



Crassothonna agaatbergensis (Asteraceae), a new species from the Skeleton Coast, Namibia

WESSEL SWANEPOEL^{1*} & VERA DE CAUWER²

¹H.G.W.J. Schweickerdt Herbarium, Department of Plant and Soil Sciences, University of Pretoria, Pretoria, 0002 South Africa. Postal address: P.O. Box 21168, Windhoek, Namibia.

²Biodiversity Research Centre, Faculty of Natural Resources and Spatial Sciences, Namibia University of Science and Technology, Private Bag 13388, Windhoek, Namibia.

*Author for correspondence. Email: wessel@kaokosafari.com

Abstract

Crassothonna agaatbergensis, here described as a new species, is known only from the northern part of the Skeleton Coast (part of the Namib Desert) in the Kaokoveld Centre of Endemism, northwestern Namibia. These perennial shrublets grow on basalt of the Agaatberg Mountain under harsh desert conditions. Diagnostic characters for *C. agaatbergensis* include the partially buried, globose, obovoid or ampulliform caudex and the inconspicuous rays which are much shorter than the involucre. A comparison of some of the more prominent morphological features to differentiate between *C. agaatbergensis* and its possible nearest relatives, *C. clavifolia* and *C. protecta*, is provided. Based on IUCN Red List categories and criteria, a conservation assessment of Endangered (EN D) is recommended for the new species.

Keywords: Agaatberg, endemism, flora, Gariiep Centre of Endemism, Kaokoveld Centre of Endemism, Namib Desert, succulent, taxonomy

Introduction

Crassothonna Nordenstam (2012: 70) is endemic to the *Flora of southern Africa* region (South Africa, Namibia, Botswana, Eswatini and Lesotho) with thirteen described species recognized at present. Six species occur in Namibia, all recorded from the predominantly winter rainfall region of the southern Namib Desert, from Lüderitz southwards to the Orange River, except for *C. protecta* Dinter (1923: 141) Nordenstam (2012: 74) which occurs as far north as the Naukluft massif in the north-central Namib. As a genus, *Crassothonna* can easily be recognized by the terete, succulent leaves (Nordenstam 2012).

In this contribution, a new species of *Crassothonna* 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 northern section of the Skeleton Coast National Park, Namibia, in May 2019, the first author encountered an unfamiliar succulent shrublet on the summit of the Agaatberg Mountain, approximately 8 km east of Cape Fria. The plants were in flower, enabling material to be collected and the plants to be identified as an undescribed species of *Crassothonna*. The new species seems to be closely related to *Crassothonna clavifolia* (Marloth 1910: 38) Nordenstam (2012: 73) and *C. protecta* from southern Namibia and the Northern Cape Province of South Africa (the latter species extending into the Western Cape), due to similarities in habit and leaf morphology (short caudex embedded in the ground; leaves cylindrical, subterete or clavate). A study of the *Crassothonna* holdings in WIND and PRE revealed no other collection of the new species (Herbarium acronyms follow Thiers 2019).

Live material of the new species, here described as *Crassothonna agaatbergensis* was studied in the field. Morphological characters in the description that follows were determined from live specimens and from fresh flowering material and ripe fruit for *C. agaatbergensis* and from herbarium material and the literature (Marloth 1910; Dinter 1923; Compton 1931; Rowley 1994; Nordenstam 2012) for *C. clavifolia* and *C. protecta*.

