CLIVIA

Yearbook of the Clivia Society

14

2014

CLIVIA **The Clivia Society** | www.cliviasociety.org

The Clivia Society caters for *Clivia* enthusiasts throughout the world. It is the umbrella body for a number of constituent Clivia Clubs and interest Groups that meet regularly in South Africa and elsewhere around the world. In addition, the Society has individual members in many countries, some of which also have their own Clivia Clubs. An annual Yearbook and quarterly Newsletters are published by the Society. For information on becoming a member and / or for details of Clivia Clubs and Interest Groups contact the Clivia Society secretary or where appropriate, the International contacts, at the addresses listed in the inside back cover.

THE OBJECTIVES OF THE CLIVIA SOCIETY

1. To coordinate the interests, activities and objectives of constituent Clivia Clubs and associate members;
2. To participate in activities for the protection and conservation of the genus *Clivia* in its natural habitat, thereby advance the protection of the natural habitats and naturally occurring populations of the genus *Clivia* in accordance with the laws and practices of conservation;
3. To promote the cultivation, conservation and improvement of the genus *Clivia* by:
   - 3.1 The exchange and mutual dissemination of information amongst Constituent Clivia Clubs and associate members;
   - 3.2 Where possible, the mutual exchange of plants, seed and pollen amongst Constituent Clivia Clubs and associate members; and
   - 3.3 The mutual distribution of specialised knowledge and expertise amongst Constituent Clivia Clubs and associate members;
4. To promote the progress of and increase in knowledge of the genus *Clivia* and to advance it by enabling research to be done and by the accumulation of data and dissemination thereof amongst constituent Clivia Clubs and associate members;
5. To promote interest in and knowledge of the genus *Clivia* amongst the general public; and
6. To do all such things as may be necessary and appropriate for the promotion of the above mentioned objectives.

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COVER ILLUSTRATIONS

FRONT COVER: *Clivia miniata* by Barbara Jeppe, with kind permission of Leigh Voigt.

BACK COVER: *Clivia gardenii* by Barbara Jeppe, with kind permission of Leigh Voigt.

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Contents

1828

—

Clivia nobilis

Lindley, J. (1828). Clivia nobilis. Edwards's Botanical Register 14: t. 1182.

Clivia nobilis*

Scarlet Clivia

HEXANDRIA *MONOGYNIA*

Nat. ord. Amaryllideæ

CLIVIA. – ***Perianthium*** tubulosum, sexpartitum, deciduum, laciniis imbricantibus: exterioribus paulò brevioribus. ***Stamina*** sex, æqualia, perianthio basin versùs inserta; ***filamenta*** subulata, subinclusa; antheræ versatiles. ***Ovarium*** 3-loculare polyspermum. ***Fructus*** baccatus, indehiscens, monospermus. ***Semen*** carnosum; subrotundum. – Herba (*Capensis*) radicibus *fasciculatis*, foliis *distichis*, floribus *umbellatis pendulis*. Scapo *plano-convexo*!

C. nobilis, a good full head of flowers, from near the Kei River.

C. nobilis.

Radices *carnosi, fasciculati.* ***Folia*** *disticha, coriacea, atroviridia, ligulata, basi vaginantia, apice retusa oblique, margine scabra.* ***Scapus*** *erectus, plano-convexus, marginatus, versùs fastigium sulcatus.* ***Flores*** *circiter 48 v. 50, longè pedunculati, umbellate, penduli.* ***Perianthium*** *tubulosum, clavatum, deciduum, laciniis luteo-coccineis, apice virescentibus, obtusis, duplici ordine imbricates, versùs basin connatis, exterioribus paulò brevioribus, Lachenaliæ modo.* ***Stamina*** *6, fauce tubi inserta, æqualia; filamenta glabra; antheræ parvæ, ovales, viridi-luteæ, versatiles.* ***Ovarium*** *inferum, luteo-viride, 3- loculare, polyspermum, sphæricum, ventricosum;* ***ovula*** *plurima versùs basin axeos inserta;* ***stylus*** *filiformis;* ***stigma*** *subtrilobum.* ***Fructus*** *baccatus, indehiscens, ruber, sæpiùs, loculis 2, ovulisque plurimis abortientibus, monospermus; apice perianthio deciduo cicatrizatus.* ***Semen*** *unicum, ascendens, (maturum non vidi), glaberrimum, hyalinum, ovale;* ***hilo*** *parvo suprabasilari;* ***foramine*** *basilari;* ***raphe*** *brevi, elevatâ.* ***Testa*** *junior minutissimè areolata;* ***albumen*** *copiosum.* ***Embryo*****.....**

