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Euphorbia otavimontana (Euphorbiaceae), a new species from Namibia

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ABSTRACT

Euphorbia otavimontana Swanepoel, here described as a new species, is a robust, spiny, succulent shrub endemic to the Otavi Mountains and surrounding areas in northern Namibia. It is probably most closely related to *E. ingenticapsa* from western Angola. Diagnostic characters for the new species include the variably shaped stem segments with greyish white or grey margins, the obconic involucre with the glands spreading in the central initial cyathium and erect or suberect in lateral cyathia, the papillate bifid styles and the obtusely trigonous or 3-lobed capsule which lacks turgid sinuses when developing. A comparative table with diagnostic morphological features to distinguish between *E. otavimontana* and *E. ingenticapsa* is provided. Based on IUCN Red List categories and criteria, a conservation assessment of “Endangered” is recommended for the new species.

Keywords: Euphorbiaceae, *Euphorbia otavimontana*, Karstveld, limestone, new species, Namibia, Otavi Group, succulents, taxonomy

INTRODUCTION

Hitherto seven large, spiny, succulent shrub or tree species of *Euphorbia* Linnaeus (1753: 450) with \pm candelabriform habit have been recognised from Namibia (Germishuizen & Meyer 2003, Klaassen & Kwembeya 2013). In this contribution, an eighth candelabriform species of *Euphorbia* is described for Namibia.

In 2008 during a botanical excursion to the Otavi Mountains and surrounding areas in the Karstveld (region dominated by limestone) of central northern Namibia, the author encountered an unusual large, spiny, succulent, shrub *Euphorbia*, with a candelabriform habit belonging to subg. *Euphorbia* sect. *Euphorbia* (Bruyns et al. 2006). Initially it was thought to represent *E. virosa* Willdenow (1799: 882), but careful examination showed that it differs from this species in several characters and is in fact more closely related to *E. ingenticapsa* Leach (1971: 356) from western Angola. Plants were found at four localities and are here proposed as representing a distinct new species. A study of the *Euphorbia* holdings in the National Herbarium of Namibia (WIND) revealed one other collection of the taxon, filed under the name *E. venenata* Marloth (1930: 337, 339), a synonym of *E. avasmontana* Dinter (1928: 96) (Bruyns 2012).

Populations of the new species were studied in the field and morphological states described in the present contribution are based on live plants, fresh

flowering material and mature fruit. For *E. ingenticapsa* and the other species mentioned in the text, diagnostic features were obtained from field observations and/or the original descriptions.

TAXONOMIC TREATMENT

Euphorbia otavimontana Swanepoel, *sp. nov.* (Figures 1-9)

Euphorbia otavimontana resembles *E. ingenticapsa*, but is easily distinguished from this species by, amongst others, the stem segments being more variable in shape, namely elliptic, narrowly elliptic, ovate, trullate, lanceolate, spatulate or suborbicular, rarely oblong (vs. more or less trullate, elliptic or suborbicular), with margins greyish white or grey (vs. pale brown), not hump-like at base of spines (vs. hump-like at base of spines); 1-5 cymes produced per flowering eye (vs. 1-3); involucre obconic (vs. bowl-shaped); glands spreading in initial cyathium, erect or suberect in lateral cyathia (vs. spreading in all cyathia); male flowers 16-48 per involucre (vs. \pm 70), pedicels shorter, 1.8-3.6 mm (vs. \pm 5 mm), filaments longer, 1.2-2.0 mm (vs. \pm 1 mm); female flowers with ovary ovoid or trigonous (vs. subglobose), styles shorter, 2.6 mm (vs. \pm 5 mm), stigmas papillate, bifid (vs. capitate, rugulose, emarginate); capsule \pm obtusely trigonous or 3-lobed, smaller, 9-13 \times 6-9 mm, developing sinuses not turgid (vs. 3-lobed, larger, 26-28 \times 11-13 mm, developing sinuses turgid).



Figure 1: *Euphorbia otavimontana*.
Terminal branch segment with
flowering eyes.



Figure 2: *Euphorbia otavimontana*.
Terminal branch segment with fully
developed cyathia.



Figure 3: *Euphorbia otavimontana*.
Almost mature fruit.