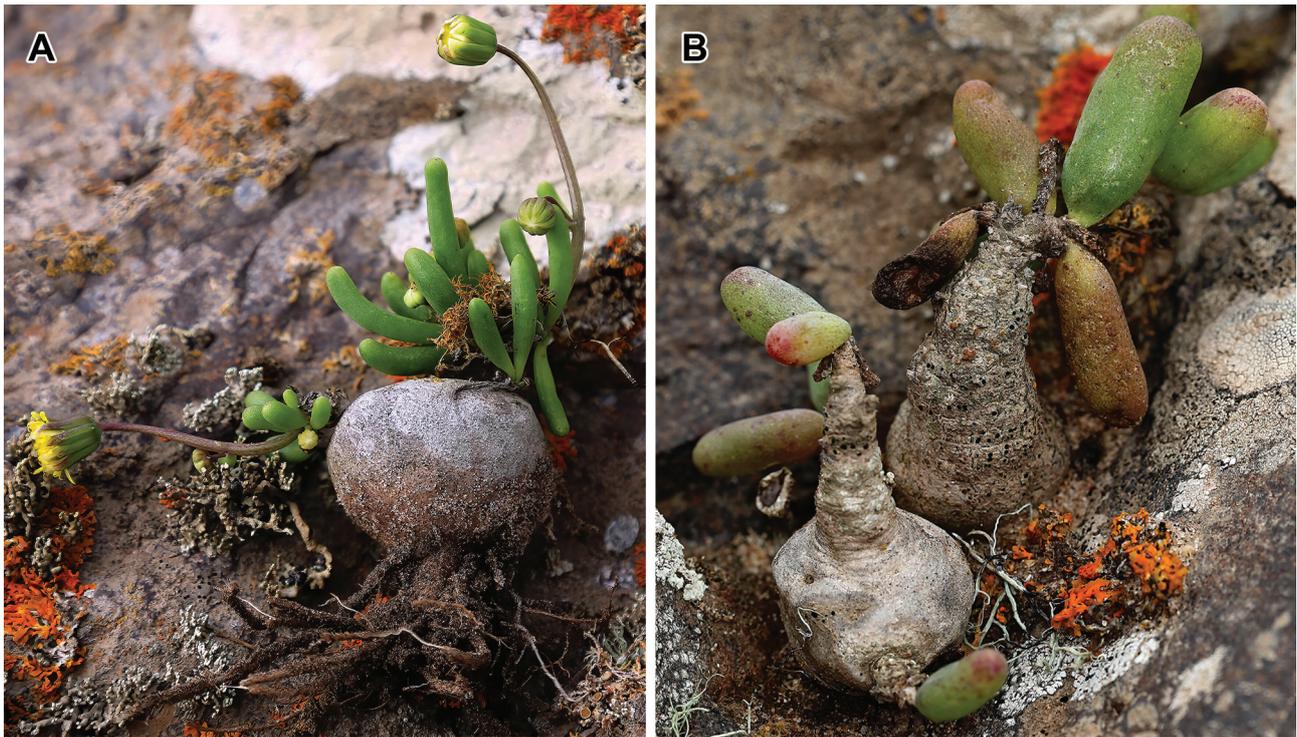


FIGURE 1. *Crassothonna agaatbergensis*. **A.** caudex (obovoid), leaves, flowers and roots; **B.** caudex elongated into a long branch. Photographs by W. Swanepoel.

Taxonomic treatment

Crassothonna agaatbergensis Swanepoel, *sp. nov.* (Figs. 1 & 2)

Diagnosis:—Succulent shrublet up to 150 mm high, related to *C. clavifolia* and *C. protecta*, differing from *C. clavifolia* by leaves being cylindrical, botuliform, or in shorter leaves often clavate, 10–70 mm long, 2–7 mm diam. (3–6 times as long as broad) [*vs.* leaves in habitat grape-like, up to 15 mm long, 6–8 mm diam. (ca. twice as long as broad)], inflorescences simple or once to several times forked, bracts leaf-like, capitula 1–10, rays very short (a fifth to a quarter as long as involucre) [*vs.* inflorescences simple, bracts scale-like, capitula solitary, rays long (twice as long as involucre)]; from *C. protecta* by the caudex being globose, obovoid or ampulliform [*vs.* caudex slender, bottle-shaped or sausage-like], rays very short (a fifth to a quarter as long as involucre), not rolled backwards, with 1 or 2 green lines [*vs.* rays long (as long as involucre), soon rolled backwards, with 3 or 4 green lines].