Left: *Clivia nobilis* by Barbara Jeppe

*We have named this genus in compliment to her Grace the Duchess of Northumberland, to whom we are greatly indebted for an opportunity of publishing it. Such a compliment has long been due to the noble family of Clive; and we are proud in having the honour of being the first to pay it.

Clivia nobilis type illustration from Edwards's Botanical Register, t.1182. Based on a plant that flowered at Syon House in 1827.

"The fruit of this plant is a round berry, about the size of a boy's marble, or ⅝ths of an inch diameter, slightly coloured with red. The three cells which contain the seeds consist of a red and very juicy pulp, which (like the internal segments of an orange) are separable from the rind and from each other; and they might easily be mistaken for seeds. Within each cell are from two to four, but generally three, pearl-coloured seeds, which are apt to germinate while still contained in the berry, and even long before it is perfectly ripe. In a cool and airy greenhouse the fruit is from twelve to fourteen months coming to maturity. The progress of the young plants, also, is slow." — *W. H.*

Hooker, W.J. (1832). Note upon *Clivia nobilis*, fol. 1182. Edwards's Botanical Register, 18: sub.t.1546

Clivia nobilis in habitat at Kei River.

This noble plant is supposed to have been one of the discoveries of Mr. Bowie at the Cape of Good Hope, from some of the inner districts of which colony it was probably procured. The plant from which our drawing was made flowered for the second time in July last, in the princely Garden of his Grace the Duke of Northumberland, at Syon House, and was communicated to us by Mr. Forrest, to whom we are indebted for several observations upon its habit and characters.

At first sight it has so much the appearance of a Cyrtanthus that it may easily be mistaken for one, especially if the detached flowers only are seen. But upon a more minute examination, it will be found that it is not only not referable to that genus, but that it is actually doubtful whether it does not belong to a distinct natural order. In the first place, it does not form a bulb, an almost indispensable character of Amaryllideae, from which there is but one other variation hitherto

Clivia nobilis in habitat at Qwaninga River showing flowers and last year's ripe berries.

One of many *C. nobilis* plants at Qwaninga River growing off the ground.

Clivia nobilis on the left bank of a dry river bed, with inset showing its inflorescence.

known, namely in Doryanthes. In the second place, the fruit is not a dehiscent dry capsule, but fleshy and indehiscent; and, thirdly, the seeds are not numerous, compressed, and membranous, but solitary, round, and fleshy. It is, therefore, obviously distinct from Cyrtanthus; and there is no other Amaryllideous genus to compare with it, except Eustephia, the fruit of which is still unknown, but which is peculiarly characterised by its 3-toothed filaments, and which is probably not far removed from Phycella.

Perhaps the real affinity of this plant cannot at present be determined: to us it appears most closely allied to Hæmanthus, the bulbs of which are very imperfect.

A greenhouse plant, not appearing to require particular care in its cultivation, and propagating either by seeds or suckers.

Roots fleshy, fascicled. ***Leaves*** distichous, coriaceous, dark green, strap-shaped, sheathing at the base, retuse and oblique at the apex, rough at the margin. ***Scape*** erect, plano-convex, bordered, furrowed towards the summit. ***Flowers*** from 48 to 50, on long stalks, pendulous, arranged in an umbel. ***Perianth*** tubular, clavate, deciduous; the segments yellowish scarlet, greenish at the apex, obtuse, imbricated in a double row, cohering towards the base, the outer rather shorter than the inner, like those of a Lachenalia. ***Stamens*** 6, inserted in the orifice of the tube, equal; ***filaments*** smooth; ***anthers*** small, oval, greenish yellow, versatile. ***Ovarium*** inferior, greenish yellow, 3-celled, many seeded, round, ventricose. ***Ovula*** numerous, inserted towards the base of the axis; ***style*** filiform; ***stigma*** somewhat 3-lobed. ***Fruit*** berried, indehiscent, red, generally, in consequence of the abortion of two cells and most of the ovula, one-seeded, marked at the top by the scar of the fallen perianth. ***Seed*** single, ascending, (only seen unripe), very smooth, transparent, oval; ***hilum*** small, above the base; ***foramen*** in the base; ***raphe*** short, raised. ***Testa***, when young, marked with very minute areolations; ***albumen*** abundant. ***Embryo***.....