Type:

NAMIBIA. Otjozondjupa Region: Otavi Mountains, Farm Auros 595, hillside opposite farmhouse, 1,880 m, 1917DA, 1 July 2008, *Swanepoel* 349 (holotype WIND!; isotype South African National Biodiversity Institute, PRE!).

Description:

Succulent, candelabriform, \pm flat-topped, spiny, small to large shrub with height and diam. up to 2.5 m, appearing acaulous. *Central stem* reduced, branching from base and up to 0.6 m above ground. *Branches* numerous, arcuate-ascending, rarely decumbent, densely whorled on central stem, persistent, constricted into segments, 4-7(8)-winged, up to 2.8 m long, occasionally rebranched at or towards apex, green or glaucous-green, sometimes with yellow-green bands radiating more or less to flowering eyes, often grey towards base; segments variable in shape, elliptic, narrowly elliptic, ovate, trullate, lanceolate, spatulate, or subcircular, rarely oblong, 20-150 mm long, 30-130 mm diam. over broadest part, 20-70 mm diam. over narrowest part, rarely twisted; wing-like angles usually much compressed, deeply grooved in between with continuous, \pm even, sinuate, dentate, crenate or irregular, rarely undulate horny margin, often slightly decurrent; margin initially green or maroon becoming greyish white or grey, 3.5-10.0 mm wide, often widened at flowering eyes, armed with spines at apex of crenations. *Spines* paired, stout, \pm straight, alternating with flowering eyes, 1-16 mm long, longest on broadest part of wings, spaced at 3-25 mm intervals, diverging at 20-160 degrees or parallel, \pm perpendicular to margin or slightly pointing upwards or downwards. *Secondary branches* produced from wing margin at broadest part of segment or just

below, single or whorled. *Leaves* sessile, ovate, ovate-triangular, ovate-pentagonal, triangular or pentagonal, in t/s concave or flat adaxially, convex abaxially, apex obtuse or acute, often apiculate, base cuneate or parallel-sided, thick, fleshy; flanked by pair of fleshy, soon withering, obtusely angular or conical prickles with drawn-out apices, marcescent, 15-50% as long as lamina; caducous, leaving often an inconspicuous, crescent-shaped or semi-circular leaf scar shortly above spine pairs, 1.5-3.9 \times 1.6-4.1 mm long, margin entire, irregularly denticulate or crenate, dentate or irregular. *Inflorescences* cymose, glabrous, (1-3(-5) horizontally arranged cymes arising above lower of two spine pairs, solitary cymes usually on smaller plants, on new growth a pair of thin, triangular or subquadrate, leaf-like caducuous prickles at base of flowering eye, up to 0.9 \times 0.8 mm long, margins unequally lacinate or irregularly dentate; flowering eyes at 30-60% the distance between adjacent pairs. *Cymes* pedunculate, glabrous, each with 3 vertically arranged cyathia, central initial cyathium male marcescent, sessile, laterally compressed by bisexual lateral cyathia, laterals borne on cyme branches. *Peduncle* bibracteate, stout, laterally compressed when more than one cyme at flowering eye, tapering to base, sometimes obscurely grooved vertically on sides between branches, light green, 1.5-3.4 mm long, 1.2-2.0 mm diam. at base, 4.5-5.5 mm at apex; bracts ovate or triangular-ovate, clasping peduncle, slightly keeled, light green, light yellow or orange-red, soon withering, thin and papery towards margin, margin entire, denticulate towards apex, 2.2-3.5 \times 3.1-4.3 mm. *Cyme branches* bibracteate, stout, tapering to base, vertically ridged opposite adjacent cymes, light green, 2.1-4.3 \times 4.3-5.5 mm diam.; bracts similar to those on peduncle, clasping involucre, leaving conspicuous broad v-shaped scar on cyme branch. *Involucre* obconic, glabrous, light green, in initial



Figure 4: *Euphorbia otavimontana*. Plant in natural habitat, farm Auros, E of Otavi (type locality)

Figure 5: *Euphorbia otavimontana*. Plant in natural habitat, farm Nimitz, NE of Outjo

Figure 6: *Euphorbia otavimontana*. Plant in natural habitat, Lake Otjikoto, NW of Tsumeb