Type:—NAMIBIA. Kunene Region: Skeleton Coast National Park, Agaatberg, 8 km east of Cape Fria, summit of western ridge, 1812AC, 225 m, 6 May 2019, *Swanepoel 368* (holotype WIND!; isotypes PRE!, PRU!).

Succulent shrublet with globose, obovoid or ampulliform caudex, apices on older plants drawn out (referred to as branches below) and continually growing, often with growth rings, partially buried or wedged between rocks, up to 0.15 m high, roots fibrous. *Branches* globose, cylindrical or conical, 1–8 arising from apex of caudex, rarely laterally, often articulated, 5–30(–130) mm long, 7–15 mm diam. *Leaves* alternate and spirally arranged or clustered on branch apices, spreading to erect, sessile, cylindrical, botuliform or in shorter leaves often clavate (3–6 times as long as broad), sometimes slightly flattened and grooved adaxially, rarely mucronate, base gradually tapering, soft, very fleshy, green to maroon-green, often glaucous, 10–70 mm long, 2–7 mm diam., leaf axils woolly. *Inflorescences* axillary, simple or once to several times forked, 40–180 mm long, green or maroon-green, usually with maroon longitudinal lines, glaucous. *Bracts* at ramifications leaf-like, up to 42 mm long. *Peduncle* erect, 15–110 mm long, 2–3 mm diam., (at capitulum 1 mm diam.), 1 or 2 smaller scale-like bracts towards capitulum, lanceolate, 2–3 mm long, or absent. *Capitula* solitary or up to 10, slightly convex, 6.5–7.2 mm diam. (8–10 mm diam. including rays), yellow-flowered, radiate (appearing disciform), heterogamous with female ray florets and cylindrical hermaphrodite (female sterile) disc florets. *Receptacle* convex, alveolate. *Involucre* soft, cupuliform, campanulate at anthesis, phyllaries uniseriate, 8,

