

Flowering Plants of Africa

Volume 66

June 2019



Flowering Plants of Africa

Since its inception in 1921, this serial, modelled on the former *Curtis's Botanical Magazine*, has published well over 2 000 colour plates of African plants prepared by some 80 artists.

The object of the journal is to convey to the reader the beauty and variety of form of the African flora, to stimulate an interest in the study, conservation and cultivation of African plants, and to advance the science of botany, as well as botanical art.

The illustrations are mostly prepared by artists on the staff of the South African National Biodiversity Institute (SANBI), but we welcome other contributions of suitable artistic and scientific merit. Please see *Guide for authors and artists* on page 179.

Please contact the SANBI Bookshop for a list of available back issues: SANBI Bookshop, South African National Biodiversity Institute, Private Bag X101, Pretoria, 0184 South Africa; e-mail: bookshop@sanbi.org.za; website: www.sanbi.org.

History of this series

(note Afrikaans translation and changes in title)

Volume 1 (1921) to Volume 24 (1944):

The Flowering Plants of South Africa

Volume 25 (1945–1946) to Volume 26 (1947):

The Flowering Plants of Africa

Volume 27 (1948–1949) to Volume 52 (1992–1993):

The Flowering Plants of Africa

Die Blomplante van Afrika

Volume 53 (1994) to Volume 66 (2019):

Flowering Plants of Africa

Cover illustration: *Aloidendron barberae* (Plate 2342)

Copyright © 2019 by South African National Biodiversity Institute (SANBI)

All rights reserved. No part of this book may be reproduced in any form without written permission of the copyright owners.

The views and opinions expressed do not necessarily reflect those of SANBI. The authors and publisher have made their best efforts to prepare this journal, and make no representation or warranties of any kind with regard to the completeness or accuracy of the contents herein. All images in this journal have been reproduced with the knowledge and prior consent of the artists concerned and no responsibility is accepted by the publisher or printer for any infringement of copyright or otherwise arising from the contents of this publication. Every effort has been made to ensure that the credits accurately comply with the information supplied by the various authors.

Flowering Plants of Africa

A peer-reviewed journal containing colour plates with descriptions of flowering plants of Africa and neighbouring islands

Edited by

Alicia Grobler

with assistance of

Gillian Condry

Volume 66



Pretoria
2019

Editorial board

- R.R. Klopper South African National Biodiversity Institute,
Pretoria, RSA
- P.C. Zietsman National Museum, Bloemfontein, RSA

Referees and other co-workers on this volume

- H. Baijnath, University of KwaZulu-Natal, Durban, RSA
 K. Balkwill, University of the Witwatersrand, Johannesburg, RSA
 A. Beaumont, Pietermaritzburg, RSA
 H. Beentje, Royal Botanic Gardens, Kew, UK
 R. Boon, eThekweni Municipality, Durban, RSA
 J.E. Burrows, Buffelskloof Nature Reserve, Lydenburg, RSA
 P.V. Bruyns, Bolus Herbarium, University of Cape Town, Cape Town, RSA
 A.P. Dold, Selmar Schonland Herbarium, Rhodes University, Grahamstown, RSA
 G.D. Duncan, South African National Biodiversity Institute, Cape Town, RSA
 C. Geldenhuys, Northern Cape Department of Environment and Nature Conservation, Spring-
 bok, RSA
 P. Goldblatt, Missouri Botanical Garden, St. Louis, USA
 D. Goyder, Royal Botanic Gardens, Kew, UK
 A. Grobler, South African National Biodiversity Institute, Pretoria, RSA
 P.P.J. Herman, South African National Biodiversity Institute, Pretoria, RSA
 A.N. Hitchcock, South African National Biodiversity Institute, Cape Town, RSA
 R.R. Klopper, South African National Biodiversity Institute, Pretoria, RSA
 M. Koekemoer, South African National Biodiversity Institute, Pretoria, RSA
 M.M. le Roux, South African National Biodiversity Institute, Pretoria, RSA
 J.C. Manning, South African National Biodiversity Institute, Cape Town, RSA
 U. Meve, University of Bayreuth, Bayreuth, Germany
 S.M. Mothogoane, South African National Biodiversity Institute, Pretoria, RSA
 N. Phaliso, South African National Biodiversity Institute, Pretoria, RSA
 J.S. Pringle, Royal Botanical Gardens, Burlington, Canada
 S. Ramdhani, University of KwaZulu-Natal, Durban, RSA
 V. Silva, University of Lisbon, Portugal
 H.M. Steyn, South African National Biodiversity Institute, Pretoria, RSA
 M. Struwig, North-West University, Potchefstroom, RSA
 J.E. Victor, South African National Biodiversity Institute, Pretoria, RSA
 W.G. Welman, ex South African National Biodiversity Institute, Pretoria, RSA
 W. Wetschnig, University of Graz, Graz, Austria
 P.J.D. Winter, South African National Biodiversity Institute, Cape Town, RSA
 P.C. Zietsman, National Museum, Bloemfontein, RSA