J.L.

A variety of phenotypes at a single location, showing the diversity of colour and shape observed in *Clivia nobilis*. Note the high flower count (78!) on the overhead shot.

Hooker, W.J., (1828). Imatophyllum Aitoni. Handsome-flowered Imatophyllum. Curtis's Botanical Magazine series II 55: t2856.

Imatophyllum Aitoni.

Handsome-flowered Imatophyllum

Class and Order.

HEXANDRIA MONOGYNIA.

(Nat.Ord. – AMARYLLIDEÆ.)

Generic Character.

Flores umbellati, spathacei, nutantes. ***Perianthium*** superum, subcurvatum, sexpartitum, tubulosum, laciniis subæqualibus. ***Stamina*** basi submonadelpha, tubo inserta, perianthio longiora. ***Germen*** globosum, hexagonum: ***Stylus*** filiformis, exsertus: ***Stigma*** trifidum. ***Bacca*** globosa, trilocularis, loculis trispermis.

Habitus *Cyrtanthi; sed* radix *fibrosa:* folia *numerosa, loricata, disticha, marginata:* umbella *multiflora, floribus vix curvatis, limbo perianthii profunde sexpartito:* stamina *exserta.*

Specific Name.

IMATOPHYLLUM* *Aitoni.*

DESCR. ***Root*** perennial, consisting of numerous large and thick, fleshy, simply or branched fibres. ***Leaves*** radical, long, spreading out in a distichous manner, strap-shaped, flat, striated, green, with a diaphanous, jagged margin, the apex blunt, almost retuse, the bases sheathing each other, and purplish. On breaking a leaf, a greenish, gelatinous fluid extrudes in considerable quantity, which has the flavor and smell of a fully ripe apple. From the centre of these leaves arise one or more erect, rounded ***scapes***, with a large umbel at the extremity, of handsome, numerous, drooping flowers, accompanied by a many-leaved spatha, which soon withers. ***Peduncles*** filiform, glabrous. ***Perianth*** superior; of six somewhat incurved and slightly unequal, lanceolate, acute, orange-green segments, united at the base into a tube. ***Stamens*** six, inserted at the top of this tube, and, at the very base of the filaments, monadelphous: longer than the perianth. ***Anthers*** oblong, yellow, fixed near the centre of the back; the cells opening at the sides. ***Germen*** globose, with six angles and three cells, each with three ovules: ***Style*** longer than the stamens, filiform: ***Stigma*** trifid. ***Fruit***, a large, three-celled, red ***Berry***, containing about six, somewhat triangular, whitish seeds, clothed in a double integument; the outer loose and pulpy. Albumen between waxy and horny. ***Embryo*** cylindrical.

*From Ιμας, αντος a thong, or strap, and φυλλον a leaf, from the shape of the foliage.

Was the plant named *Clivia nobilis* in 1828 surreptitiously obtained from Kew?

John van der Linde

[First published in Clivia 5, pp. 92-95]

The late Amelia Obermeyer (Mrs. Mauve), who was a botanist at the National Botanical Institute in Pretoria, wrote the following in the August 1972 issue of *Flowering Plants of Africa*-. *"By a curious coincidence two English botanists, Lindley and Hooker, separately published on the same day in October, 1828, a new genus based on the same plant. Lindley named this new genus Clivia and Hooker called it Imantophyllum. In 1830 Roemer and Schultes (Syst. Meg. 7:892) chose the name Clivia and reduced Imantophyllum to synonymy. The plant in question was an introduction from the eastern Cape by Bowie and it grew in the hot houses at Kew and at Syon House, the residence of the Duchess of Northumberland. Lindley named the plant Clivia nobilis saying that such a compliment had long been overdue to the noble family of Clive.*

A high flower count at Kei River. The colour of this flower is very similar to the original one collected and still grown at Kew Gardens.