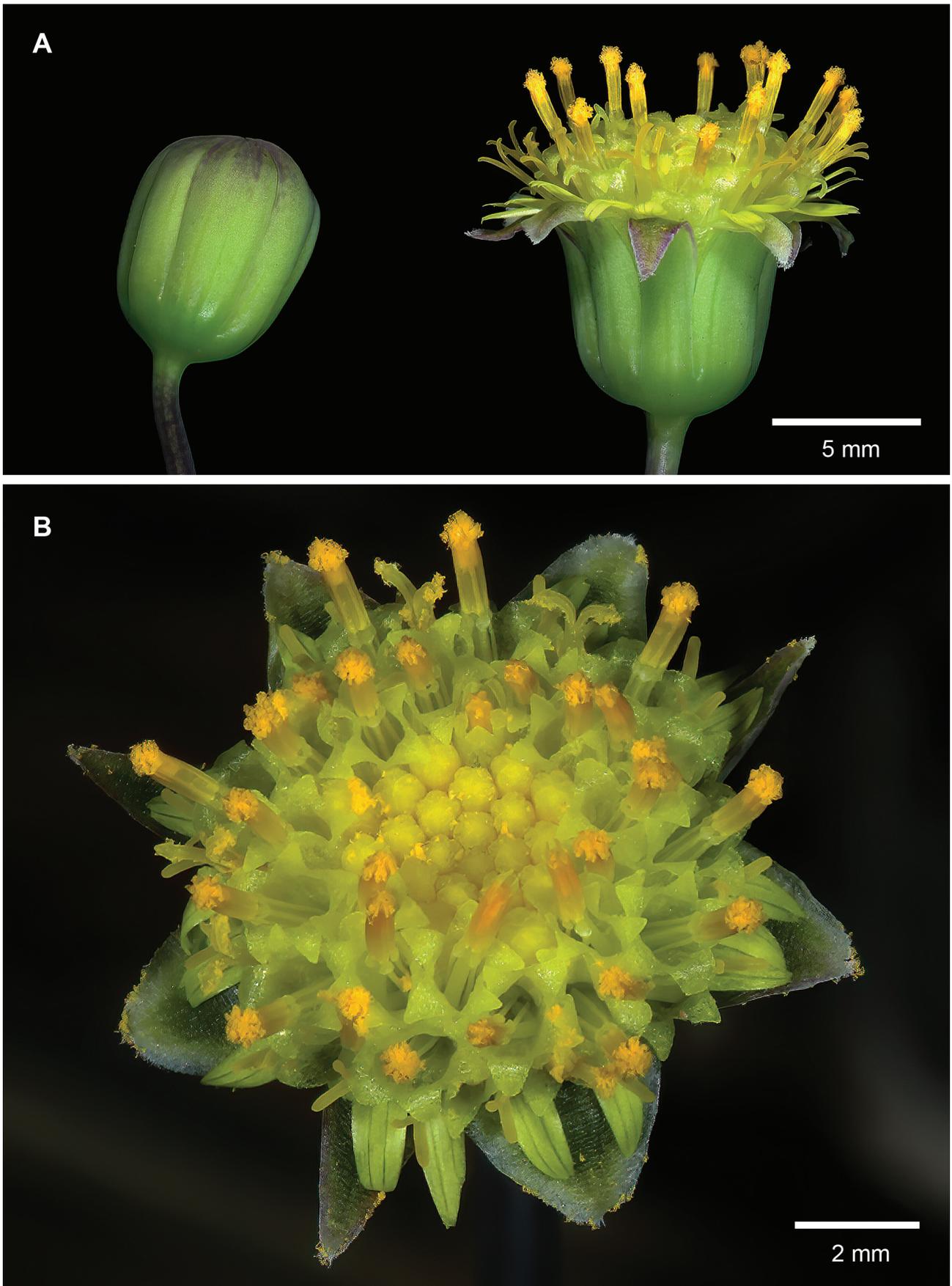


FIGURE 2. *Crassothonna agaatbergensis*: capitulum at anthesis. **A.** side view; **B.** view from above. Photographs by W. Swanepoel.

basally shortly connate, narrowly elliptic or lanceolate, 7–8 mm long, 2–4 mm wide, herbaceous, margins membranous or not (three membranous, two membranous one side only, three lacking membranes), acute, green or maroon-green, glaucous, with 3–5 maroon lines. *Ray florets* yellow, ligulate, corolla ca. 4.7 mm long (including ray), tube tapering towards limb from 0.6 to 0.4 mm diam.; ray very short, inconspicuous, pale yellow, narrowly elliptic with 1 or 2 longitudinal green lines, 1.8–2.1 mm long, a fifth to a quarter as long as the involucre, apex obtuse, entire or with 1 or 2 denticulate teeth. Ovary fusiform-oblong, pale green, glabrous, 1.3 mm long, 0.6 mm diam. Style 3.7–4.0 mm long, 0.3 mm diam. at base tapering for 0.7 mm to 0.3 mm then terete; branches ca. 1 mm long, flattened, grooved, minutely papillate. Pappus bristles persistent, copious, ca. 50, erect, straight, minutely barbellate, white, ca. 4.5 mm long. *Achene* narrowly obovate, angular, smooth, glabrous, 0.5 mm long, 0.3 mm wide. *Disc florets* pale green, corolla ca. 4.5 mm long; tube cylindrical, ca. 1.3 mm long, 0.5 mm diam.; limb narrowly campanulate, slightly narrowed in centre, ca. 3.2 mm long, 1.1 mm diam.; lobes deltoid, 0.5 mm long, densely papillate outside. Anthers 1.7–1.9 mm long including the ovate appendage; filaments ovate apically, distinctly swollen. Style simple, sterile, ca. 5.3 mm long, 0.2 mm diam., tipped with an obtuse conical appendage, cone 0.3 mm long with short hairs, hairs at base longer. Pappus absent, marginal florets sometimes with 1–5 bristles. Ovary narrowly obconical, glabrous, ca. 2.1 mm long.