All maps produced by H.M. Steyn, South African National Biodiversity Institute, Pretoria, RSA

Date of publication of Volume 65

Plates 2321–2340 1 June 2017

Next volume

Volume 67 is likely to appear in 2021.—The Editor
 ISSN 0015-4504
 ISBN 978-1-928224-32-7

Contents

Volume 66

2341. <i>Moraea spathulata</i> . M. Struwig and Gillian Condy	2
2342. <i>Aloidendron barberae</i> . C.C. Walker, G.F. Smith, E. Figueiredo, R.R. Klopper, N.R. Crouch and Gillian Condy	8
2343. <i>Cyrtanthus pondoensis</i> . E.J. van Jaarsveld and Marieta Visagie	22
2344. <i>Albuca heydenrychii</i> . E.J. van Jaarsveld and Marieta Visagie	30
2345. <i>Drimia intricata</i> var. <i>visagieae</i> . E.J. van Jaarsveld and Marieta Visagie	38
2346. <i>Eucomis sonnetteana</i> . N.R. Crouch, M. Martínez-Azorín, M.C. Lötter, J.E. Burrows and Gillian Condy	46
2347. <i>Protea parvula</i> . J.P. Rourke and Gillian Condy.	56
2348. <i>Kalanchoe winteri</i> . G.F. Smith, E. Figueiredo, N.R. Crouch and Gillian Condy	62
2349. <i>Agathosma adenandriiflora</i> . T.H. Trinder-Smith and Ellaphie Ward-Hilhorst . . .	70
2350. <i>Triumfetta welwitschii</i> . Y. Singh, S. Sharma, S. Ramdhani and Gillian Condy . .	78
2351. <i>Mussaenda arcuata</i> . L. Hoveka and Gillian Condy	88
2352. <i>Chironia baccifera</i> . Y. Singh, H. Baijnath and Gillian Condy	94
2353. <i>Strophanthus amboensis</i> . S.P. Bester and Gillian Condy	102
2354. <i>Orbea namaquensis</i> . S.P. Bester and Gillian Condy.	116
2355. <i>Pachycarpus natalensis</i> . S.P. Bester and Angela Beaumont	126
2356. <i>Cycnium racemosum</i> . H. Baijnath, K. Singh, Y. Singh and Gillian Condy. . . .	136
2357. <i>Acanthopsis pagodiformis</i> . H.M. Steyn, A.E. van Wyk and Daleen Roodt	144
2358. <i>Barleria monticola</i> . H.M. Steyn and Gillian Condy	152
2359. <i>Senecio voigtii</i> . E.J. van Jaarsveld and Marieta Visagie	160
2360. <i>Caputia tomentosa</i> . C.C. Walker, G.F. Smith, N.R. Crouch and Gillian Condy	168
Guide for authors and artists	179
Index to Volume 66	183

New taxa published in this volume

Cyrtanthus pondoensis Van Jaarsv., sp. nov., p. 22

Albuca heydenrychii Van Jaarsv., sp. nov., p. 30

Eucomis sonnetteana N.R.Crouch, Mart.-Azorín & J.E.Burrows, sp. nov., p. 46

Acanthopsis pagodiformis H.M.Steyn, sp. nov., p. 144

Senecio voigtii Van Jaarsv., sp. nov., p. 160



PLATE 2346 *Eucomis sonnetteana*

Eucomis sonnetteana

Hyacinthaceae

South Africa

Eucomis sonnetteana N.R.Crouch, Mart.-Azorín & J.E.Burrows sp. nov. differs from *E. zambesica* Baker in its extremely short peduncle, shorter and fewer-flowered raceme, shorter leaves, and its unpleasant rather than sweet floral scent.