It is said that the plant described by Lindley 'had been surreptitiously obtained from Kew'."

The final sentence, with its strong hint of *Clivia* theft and the receiving of stolen property back in the early 1800s, intrigued me. I set out to examine the evidence. I began by reading what the two botanists closest to the action had said. Were there any clues there? I then spread the net wider to other writers, looking for evidence of any crime. Finally, I set out to track the allegation to its source.

Lindley, in naming the plant *Clivia nobilis*, said *"This noble plant is supposed to have been one of the discoveries of Mr Bowie at the Cape of Good Hope, from some of the inner districts of which colony it was probably procured. The plant from which our drawing was made, flowered for the second time in July last, in the princely Garden of his Grace the Duke of Northumberland, at Syon House, and was communicated to us by Mr. Forrest, to whom we are indebted for several observations upon its habit and characters."* Lindley also says *"We have named this genus in compliment to her Grace the Duchess of Northumberland, to whom we are greatly indebted for our opportunity of publishing it."*

The plant flowered for the second time in July, more or less the time one would expect a *C. nobilis* to flower in the Northern summer. This suggests that the plant was well-acclimatized to the Northern Hemisphere, and was probably imported before 1827.

The noble couple would almost certainly not have been directly involved in buying the plant; the Head Gardener would normally have dealt with suppliers. The said Mr. Forrest became Gardener to the Duke at Syon House in 1826. If the plant had been bought by his predecessor, Forrest may not have known its source. Lindley refers to Bowie as having discovered the plant, but the words he uses do not actually say that the plant at Syon came from those introduced by Bowie to Kew. Bowie is certainly credited in the records of Kew as having introduced *Clivia nobilis* to Kew. He must have done this when or before he was recalled to England in 1823, after 'his contract to collect plants in South Africa for Kew had been terminated. All *C. nobilis* plants he may have collected then would all have belonged to Kew. There was of course nothing to stop Bowie legitimately importing plants to England on his own account, but only after his recall in 1823, as speculated below.

In naming the plant *Imantophyllum aitonii* (after William Townsend Aiton) in the October 1828 issue of *Curtis's Botanical Magazine* Hooker gives considerably more detail than did Lindley: *"Mr. Bowie .... in the summer of last year, immediately previous to his return to the Cape, mentioned to me a Cyrtanthus-like? plant, which he had there found and imported, and which if it blossomed in this country, he desired might bear the specific name of his patron, Mr. Aiton. At the same time the letter enclosed one or two of the wild specimens of the flowers, and a small piece of the leaf ...".* Does the use of the word 'imported' imply that Bowie was already in England, i.e., between 1823 and 1827, the year he returned to South Africa?

Hooker, then goes on to say that a specimen of the plant had flowered in October 1827 *"in the noble gardens of Syon House"*, and that *"Mr. Forrest ... kindly requested His Grace the Duke of Northumberland's permission for a drawing to be made of the plant..."* Clearly a plant had also flowered at Kew, because W.T. Aiton, Director-General of all the Royal Gardens, including Kew,

"has likewise been so obliging to send me a drawing and specimens of the fruit...". Aiton also consulted Bowie's notes, stored at Kew, to tell Hooker that the plant(s) at Kew had been found *"on shaded spots, near Quagga flats, and more common in the Albany tracts, near the great Fish River"*.

Forrest would hardly be likely to have knowingly drawn attention to a plant that had been 'nicked' from Kew; similarly if Aiton had known that a plant 'surreptitiously acquired from Kew' had flowered anywhere else he is hardly likely to have co-operated in supplying further information on the plant, especially if it were to be named for him! This would have made him an accomplice to theft.

There had in fact been thefts from Kew; plants that were exclusively Kew's were appearing for sale in nurseries, probably smuggled out with the assistance of garden staff, bribed by middle-men who could make a profit, on-selling to eager customers. In 1824 it was found that the keys to the Royal Gardens at Kew had been counterfeited and all the locks had to be changed.