Phenology:—Flowers were recorded from May to July (probably flowers throughout the year).



FIGURE 3. Habitat of *Crassothonna agaatbergensis* on the Agaatberg Mountain. Photograph by W. Swanepoel.

Distribution and habitat:—At present *Crassothonna agaatbergensis* is known only from the Agaatberg Mountain 8 km to the east of Cape Fria, in the Skeleton Coast National Park (Figs. 3 & 4). This part of the Skeleton Coast National Park falls within the Namib Desert zone of the Kaokoveld Centre of Endemism, a biogeographical region known for its many restricted-range plants and animals, and extending from northwestern Namibia to southwestern Angola (Van Wyk & Smith 2001). *Crassothonna agaatbergensis* occurs approximately 8 km from the coast at elevations of 195–225 m a.s.l. Average annual rainfall in the area is less than 50 mm, occurs in summer and is highly erratic. However, the area regularly receives fog from the bordering Atlantic Ocean (Mendelsohn *et al.* 2002). The Agaatberg Mountain, especially the higher ridges, clearly receives more precipitation from coastal fog than the surrounding hills and outcrops. This is evident by the occurrence of pockets of moss at the base of rocks and vertical areas, and the density of lichens which is markedly greater on the summits of the highest ridges. The new species occurs on the summits of two of the highest ridges of the Agaatberg Carbonatite Complex (Guj *et al.* 2011), separated by approximately 0.5 km,

in small colonies of about twenty plants each (ca. seventy plants known). It grows on basalt in soil-filled rock fissures and among rocks on level and low vertical areas. Environmental conditions in the general area are extremely harsh, with low rainfall, high temperature variation and strong winds (calm for only 14% of the time as measured at Möwe Bay to the south (Mendelsohn *et al.* 2002)).