TYPE.—South Africa, Mpumalanga: Pilgrim's Rest District, Morgenzon Reserve (2430DC), 2106 m, 17 November 2012, J.E. Burrows & Turpin 13172 (BNRH, holo.; NH, iso.).

The Hyacinthaceae are a widespread family of ca. 1 000 taxa that remains in contentious taxonomic flux. However, recent molecular analyses coupled to morphological and phytogeographical studies (Martínez-Azorín et al. 2011) have resolved generic boundaries in one large subfamily, and work is ongoing in the rest of the family. South Africa is one of two main centres of global Hyacinthaceae diversity, harbouring approximately half of the overall diversity in three of the four subfamilies. The fourth subfamily, the Oziroëoideae, is restricted to South America. Within the Flora of Southern Africa (FSA) region the subfamily Hyacinthoideae is represented by two tribes, the small and recently delimited Pseudoprosopereae, and the much larger and long-established Massonieae to which *Eucomis* L'Hér. is assigned. The circumscription of *Eucomis* is not contested, and has been relatively stable since last revised by Reyneke (1972) for his unpublished M.Sc. study. Accordingly, the genus size and nomenclature have not altered substantially in recent years, save for the description of two new species, *E. schijffii* Reyneke and *E. grimshawii* G.D.Duncan & Zonn., the reinstatement of *E. amaryllidifolia* Baker to species level, and the recognition of *E. pole-evansii* N.E.Br. as a larger, more northerly subspecies of *E. pallidiflora* Baker (Reyneke 1976; Zonneveld & Duncan 2009; Duncan 2013). Reyneke published most of his findings by 1980, with an adaptation of his key to the species appearing only 30 years later (Crouch 2010).

Members of the genus *Eucomis* are readily recognisable in the field with their prominent tuft of leafy bracts (coma) that tops the many-flowered cylindrical racemes, a character that has led to their common name, pineapple lilies. At the base of the inflorescence, several synanthous leaves are present in a rosette which may be either flattened or semi-erect. As deciduous perennials, they possess subterranean bulbs that are broadly ovoid in shape, with papery outer scales. Although representatives of the tribe Massonieae are distributed widely in both summer- and winter-rainfall regions, *Eucomis* is found primarily in the summer-rainfall zone where it is a typical component of moist grasslands in mostly montane and Afro-alpine areas. Only *E. regia* (L.) L'Hér. is localised in the winter-rainfall region, where it inhabits arid, shady sites from western Namaqualand through to the southern Cape. When not hybridising, as they so often do, plants of *Eucomis* are usually easily identifiable in the field. As noted by Zonneveld & Duncan (2009) the flowers of *Eucomis* are very similar, and the species are best separated on the basis of plant size, leaf colour and flower fragrance. Habitat

PLATE 2346.—1, habit (in flower), × 1; 2, basally-fused anthers, × 2; 3, ovary, × 1; 4, incurved filament, × 1; 5, flower, × 1. Voucher specimen: Burrows & Turpin 13172 in Buffelskloof Herbarium (BNRH), Lydenburg. Artist: Gillian Condy.

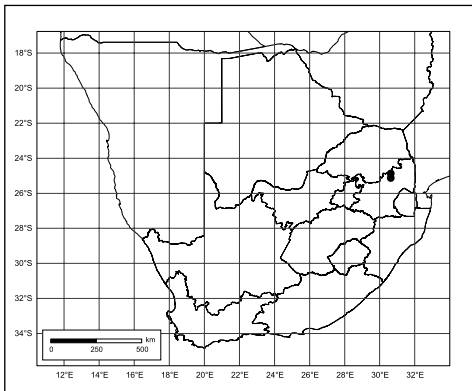


FIGURE 1.—Known geographical distribution range of *Eucomis sonnetteana* in southern Africa.

preferences, maculation patterns and the colour of floral parts are also useful taxonomically. Nine of the 12 *Eucomis* species (16 accepted taxa) are found only in southern Africa, with *E. zambesiaca* Baker and the nominate subspecies of *E. autumnalis* (Mill.) Chitt. also occurring north of the Limpopo River in south tropical Africa (Reyneke 1980; Compton 1990; Winter & Condy 2009). This last-mentioned species was the first to be figured (as *E. undulata* Aiton) in *The Flowering Plants of Africa* (Pole Evans 1926). Other genus representatives featured in this series include *E. zambesiaca* (Winter & Condy 2009), *E. humilis* Baker (Verdoorn 1944a) and *E. vandermerwei* I.Verd. (Verdoorn 1944b).