Figure 7: *Euphorbia otavimontana*. Plants in natural habitat, Lake Otjikoto, NW of Tsumeb

Figure 8: *Euphorbia otavimontana*. Plants in natural habitat, Lake Otjikoto, NW of Tsumeb

male cyathium usually laterally compressed by laterals, 4.2-4.5 mm long, 5.2-7.2 mm diam. including glands, in lateral cyathia \pm 3.6 mm long, \pm 7.1 mm diam. including glands, laterally compressed when developing; *glands* (4)5(6), transversely oblong, elliptic-oblong or reniform, spreading in initial male cyathium, erect or suberect in lateral cyathia, thick, coriaceous, contiguous, rarely separate, obscurely peltate, green becoming yellow, smooth, margin entire; convex to flat adaxially and in t/s, in male cyathium $3.9-4.7 \times 1.1-2.5$ mm, *lobes* (4)5(6), erect, glabrous, transversely rectangular, subquadrate or flabellate, basally prominently longitudinally ridged abaxially, apex irregularly

fimbriate, $1.1-1.5 \times 1.1-2.2$ mm. *Male flowers* 16-48, well exerted from involucre, subtended by filiform bracteoles, arranged opposite lobes in (4)5(6) bracteate fascicles of 4-8 flowers each, glabrous; *fascicular bracts* broad, unequally deeply lacinate, irregularly fimbriate, 3.0-3.8 mm long; *bracteoles* filiform or filiform-lacinate, 0.9-2.9 mm long; *pedicels* filiform, pale green, apices exerted beyond glands, when fully developed 1.8-3.6 mm long, 0.2-0.4 mm diam.; *filaments* terete, pale green, 1.2-2.0 mm long; *anther thecae* ellipsoid or subglobose, flattened, pale yellow, 0.4-0.7 mm diam., pollen yellow. *Female flowers* erect, glabrous; *ovary* ovoid, trigonous, three-locular, green, \pm 1.6-1.8 mm high,

1.3-1.5 mm between corners, included in involucre; *perianth* 3-lobed or pentagonal, fleshy, margin irregularly dentate, \pm 2mm diam.; female flower rudimentary in male cyathium; *styles* 3, horizontally spreading, recurved at apex, \pm equal to apex of pedicels, shallowly grooved down inner face, \pm 2.6 mm long, united into a column for third to half their length; *stigmas* bifid, papillate. *Capsule* pale green to reddish green when fully developed, glabrous, 3-locular, \pm obtusely trigonous or 3-lobed, usually prominently obtusely ribbed in sinuses, 9-13 mm between corners, broadest towards base, 6-9 mm high, apex truncate, base truncate, exserted from involucre on a straight, stout, pedicel, \pm 3 mm long, 4-5 mm diam; *perianth* \pm triangular or pentagonal, margin irregularly dentate, 7-8 mm diam.; *seed* subglobose, greater diam. 2.8-3.4 mm, lesser diam, 2.4-3.0 mm, pale brown with creamy blotches or *vice versa*, sometimes with dark brown reticulate markings in addition, suture blackish brown, hilum biconvex or ligulate.

Phenology:

Cyathia were recorded from June to September.

Distribution and habitat:

Endemic to Namibia. At present *Euphorbia otavimontana* is only known from the type locality and three other sites in the Otavi Mountains and surroundings: farm Nimitz NE of Outjo, the mining grounds on the outskirts of Tsumeb and at Lake Otjikoto NW of Tsumeb. The new species is found \pm 340-470 km from the coast at elevations of 1,350-1,920 m. Annual rainfall of 450-600 mm is received in summer (Mendelsohn et al. 2002). Plants are locally uncommon and grow in isolated colonies in

savannah on mountain slopes or level ground on stony-sandy soil or limestone outcrops of the Otavi Group (Mendelsohn et al. 2002). (Figure 9).

Conservation status:

Euphorbia otavimontana is vulnerable, because apart from the population at Lake Otjikoto, plants do not occur in protected areas but on commercial farm land. Potentially the greatest threat to the species is the illegal collecting of plants for the succulent plant trade and for horticultural purposes. It is suspected that due to confusion with the widespread *E. avasmontana*, collecting permits for horticultural purposes were issued in the past. Due to the small known population of less than 250 mature individual plants, an IUCN Red List category of Endangered (EN) is proposed (IUCN 2012; Red List criterion D).