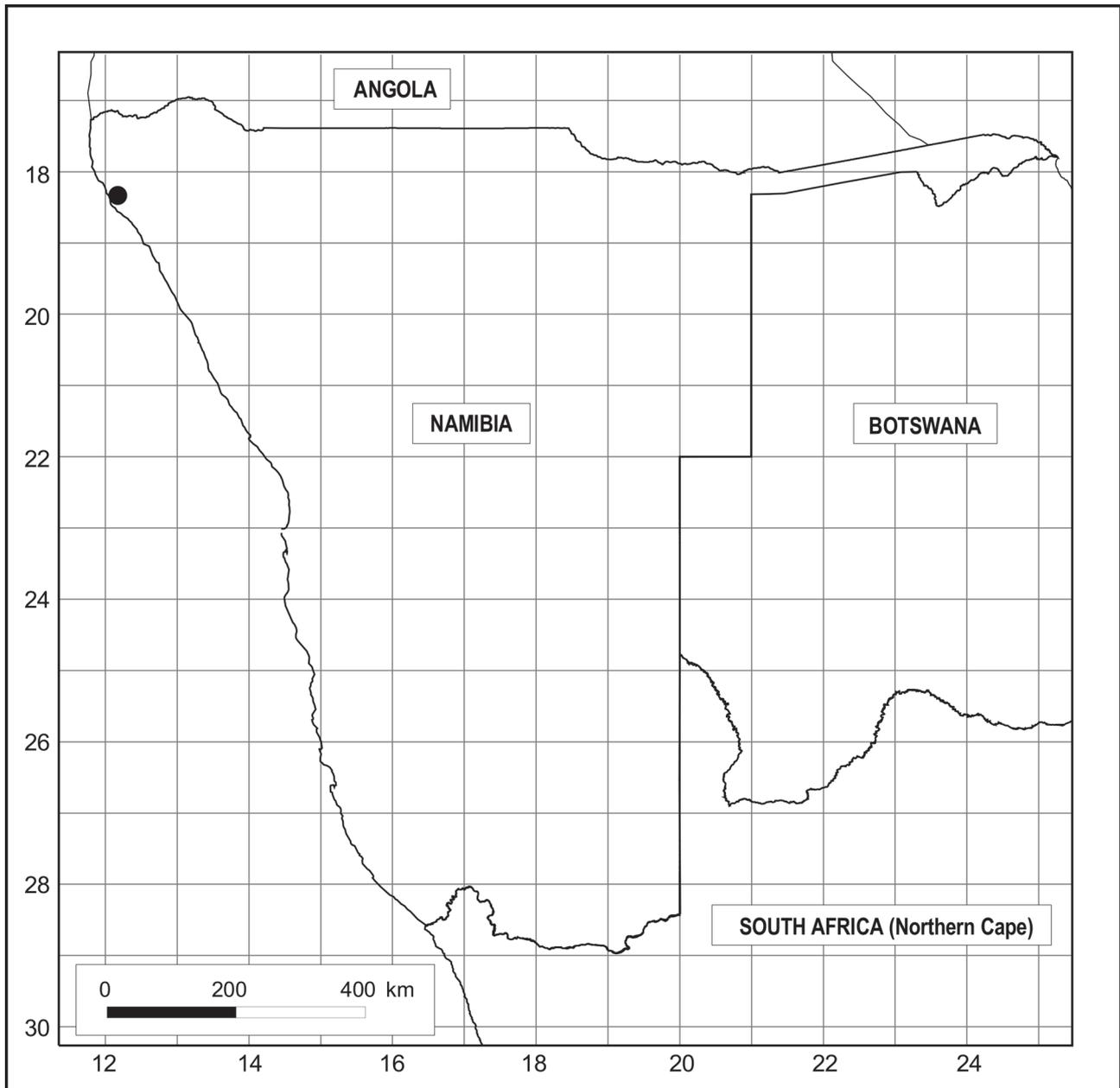


FIGURE 4. Known distribution of *Crassothonna agaatbergensis*.

Conservation status:—Although rare and known from a very small area, *Crassothonna agaatbergensis* is probably not threatened at present as it occurs in the Skeleton Coast National Park, a protected area with limited access. No signs of damage caused by animals or humans could be found on any of the *in situ* specimens examined. It should be considered as Endangered (EN D) due to the small known population size (IUCN 2012).

Etymology:—The specific epithet refers to the Agaatberg Mountain 8 km to the east of Cape Fria, in the Skeleton Coast National Park, Namibia.

Notes:—The nearest relatives of *Crassothonna agaatbergensis* appear to be *C. clavifolia* and *C. protecta*, species from which it differs in habit, branches, leaf and floral characters. Distribution ranges of the three species do not overlap; *C. agaatbergensis* occurs in the northern parts of the Namib Desert, in the Skeleton Coast National Park, *C. clavifolia* in the southern Namib in the Gariiep Centre of Plant Endemism both in Namibia and South Africa (Van Wyk

& Smith 2001) and *C. protecta* in the north-central Namib in Namibia to the Northern and Western Cape Provinces of South Africa (Nordenstam 2012). Some of the more prominent morphological features to distinguish between the three species are provided in Table 1.

TABLE 1. Prominent morphological differences between *Crassothonna agaatbergensis*, *C. clavifolia* & *C. protecta*