The material illustrated here (Plate 2346) was first encountered and collected during mid-November of 2012 during a trip by the Mpumalanga Plant Specialist Group to the Forest Nature Reserve known as Morgenzon, near Pilgrim's Rest in Mpumalanga (Figure 1). The following year the site was formally gazetted as 'Morgenzon Reserve'. Live material was that same evening presented to Gill Condy, an artist with a group from the Botanical Artists Association of South Africa (BAASA), who was staying at Buffelskloof Private Nature Reserve near Lydenburg. After painting this miniature species for several hours she reported having to physically distance herself from the specimen on account of the repulsive 'smelly sock' scent of its flowers. In common with both *Eucomis zambesiaca* and *E. autumnalis*, the leaves and other organs of *E. sonnetteana* are immaculate. This feature allows for its distinction within the Mpumalanga Highveld from the purple-spotted *E. montana* Compton and *E. vandermerwei*. The immaculate *E. autumnalis* var. *clavata* (Baker) Reyneke has been observed to grow with *E. sonnetteana*. It is substantially larger in most respects (Reyneke 1980), with plants at the Morgenzon site producing more expansive leaves (ca. 220 × 65 mm) with undulate margins, peduncles to 70 mm tall, and racemes with a greater number of larger flowers that are green rather than white.

This highly distinct *Eucomis* was an unexpected find, but one that will be eagerly sought by plant breeders as a hybrid parent in their cultivar development programmes. This is on account of its small stature, bright white campanulate flowers, erect inflorescence, and its short but spreading leaves, all attributes that allude to its stock value in new alpine garden or potted plant cultivars. The inflorescence size of *E. sonnetteana* in relation to its leaf rosette is aesthetically proportional (Figure 2), unlike the overly leafy dwarf species *E. grimshawii* (see e.g. Figure 2 in Zonneveld & Duncan 2009). Another small member with unpleasantly scented flowers is *E. vandermerwei* (Crouch & Krynauw 1999), which is similarly endemic to the broader Lydenburg Centre of Endemism (Lötter & Burrows 2012). Despite its malodorous character *E. vandermerwei* has been developed as a long-lasting summer-flowering container subject and rock garden plant (Duncan 2011), even receiving an RHS Garden Merit Award. The cultivar 'Octopus' has been especially well received



FIGURE 2.—*Eucomis sonnetteana* plants in flower at the type locality, Morgenzon Reserve, Mpumalanga. The erect inflorescences are dense and few-flowered, with barely discernible peduncles and remarkably short racemes. Photograph: J.E. Burrows.

by the horticultural community in the northern hemisphere. We have no doubt that the subject of this report will also find a valued place in European gardens and as a flowering potted plant.

In habitat at Morgenzon Reserve, plants form concentrated stands comprising individuals and small clumps of plants (Figure 3), which are particularly obvious in mid-summer when they bloom. The population comprises several hundred individuals or small clumps, and occurs within Long Tom Pass Montane Grassland (Gm 31) (Lötter & Burrows 2012) in the Lydenburg Centre of Endemism (Lötter et al. 2002), at one of the highest points along the escarpment. During late autumn the above-ground parts senesce such that by mid-winter only the below-ground bulbs remain, making plants difficult to locate. The soil at the site, derived from the surrounding Klapperkop Quartzites, is remarkably sandy, indicating a preference by this species for well-drained media. As with such soils derived from the Blackreef Quartzites in the neighbouring Wolkberg Centre of Endemism (Van Wyk & Smith 2001), those quartzitic soils of the Lydenburg Centre are acidic, nutrient-poor and highly leached. At the type locality (Figure 4) the plants occur on level areas in very sparse grassland where they are fully exposed at an altitude of approximately 2 000 m. This vegetation unit receives an average of 25 frost days each year (Schulze 1997), and based on a 2018 high-resolution rainfall model developed by the Mpumalanga Tourism & Parks Agency, an expected mean annual precipitation of 933 mm, augmented by frequent mists. The plants co-occur with a number of other bulbous species including a profusion of *Drimia sphaerocephala* Baker plants, along with a lesser number of individuals of *Ledebouria* Roth and



FIGURE 3.—A flowering colony of *Eucomis sonnetteana* at Morgenzon Reserve, Mpumalanga. Plants grow exposed within the very sparse grassland, with their inflorescences reaching only 70 mm in height, and the small leaf rosettes presented almost flat on the ground. Photograph: J.E. Burrows.