Etymology:

The subspecific epithet refers to the Otavi Mountains in central northern Namibia, to which the new species is endemic.

Additional specimens examined (paratypes):

NAMIBIA. Oshikoto Region: Lake Otjikoto, 12 miles NW of Tsumeb, 1,230 m, 1917BA, *De Winter* 3678A (PRE!, WIND!).

Kunene Region: Farm Nimitz 353, 50 km NE of Outjo, in woodland 500 m north of homestead, 1,354 m, 1916DC, 11 November 2015, *Swanepoel* 350 (WIND!).

Notes:

The new species differs from *E. ingenticapsa* in the morphology of the branches, inflorescences, flowers and fruit. Some of the more prominent morphological features to differentiate *E. otavimontana* from *E. ingenticapsa* are compared in Table 1.

Euphorbia otavimontana can be confused with several of the other large spiny species of *Euphorbia* occurring in Namibia, but differs from them in a combination of characters. In *E. avasmontana* the ovary and capsules are far exserted on curved pedicels, *E. otjingandu* Swanepoel (2009: 497) has a short trunk (up to 1 m) terminating in a central stem and in *E. virosa* the flowering eyes produce solitary cymes, the involucre frequently have more than the usual five glands and lobes (up to 10) and the ovary is 3-6-merous.

Euphorbia otavimontana can also be confused with some of the larger members of *Euphorbia* in Angola. It differs from *E. dispersa* Leach (1974: 48) in the peduncles and cyme branches which are always smooth, peduncles and cyme branches which are \pm of equal length and by the teeth of the perianth that are

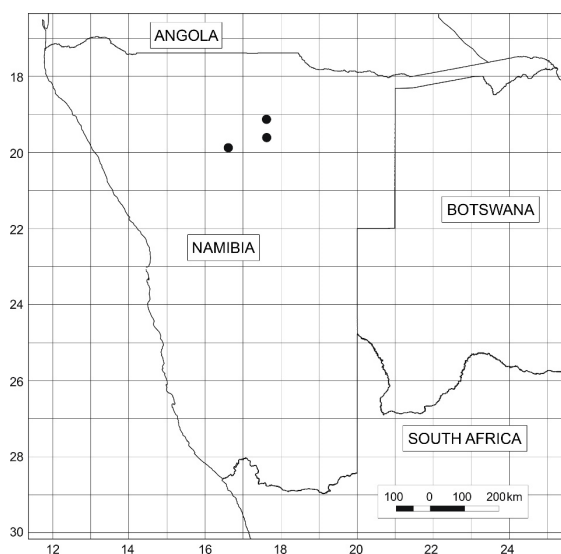


Figure 9: Known distribution (black dots) of *Euphorbia otavimontana*.

Table 1: Prominent morphological differences between *Euphorbia otavimontana* and *E. ingenticapsa*.