Robert Sweet, the manager of Colvill's nursery (which incidentally had a large collection of Cape bulbs) in Kings Road, Chelsea, was accused of receiving some choice Australian plants stolen from Kew. Aiton was determined to make an example of him and the case was heard at the Old Bailey in February 1824. *"Sweet's unblemished reputation, vouched for by other nurserymen, secured his acquittal on technical grounds"*.

So, going on what I had discovered to date there did not seem to be any evidence that the plant at Syon House had been 'surreptitiously obtained from Kew', even though other thefts from Kew had indeed taken place. So where did the plant come from? From Hookers' account which ties in with Lindley's in this regard, one could perhaps, at a stretch, conclude that it came from an importation by Bowie some time after 1823, when he was no longer under contract to Kew. Important to the story is the wording of Bowie's contract to collect for Kew. Exclusive supply to Kew was demanded: *"Should a plant sent by you to Kew appear in any other garden, an enquiry will immediately be set...."*

Then along comes the very well-connected Rev. William Herbert, the multi-talented bulb expert and younger son of the Earl of Carnarvon, with a more conclusive explanation. I repeat in full his account, given in his classic monograph *Amaryllidaceae* published in 1837:

"This beautiful plant was first discovered by Dr. Burchell, in whose herbarium, soon after his return from Africa, I saw a fine specimen, which not having been

A closer picture of typical habitat conditions shown on the next page.

C. nobilis growing in brackish sand adjacent to the Indian Ocean beach just showing at the foot of the picture. The large-leaved plants are strelitzias, which typically occur in *Clivia* habitats.

carefully examined, had been mistaken for an Agapanthus, *to which its root and leaves have a striking affinity. I soon after became possessed of a plant of this species, brought over by an officer who had been employed on the Caffre frontier, and I recognized it to be the plant I had seen in Dr. Burchell herbarium, but concluded it to be an* Agapanthus. *Not long after, I obtained for Mr. Tate, from the kindness of Dr. Burchell, a precise account of the spot where he had seen this plant; the result of which was a large importation of the roots—but after they had vegetated, Mr. Tate mistook them for the common* Agapanthus, *and was about to dispose of them as such, when I saw them accidentally, and immediately recognized them. One of the plants flowered for the first time in this country in the collection of the Duchess of Northumberland, after whom it was named. By a singular accident it appeared on the same day in the Bot. Reg. and Mag., being named in the latter work Imatophyllum aytonii, but the name* Clivia nobilis *has been generally preferred. Sir W. Hooker was mistaken in supposing Mr. Bowie to have been the first discoverer of this plant. Indeed, roots of it were in my hands before he had seen it in Africa. It is a plant of perfectly easy culture, requiring no particular care but to shelter it from frost, and it flowers freely in the greenhouse if placed near a front light, and ripens its seeds; but the seedlings are of very slow growth. The reason of its not having flowered in my collection earlier was that from the slowness of its growth I had been induced to put it in the stove, hoping that it might grow there more freely; but the heat increased its sulkiness."*

Left: Herbarium specimen of *Clivia nobilis*, housed at Kew, and collected by WJ Burchell between Riedfontein and the source of the Kasuga River, Bathurst Division, Oct 25, 1813.

'Stove' was the word used in those days for a hothouse with artificial heat. Herbert says he saw the plant (a dried specimen?) soon after Burchell returned to England, which was in 1815. He says that there was a *"large importation of roots"* which subsequently *"vegetated"*. This would have taken several years – Herbert refers to very slow growth – and then one or more plants were sold, prior to flowering.

Tate imported the plants directly, maybe even before Bowie returned to England in 1823. James Charles Tate had a nursery in Sloane Street, Chelsea, close to Burchell, who had collected in South Africa from 1810 to 1815, and who was then living in Fulham. Four other horticultural Tates are listed as having been born in Alnwick, Northumberland. What is significant about that is that Alnwick was the 'home territory' of the Duke of Northumberland, owner of Syon House. If James Tate had a family connection with Alnwick then this may have given him an entree to supply plants to the garden at Syon.

Herbert says that his own plant was acquired from an army officer before 1823, the year Bowie returned to England. Tate may have used a similar contact in South Africa – Bowie complains about having to compete with officers who sent their troops out on plant-hunting expeditions!