Nicipe Raf. The closely related *Eucomis autumnalis* subsp. *clavata* is sympatric at the site, and presents its characteristically larger habit, and flowers with green rather than white perigones. Mature plants of this more robust species are clearly distinguishable, even in the vegetative state. *Eucomis sonnetteana* is one of about 50 plant species that are endemic on the shale- or quartz-derived substrates of the Lydenburg Centre, and like most quartzitic ones is an inhabitant of the grasslands (Lötter et al. 2002). Although only 60% of the Long Tom Montane Grassland is still natural and untransformed (MTPA 2014), both the known populations of *E. sonnetteana* occur within forest nature reserves where they are protected. Threats to this vegetation unit are primarily from expanding alien tree plantations, with 39% of this unit already afforested. A further threat is gold mining from both organised and illegal artisanal activities (Lötter & Burrows 2012).

Eucomis sonnetteana is most closely related to the diploid *E. zambesiaca* which is currently thought to occur from northern South Africa, through eastern Zimbabwe to southern Malawi, from where this species was first described (Baker 1886). The closest known population of *E. zambesiaca* is in the Blouberg range some 250 km to the northwest of Morgenzon Reserve. Winter & Condry (2009) detailed the history, distribution, circumscription and typification of *E. zambesiaca*, and raised questions about the precise identity and form of this rather uncommon species. They noted the possibility, which we also entertain,

that Baker described this species based on a mixed concept. Kativu (2006) lectotypified the name *Eucomis zambesiaca*, and although his type differs somewhat from South African material linked to this epithet, our consideration of images of the lectotype (Kirk s.n., K) and both syntypes (Lynch s.n., K; Strickland s.n., K) has confirmed that *E. zambesiaca* is not conspecific with the Morgenzon plants. Besides differing in respect of the characters detailed in the above diagnosis, the tepals of *E. sonnetteana* are bright white immediately after anthesis whereas Baker (1886) described the perigone [perianth] of *E. zambesiaca* as 'green'. Flower colour has not been emphasised as a distinguishing feature in the current account as there is neither consensus regarding the colour of the perigone of *Eucomis* species from north of the Limpopo River, nor of the names that should be applied, even at country level. Such contention is well exemplified by illustrated accounts of the Zimbabwean flora (e.g. Martineau & Pear 1953; Linley & Baker 1972; Plowes & Drummond 1990). Resolution of the identity of *Eucomis* plants from the *Flora zambesiaca* (FZ) region has not much improved with the lectotypification of *E. zambesiaca* by Kativu (2006). This author considered the three specimens cited by Baker in the protologue of *E. zambesiaca* and selected the lectotype on the basis that 'Kirk's specimen containing leaf, inflorescence, flowers and capsule, together with details of locality and date of collection was the most ample'. However, consideration of this specimen (Alap.specimen.k00257391) reveals that Kirk's material is only of an infructescence with capsules in various stages of development. Kativu appears to have mistakenly interpreted the leaf and mature inflorescences of other *Eucomis* material mounted on the same sheet (Alap.specimen.k00257390, 5 July 1889, from Hort Gumbleton) to be part of the gathering by Kirk.



FIGURE 4.—Typical montane grassland habitat of *Eucomis sonnetteana*, Morgenzon Reserve, Mpumalanga, South Africa. Photograph: N.R. Crouch.



FIGURE 5.—Flowers of *Eucomis sonnetteana* have bright white perigones, and produce copious clear nectar that concentrates on the outer ovary wall as honey-coloured droplets. Calliphorid (blowfly) visitors are attracted by the unpleasant floral fragrance. Photograph: N.R. Crouch.