Character	<i>C. agaatbergensis</i>	<i>C. clavifolia</i>	<i>C. protecta</i>
Caudex	globose, obovoid or ampulliform, apex sometimes drawn-out; partially buried or wedged between rocks	potato-like, ca. buried or wedged between rocks	slender bottle-shaped or sausage-like, partially or completely buried
Branches	1–8 arising from apex of caudex, rarely laterally, stout, globose, cylindrical or conical, often articulated, not brittle, not fleshy	not branching or with few stout, short branches	few, fleshy, brittle, cylindrical, tending to die back during drought
Leaves	cylindrical, botuliform, or in shorter leaves often clavate, (3–6 times as long as broad), often somewhat flattened and grooved adaxially; 10–70 mm long, 2–7 mm diam.	in habitat grape-like, up to 15 mm long, 6–8 mm diam. (ca. twice as long as broad), in cultivation club-like, up to 40 mm long	subterete or cylindrical, often somewhat flattened or grooved adaxially; 40–100 mm long, 2.5–3.0 mm diam.
Inflorescences	simple or once to several times forked; bracts leaf-like, up to 42 mm long, distant bracts scale-like, lanceolate, 2–3 mm long or absent	simple, bracts scale-like	simple or forked; bracts linear, 4–8 mm long
Capitula	1–10, ca. 7 mm diam., 8 phyllaries	solitary, ca. 15 mm diam., 6–8 phyllaries	1–3, 8–12 mm long, 7 mm diam., 7–9 phyllaries
Ray florets	18–23; rays very short, a fifth to a quarter as long as involucre, pale yellow with 1 or 2 green lines	13–17; rays twice as long as involucre, yellow	13–30; rays as long as involucre, briefly spreading but soon rolled backwards, yellow with 3 or 4 green lines
Disc florets	21–42, pale green	yellow	ca. 48; yellowish green
Achenes	narrowly obovate, angular, smooth, glabrous	oblong, curved, narrowed at both ends, with closely appressed, short, white hairs	short and wide, with closely appressed, short, grey hairs
Distribution	Kaokoveld Centre of Endemism in the Northern Namib	Gariiep Centre of Endemism in the Southern Namib, both in Namibia and South Africa	north-central Namib; Gariiep Centre of Endemism in the Southern Namib; also further to the south in the Northern Cape and Western Cape provinces of South Africa

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 (WIND) and the National Herbarium South African National Biodiversity Institute (PRE) are thanked for their assistance during visits to these institutions. We are grateful to the University of Pretoria and the SCIONA project funded by the European Union (EuropeAid/156423/DD/ACT/Multi) for financial support. For assistance and companionship during field trips, the first author is especially grateful to his wife Hannelie.

References

- Compton, R.H. (1931) The Flora of the Whitehill District. *Transactions of the Royal Society of South Africa* 19: 269–326.
<https://doi.org/10.1080/00359193109518840>
- Dinter, K. (1923) Beiträge zur Flora von Südwestafrika I. *Repertorium Specierum Novarum Regni Vegetabilis* 19: 122–160.
<https://doi.org/10.1002/fedr.19230190807>
- Guj, P., Porada, H., Schalk, K., Hedberg, R., Goscombe, B., Milner, S., Kitt, S., Hoffman, P.F., Halverson, G.P., Richards, D.L. & Schreiber, U.M. (2011) *Geological map of Namibia. Sheet 1812 Opuwo*. Geological Survey of Namibia, Windhoek.
- IUCN (2012) *IUCN red list categories and criteria: Version 3.1*. Second edition. Gland, Switzerland and Cambridge U.K., iv + 32 pp.
- Marloth, R. (1910) Some new South African succulents. Part 3. *Transactions of the Royal Society of South Africa* 5: 33–39.
<https://doi.org/10.1080/00359191009519359>
- Mendelsohn, J., Jarvis, A., Roberts, C. & Robertson, T. (2002) *Atlas of Namibia*. Philip, Cape Town, 200 pp.
- Nordenstam, B. (2012) *Crassothonna* B.Nord., a new African genus of succulent Compositae-Senecioneae. *Compositae Newsletter* 50: 70–77.
- Rowley, G.D. (1994) *Succulent Compositae. A grower's guide to the succulent species of Senecio and Othonna*. Strawberry Press, Mill Valley, 238 pp.
- Thiers, B. (2019) *Index Herbariorum: a global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/science/ih/> (accessed 18 October 2019)
- Van Wyk, A.E. & Smith, G.F. (2001) *Regions of floristic endemism in southern Africa: a review with emphasis on succulents*. Umदाus Press, Hatfield, Pretoria, 199 pp.