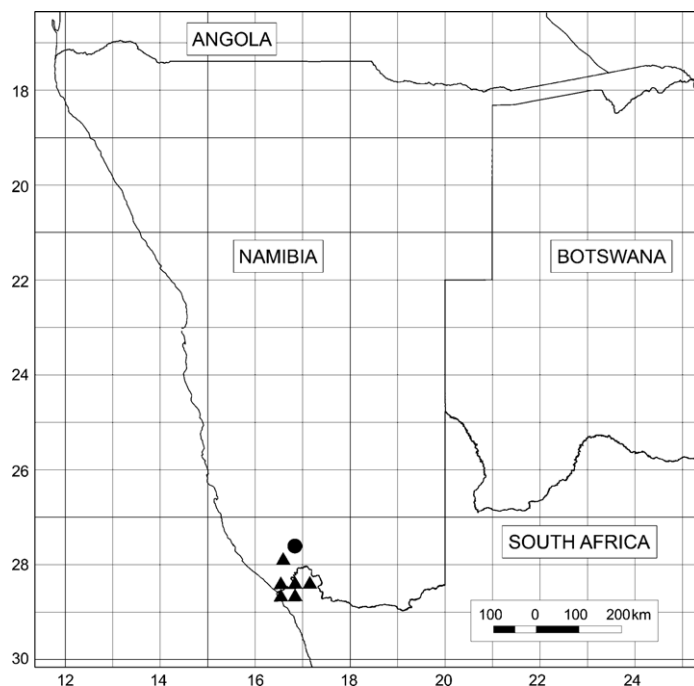


FIGURE 2. Known distribution of *E. melanohydrata* subsp. *melanohydrata*, ▲; and subsp. *conica*, ●.

Conservation status:—Subspecies *conica* is vulnerable as it occurs on commercial farm land which is from time to time subject to grazing and trampling by livestock. Potentially the greatest threat to the species is the illegal collecting of plants for the succulent plant trade. Due to the small known population of less than 250 mature individual plants, an IUCN Red List category of Endangered (EN) is proposed (IUCN 2001, Red List criterion D). In South Africa, subspecies *melanohydrata* has earlier been evaluated as Least Concerned (Raimondo *et al.* 2009).

Etymology:—The subspecific epithet refers to the distinctly conical growth form of the plants.

Additional specimen examined (paratype):—NAMIBIA. Karas Region: Farm Kolke 84, on road to farm Zebrafontein, 2716DB, 1300 m, 18 November 2006, *Swanepoel 264* (WIND!).

The subspecies *conica*, with its neat conical or ovoid (when young) habit, is an attractive and conspicuous plant. It differs from the typical subspecies in habit and some floral characters. Subspecies *conica* has a single stem whereas subsp. *melanohydrata* is often clump-forming due to the formation of rhizomatous branches, or the central stem dividing into two or more stem-like branches. In addition, the primary aerial side branches in subsp. *conica* usually are shorter (15–30 mm) than in subsp. *melanohydrata* (30–100 mm).

Differences in floral (cyathium) characters include the peduncular bracts that are elliptic or obovate in subsp. *conica*, but spatulate in subsp. *melanohydrata*. In subsp. *conica* the involucre is glabrous, whereas in subsp. *melanohydrata* it has a patch of hairs on the inside opposite the glands. Involucral lobes in subsp. *conica* lack ciliate hairs on the fimbriae, whereas these are present in subsp. *melanohydrata*. In subsp. *melanohydrata* the processes of the glands have apices that are often bifid, whereas those of subsp. *conica* are always simple. The styles in the two taxa also differ: in subsp. *conica* they are dilated at the apex, but in subsp. *melanohydrata* bifid.

Although *Euphorbia melanohydrata* subsp. *conica* is probably not closely related to *E. multiceps*, the two taxa share a similar conical habit. However, subsp. *conica* differs in a number of features from *E. multiceps* and also has a different geographical distribution. Subspecies *conica* is only known from the type locality in southwestern Namibia, whereas *E. multiceps* is confined to South Africa where it has a wide distribution ranging from the Little Karoo in the south, northwards to Steinkopf in Namaqualand (Court 2010).