An annotation on a specimen of *Eucomis zambesiaca* gathered from the Blouberg [Blauwberg] in northwest Limpopo Province (Codd & Dyer 9167, PRE) records the ‘coconut-like smell’ of the flowers, confirmed by Zonneveld & Duncan (2009) as ‘sweet’. This contrasts with the scent of our novelty from Morgenzon Reserve which is distinctly unpleasant to the nose. This points to its pollination-based reproductive isolation from not only *E. zambesiaca* but also from the sympatric and sweet-scented *E. autumnalis*. Shuttleworth & Johnson (2010) have shown that colour plays little role in pollinator discrimination in *Eucomis*, and that the production or otherwise of sulphur compounds in the fragrance bouquet can induce a shift between specialised carrion-fly and pompilid-wasp pollination systems. As the nectar of *E. sonnetteana* seems to include malodorous sulphur compounds it is likely that the species exhibits a myophilous pollination system, a view strengthened by the observation of blowfly (calliphorid) visitors to the flowers of cultivated plants (Figure 5). However, we do not discount the possibility of pollination also by rodents (therophily), an observation documented for two other members of the Massonieae; by Wester et al. (2009) for the pagoda lily (*Whiteheadia bifolia* (Jacq.) Baker), and by Johnson et al. (2001) for *Massonia depressa* Houtt. *Eucomis sonnetteana* exhibits several characters associated with a rodent pollination syndrome, including dull colouration, robust bowl-shaped flowers presented close to the ground (geoflory), and easily accessible, sometimes viscous nectar (Wester et al. 2009). The flower scent too might attract rodents. It may be of evolutionary

and phylogenetic significance that of the 12 species of *Eucomis*, three with foul scents (*E. vandermerwei*, *E. montana* and *E. sonnetteana*) are located in the uplands of Mpumalanga. A southern suite of similarly unpleasant-scented species (*E. humilis*, *E. schijffii* and *E. bicolor* Baker) are known from the central Drakensberg to the south. Both of these clusters represent a mixture of known diploid and tetraploid species (Zonneveld & Duncan 2009). The ploidy of *E. sonnetteana* has not yet been established, although it is likely diploid in view of its miniature habit.

Although *Eucomis* has attracted horticultural interest in Europe for almost three centuries (Duncan 2011), their popularity in Britain and the Netherlands has increased markedly in recent decades, especially of forms of larger species such as *E. comosa* (Houtt.) H.R.Wehrh., *E. autumnalis* and *E. pallidiflora* (Duncan 2007). This is due to the release of several well-received cultivars, and further to a realisation that the genus' hardiness in north temperate climes is greater than earlier supposed. As mostly summer-rainfall taxa, they conveniently retreat during winter to their subterranean bulbs and in so doing avoid exposure of tender green growth to frost (Mathew 1989). Bulbs in cultivation should be kept relatively dry when dormant over winter, and in temperate climates with wet winters they should either be lifted or provided with good drainage to ensure healthy air movement around them. The new season's leaves appear in late spring prior to the inflorescences and are well developed by the time the plants flower from November to February (in the southern hemisphere). In his excellent treatment of the dwarf species Duncan (2007) related the need for regular watering during the growing period, and heavy feeding. He recommended the use of potassium-rich, rather than nitrogen-rich, fertilisers in order to avoid excessive leaf growth in the subjects. Whilst division of offsets is also feasible, and best undertaken during the early spring prior to active growth, seed propagation has not yet been attempted. Propagation from leaf cuttings has been found straightforward, and even when these organs are excised from the parent plant during late autumn they root readily in a well-drained medium, forming small bulbils at their base within six weeks. Plants so produced have already been released into local horticulture in anticipation of demand. Although the global population of this species (of <1 000 mature individuals within an area of occurrence of <20 km²) is at two locations within protected areas, our concern about potential illegal extraction for horticultural purposes is such that we propose an IUCN (2001) 3.1 Red List status of Vulnerable D1+2.

Eucomis sonnetteana is named in honour of Sonnette Krynauw (1962–2010), who as an employee of the Transvaal Provincial Authority's (TPA) Department of Nature Conservation and afterwards with Mpumalanga Tourism & Parks Agency, dedicated her life to protecting the flora of northeastern South Africa. She was an active field member of the former TPA Threatened Species Unit, then later curator of the Lydenburg Herbarium (LYD) before moving in 2005 to the Larry Leach Herbarium (UNIN) as its curator. She had a particular appreciation of grassland geophytes, including *Eucomis*, and Sonnette's interest in their conservation reflects in her account of one such member (Crouch & Krynauw 1999). The generic name *Eucomis* is derived from the Greek *eu* (good or true) and *komos* (tuft), implying 'beautiful-haired', with reference to the prominent coma of leafy bracts that overtops the raceme.