Character	<i>E. otavimontana</i>	<i>E. ingenticapsa</i>
Branches		
segments (shape)	Elliptic, narrowly elliptic, ovate, trullate, lanceolate, spathulate or subcircular, rarely oblong	More or less trullate, elliptic or subcircular
margins	Sinuate, dentate, crenate or irregular, rarely wavy, sometimes slightly decurrent, often widened at flowering eyes; not hump-like at base of spines; initially green or maroon becoming greyish white or grey	Sinuate-dentate, often wavy, widened, thickened and hump-like at base of spines; pale brown
Inflorescences		
no. of cymes	1-3(-5) per flowering eye	(1-)3 per flowering eye
Peduncle		
diam. at base	1.2-2.0 mm	± 4 mm
diam. at apex	4.5-5.5 mm	6-7 mm
length	1.5-3.4 mm	5-10 mm
bracts (length)	2.2-3.5 mm	± 8 mm
Involucre		
shape	Obconic	Bowl-shaped
lobes (number of)	4-6	5-7
lobes (length)	1.1-1.5 mm	± 2.5 mm
Glands		
number of	(4)5(6)	5-7
shape	Transversely oblong, elliptic-oblong or reniform	Transversely elliptic
arrangement	Spreading in central initial cyathium, erect or suberect in lateral cyathia	Spreading
texture	Smooth	Rugulose
Male flowers		
number of flowers	16-48 per involucre	± 70 per involucre
pedicels (length)	1.8-3.6 mm	± 5 mm
filaments (length)	1.2-2.0 mm	± 1 mm
fascicular bracts (shape)	Unequally deeply laciniate, irregularly fimbriate	Filiform-fimbriate, laciniate
bracteoles (shape and size)	Filiform or filiform-laciniate; 0.9-2.9 mm long	Filiform-fimbriate; ± 4 mm long
Female flowers		
ovary	Ovoid, trigonous	Subglobose, when developing having an appearance of being 6-lobed when viewed from above
styles (length)	± 2.6 mm	± 5 mm long
stigmas (shape)	Papillate, bifid	Capitate, rugulose, emarginate
perianth	3-lobed or pentagonal	3-lobed
Capsule		
shape and size	± Obtusely trigonous or 3-lobed, usually prominently obtusely ribbed in sinuses, sinuses not turgid when developing; 9-13 × 6-9 mm	3-lobed, almost triangular when seen from above, when developing sinuses turgid, capsule appearing 6-lobed; 26-28 × 11-13 mm
perianth (shape)	3-lobed or pentagonal	3-lobed
pedicel (length)	± 3 mm	5-6 mm
Seed	2.8-3.4 mm (greater diam.), 2.4-3.0 (lesser diam.)	± 4 mm (greater diam.), 3.5 mm (lesser diam.), slightly compressed

not fused to the sinuses of the developing capsule. From *E. faucicola* Leach (1977: 99) it differs in the branches that are 4-8-winged with margins not becoming blackish and corky, prickles which do not become widely separated and positioned above the leaf scar, smooth peduncles and cyme branches, and an ovoid ovary seated on a 3-lobed or pentagonal irregularly dentate perianth.

Smaller plants of *Euphorbia otavimontana* can be confused with *E. atrocarmesina* Leach (1968: 167), *E. cannellii* Leach (1974: 47), *E. semperflorens* Leach (1970: 185) and *E. strangulata* Brown (1913: 1041), small shrubs from western Angola, due to a similar acaulous habit, branches which are variably segmented and straight paired spines which are longest at the widest part of the segments. The new species, however, can be readily distinguished from

all of these by its cymose inflorescences and shortly pedicellate capsules instead of single cyathia and sessile capsules.

Dinter (1928) mentions a species of *Euphorbia* from Auros, the type locality of the new species, with similar habit to that of *E. dinteri* Berger (1906: 109), a synonym of *E. virosa* (Leach 1971). Marloth in his description of *E. venenata*, refers to plants of similar shape and flower structure from near Auros (Marloth 1930). White et al. (1941) in their treatment of *E. venenata* also mention the latter as occurring near Auros, in the Tsumeb region and near Lake Otjikoto and include several pictures of plants from the mentioned localities. During the present study, apart from the new species and *E. volkmanniae* Dinter (1928: 124) (sympatric at Auros), no other shrub species of *Euphorbia* was found at or near any of the mentioned localities. It is thus concluded that Dinter, Marloth and White et al. all referred to the new species in their publications.

In his description of *E. ingenticapsa*, Leach (1971) provided a comparative picture of fruiting cymes of the latter and of *E. venenata*. In the caption of the figure it is mentioned that the fruiting cymes of *E. venenata* are from the specimen *Leach & Cannell 14047* from Tsumeb. Since the fruiting cymes in the figure agree with those of the new species and no other species of *Euphorbia* shrub was found in or near Tsumeb, it is concluded that the fruiting cymes depicted in Leach's picture are in fact those of the new species. The distribution records shown for *E. venenata* from the Tsumeb area in Mannheimer and Curtis (2009) most probably also refer to *E. otavimontana*. The close-up picture of a fruiting branch in the latter publication corresponds with that of the new species.

Euphorbia otavimontana is easily grown from cuttings. Porcupines (*Hystrix africaeaustralis*) feed on the branches during periods of drought.

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