In subsp. *conica* the primary side branches are much less densely crowded (there are narrow gaps between the branches through which the main stem is often visible) than in *E. multiceps*, of \pm uniform length on individual plants, thinner, shorter and secondary branches are usually present. The branches are usually cylindrical, with a few somewhat clavate or terete. In *E. multiceps* the branches are very densely crowded (main stem not visible) and branches are gradually decreasing in size from stem base to stem apex. Branches in *E. multiceps* are all somewhat clavate-cylindric and secondary branches are absent. The tubercles in *E. melanohydrata* subsp. *conica* are laxly helically arranged, rather scattered, whereas they are helical in *E. multiceps*.

The peduncles in subsp. *conica* arise from the lateral branches, are simple or branched at the tips into 2–5 conspicuous radiating branchlets (appearing like star-shaped spines). Peduncles of *E. multiceps* arise from both the main stem and the branches and are always simple. Cyathia in subsp. *conica* have the involucre glands transversely rectangular, quadrate or obovate with a deep transverse depression in front of the inner margin and are convex towards the outer margin with subulate processes. In *E. multiceps* the involucre glands are transversely oblong and concave with linear or oblong processes.

TABLE 1. Prominent morphological differences between *Euphorbia melanohydrata* subsp. *conica*, subsp. *melanohydrata* and three other medusoid euphorbias from the Gariiep Centre of Endemism.

Character	<i>E. melanohydrata</i> subsp. <i>conica</i>	<i>E. melanohydrata</i> subsp. <i>melanohydrata</i>	<i>E. multiceps</i>	<i>E. namibensis</i>	<i>E. friedrichiae</i>
Habit (shape & rhizomatous branching)	Conical, sometimes ovoid when young; solitary, very rarely with one or two rhizomatous plants	Globose or ovoid; usually clump-forming	Conical; solitary	Globose or subglobose; solitary	Subglobose or cylindrical; solitary
Branches shape	Cylindric (mainly), a few somewhat clavate or terete	Cylindric	Somewhat clavate-cylindric	Cylindric or slightly narrowing to apex	Cylindric and obtuse or elongated and tapering to spine-like point
length	15–30 mm	30–100 mm	50–75 mm	20–100 mm	25–125 mm
colour	green	blue-green	dull green	dull green	dark blue-green
Secondary lateral branches	Present	Present	Absent	Absent	Present
Tubercle shape	Rhombic, penta- or hexagonal	Subglobose, hexagonal, obovate or elongated	Rhombic or hexagonal	Rhombic	Cylindric conical or triangular
Inflorescences (cyathia)	Solitary or in simple cymes	Solitary, rarely in cymes	Solitary	Solitary or in cymes	Solitary or in cymes
Peduncles	Simple or stellate-like	Stellate-like, rarely simple	Simple	Simple or stellate-like	Simple or branching
Glands					
Outer margin (processes)	Processes 1–5, subulate, not bifid, 0.3–1.6 mm long	Processes 1–6, finger-like, often bifid, 0.3–1.0 mm long	Processes 2–4, linear or oblong, apices truncate or minutely notched, 0.5–0.7 mm long	Processes 2–5, simple or forked, subulate, 1.3–1.5 mm long	Processes 2–6, triangular or subulate, often bifid, 0.7–2.0 mm long

Euphorbia melanohydrata subsp. *conica* can also be confused with *E. namibensis* and *E. friedrichiae*, dwarf medusoid euphorbias which also occur in the western parts of the Gariep Centre of Endemism (Table 1). Subspecies *conica*, however, can be readily distinguished from these species, both of which are globose or cylindrical in habit, whereas it is conical or ovoid. It furthermore differs in several other morphological characters from these two species. In *E. namibensis* the primary branches are very laxly crowded and restricted to the apical half to two thirds of the main stem, the tubercles are helically arranged and the cyathia are bisexual only. The numerous dense, tapering peduncles, emerging and projecting beyond the main body of *E. friedrichiae*, give it a rugged, untidy appearance, whereas subsp. *conica* always has a neat, compact look. *Euphorbia friedrichiae* furthermore has the cyathia always bisexual, the involucre cup-shaped, often pubescent on the outside, the styles usually much longer (up to 5 mm), the capsules densely pubescent or tomentose and \pm double the size with larger seeds.

Additional morphological features to differentiate among the above-mentioned species are supplied in Table 1.

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