Description.—Dwarf geophyte, deciduous, immaculate, summer-growing, 50–65 mm high. *Bulb* ovoid, widest near base, 35–40 × 35–45 mm, with distinct truncate basal plate, solitary or offset-forming, scales cream, apices obtuse; tunic to 5-layered, membranous, dark

brown; cataphyll broadly triangular, 5–13 × 10–25 mm, translucent white, subterranean, adhering to leaf bases, apex obtuse. *Leaves* 7–9, narrowly ovate to oblanceolate, shallowly canaliculated, 55–70 × 20–32 mm, contemporary with flowers, spreading to suberect; apex acute to subobtuse, pale green, flattened, imbricate; midrib prominent on lower surface, median stripe yellowish green; margins entire to weakly undulate, hyaline, minutely crispate. *Peduncle* cylindrical, very short, 3–5 × 3–5 mm, erect, pale green. *Raceme* cylindrical, 35–40 × 25–35 mm, erect, dense, 25–30 flowered; rachis pale green; pedicels erectopatent, to 4 mm long; flower bracts narrowly triangular, slightly canaliculate, lengthening towards inflorescence apex, 5–11 × 1.5–3.5 mm. *Coma* seldom overtopping, 10–20 sterile coma bracts; bracts ovate to lanceolate, 12–17 × 3–10 mm, pale green, margins hyaline, suberect to spreading or weakly deflexed, not obscuring upper flowers. *Perigone* campanulate, white, greenish basally, pungently scented; tepals oblong-oblanceolate, 6.5–12.0 × 2.5–3.5 mm, apex cucullate above, spreading to recurved, soft, short-lived. *Stamens* included; filaments narrowly triangular 4.5–6.5 × 1.2–1.4 mm, bases fused for 1.5–2.0 mm, green basally, white in distal third, curved inwards; anthers oblong, 1.0–1.2 × 0.6–0.8 mm, blue-grey, pollen yellowish-cream. *Ovary* trilocular, ovoid, 2.8–3.0 × 1.8–2.5 mm, not strongly inflated, white tinged green, nectariferous above, ovules ovoid, 1 × 0.5 mm; style tapering, 2.5–4.5 mm long, weakly decurved, white; stigma penicillate. *Capsule* not seen. Plate 2346.

ACKNOWLEDGEMENTS

Barbara Turpin of Buffelskoof Herbarium (BNRH) is thanked for her extensive assistance in both field and herbarium, and the curators of NH, NU and PRE are acknowledged for making facilities and materials available during this study. Hester Steyn, National Herbarium, SANBI, is thanked for producing the distribution map.

REFERENCES

- BAKER, J.G. 1886. New garden plants: *Eucomis zambesiaca*, Baker, n. sp. *The Gardeners' Chronicle* ser. 2,25: 9.
- COMPTON, J. 1990. *Eucomis* L'Héritier. *The Plantsman* 12: 129–139.
- CROUCH, N.R. 2010. An adaptation of Reyneke's key to the genus *Eucomis*. *PlantLife* 39&40: 45–52.
- CROUCH, N.R. & KRYNAUW, S. 1999. The high altitude pineapple lily *Eucomis vandermerwei*, a rare endemic from South Africa. *Herbertia* 54: 133–138.
- DUNCAN, G.D. 2007. Lesser known *Eucomis*. *The Plantsman* 6: 98–103.
- DUNCAN, G.D. 2011. *Eucomis vandermerwei*. *Curtis's Botanical Magazine* 28: 176–189.
- DUNCAN, G.D. 2013. *Eucomis amaryllidifolia*. *Curtis's Botanical Magazine* 30: 49–55.
- IUCN. 2001. *IUCN Red List Categories and Criteria*: version 3.1. IUCN Species Survival Commission, Gland and Cambridge.
- JOHNSON, S.D., PAUW, A. & MIDGLEY, J. 2001. Rodent pollination in the African lily *Massonia depressa* (Hyacinthaceae). *American Journal of Botany* 88: 1768–1773.
- KATIVU, S. 2006. Lectotypification of *Eucomis zambesiaca* Baker (Hyacinthaceae). *Kirkia* 18: 174.
- LINLEY, K. & BAKER, B. 1972. *Flowers of the Veld*. Longman Rhodesia (Pvt) Ltd, Salisbury.
- LÖTTER, M.C. & BURROWS, J.E. 2012. *Gm 31 Long Tom Pass Montane Grassland*. South African National Biodiversity Institute (SANBI), viewed March 2018. <http://bgis.sanbi.org/Document/Download/2358>.

- LÖTTER, M.C., BURROWS, J.E. & EMERY, A.J. 2002. Phytochoria: Centres and Regions of Endemism: In A.J. Emery, M.C. Lötter & S.D. Williamson (eds), *Determining the conservation value of land in Mpumalanga*: 48–59. Mpumalanga Parks Board, Nelspruit.
- MARTINEAU, R.A.S. & PEAR, M.H. 1953. *Rhodesian Wild Flowers*. Longmans Green, Cape Town.
- MARTÍNEZ-AZORÍN, M., CRESPO, M.B., JUAN, A. & FAY, M.F. 2011. Molecular phylogenetics of subfamily Ornithogaloideae (Hyacinthaceae) based on nuclear and plastid DNA regions, including a new taxonomic arrangement. *Annals of Botany* 107: 1–37. <http://dx.doi.org/10.1093/aob/mcq207>.
- MATHEW, B. 1989. *Eucomis schiffii*. Hyacinthaceae. *Curtis's Botanical Magazine* 6: 51–54.
- MTPA. 2014. *Mpumalanga Biodiversity Sector Plan Handbook*. Mpumalanga Tourism & Parks Agency, Mbombela (Nelspruit).
- PLOWES, D.C.H. & DRUMMOND, R.B. 1990. *Wild flowers of Zimbabwe*. Longman Zimbabwe, Harare.
- POLE EVANS, I.E. 1926. *Eucomis undulata*. Liliaceae. *Flowering Plants of Africa* 6: t. 220.
- REYNEKE, W.F. 1972. 'n Monografiese studie van die genus *Eucomis* L'Hérit. in Suid-Afrika. Unpublished M.Sc. thesis, University of Pretoria.
- REYNEKE, W.F. 1976. A new species of *Eucomis* L'Hérit. (Liliaceae) from South Africa. *Journal of South African Botany* 42: 361–364.
- REYNEKE, W.F. 1980. Notes on African plants. Three subspecies of *Eucomis autumnalis*. *Bothalia* 13: 140–142.
- SCHULZE, R.E. 1997. *South African atlas for agrohydrology and climatology*. Water Research Commission, Pretoria.
- SHUTTLEWORTH, A. & JOHNSON, S.D. 2010. The missing stink: sulphur compounds can mediate a shift between fly and wasp pollination systems. *Proceedings of the Royal Society B* 277: 2811–2819.
- VAN WYK, A.E. & SMITH, G.F. 2001. *Regions of floristic endemism in southern Africa. A review with emphasis on succulents*. Umdaus Press, Pretoria.
- VERDOORN, I.C. 1944a. *Eucomis humilis*. Liliaceae. *Flowering Plants of Africa* 24: t 954.
- VERDOORN, I.C. 1944b. *Eucomis vandermerwei*. Liliaceae. *Flowering Plants of Africa* 24: t 955.
- WESTER, P., STANWAY, R. & PAUW, A. 2009. Mice pollinate the Pagoda Lily, *Whiteheadia bifolia* (Hyacinthaceae). First field observations with photographic documentation of rodent pollination in South Africa. *South African Journal of Botany* 75: 713–719.
- WINTER, P.J.D. & CONDY, G. 2009. *Eucomis zambesiaca*. Hyacinthaceae. *Flowering Plants of Africa* 61: 18–23.
- ZONNEVELD, B.J.M & DUNCAN, G.D. 2009. Genome sizes of *Eucomis* L'Hér. (Hyacinthaceae) and a description of the new species *Eucomis grimshawii* G.D.Duncan & Zonneveld. *Plant Systematics and Evolution* 284: 99–109.

N.R. CROUCH^{1,*}, M. MARTÍNEZ-AZORÍN², M.C. LÖTTER³,
J.E. BURROWS⁴ and GILLIAN CONDY⁵

¹Biodiversity Research, Assessment and Monitoring, South African National Biodiversity Institute, P.O. Box 52099, Berea Road, Durban, 4007 South Africa; School of Chemistry and Physics, University of KwaZulu-Natal, Durban, 4041 South Africa.

²Universidad de Alicante, P.O. Box 99, E-03080 Alicante, Spain.

³Mpumalanga Tourism & Parks Agency, Private Bag X1088, Lydenburg, 1120 South Africa.

⁴Buffelskloof Herbarium, P.O. Box 710, Lydenburg, 1120 South Africa.

⁵National Herbarium, South African National Biodiversity Institute, Private Bag X101, Pretoria, 0001 South Africa.

*Author for correspondence: N.Crouch@sanbi.org.za.