So neither Hooker nor Lindley appear to have known of Burchell's dried specimen, or of Tate's importation. Were they both in so much of a hurry to publish that they missed this information? Hooker does not even seem to have seen the plant at Syon. (This did not stop him from ingeniously putting together the picture which accompanies this article -his *Imantophyllum aitonii*, from *Curtis's Botanical Magazine*, Vol. 55 of 1828. It is a collage based on a drawing of the plant at Syon House, on a *'drawing and specimens of the fruit'* of a plant at Kew, supplied by Aiton, and possibly also on a *'small piece of the leaf'* given to Hooker by Bowie!)

With this additional evidence all three accounts seem to hang together, without significant contradictions, so where on earth did the *"surreptitiously obtained from Kew"* allegations originate? Robert Archer at the National Botanic Institute in Pretoria put me on a track which led back over the years from one source to another, each saying more or less the same thing, in more or less the same words; back to Saturday 29th October 1881.

This was the date on which the weekly newspaper for the serious gardener, *The Gardeners Chronicle of London*, published the latest in a series of articles on earlier plant collectors. This issue was about James Bowie. No author is named and no references were given. The relevant section of the article, dealing with events nearly 60 years before, reads: *"In the country of the Orange River State he discovered the beautiful Amaryllidaceous plant which was received at Kew in 1823 and having flowered, was in 1826 figured and named in the Botanical magazine by Dr. Hooker (afterwards Sir William) under the name* Imantophyllum aitonii; *at the same time a plant which had been surreptitiously obtained from Kew flowered in the Duke of Northumberland's garden at Syon House, was figured and described by Dr. Lindley under the name* Clivia nobilis, *both names appearing in their respective journals of the same date. Dr Lindley was requested to forego the name Clivia, but refused to do so, and ultimately it became the popular name"*.

And there the trail goes cold. Who wrote that article and who were his informants? Perhaps we will never know. But what I can say is that he did not read Hooker (writing

in 1828, not 1826), who set out exactly where Bowie found the plants growing – certainly nowhere near the Orange River State! Also, I find it hard to believe that any specialist writer at that time would not have known of Herbert's classic book and his version of events. Was that anonymous author simply doing what others did after him i.e. repeating without checking what had been written even earlier by someone else?

I did not let the matter rest there. To make sure this was indeed the end of the trail, I looked at other sources including the 465-page long very detailed *Kew – The History of the Royal Botanic Gardens* by Ray Desmond, former Chief Librarian and Archivist at Kew. Nowhere could I find any reference to the theft from Kew of a plant, subsequently to flower *"in the princely garden"* of the Duke of Northumberland, and to be published on the same day in October 1828 by two of the most prominent botanists in two leading botanical magazines in England. This must have been a high-profile event in horticultural circles. Surely there would have been some comment, if the plant had in fact been *"surreptitiously obtained from Kew"*?

My account contains speculations, but they – I submit – are logical, though they may not be conclusive. I would welcome any reader of this article to throw further light on this interesting episode in *Clivia* history. Until then, case dismissed or should it only be adjourned?

I would like to thank Victoria Herriott of Syon House, and Topher Martyn, currently the Head Gardener there, for examining Forrest's 'Alphabetical Catalogue of Plants of Syon garden", which he put together in 1831. I thought that might tell us where the plant came from. Yes, one *Clivia nobilis* appears on the list, but unfortunately there are no details of where it was obtained.

At an early stage in my research John Rourke drew my attention to Herbert's book and to his explanation for how the plant came to be at Syon House. When Harold Koopowitz's book Clivia was published I was interested to see his interpretation of this episode.

Michael Jeans and Drs. Robert Archer, Keith Hammett, Harold Koopowitz and John Rourke helped me, also Prof. Donal McCracken, who is researching the life of James Bowie. I thank them all.

Finally, you may have seen the Duke of Northumberland's two ancestral homes without knowing it; they have recently featured in three movies:
Syon House, Middlesex, in *Gosford Park*,
Alnwick Castle, Northumberland, in two *Harry Potter* films.

Bibliography

In addition to the sources specifically mentioned above, I also referred to:

Edwards' Botanical Register, Oct. 1828 (1182)

Gardeners Chronicle, 29 Oct. 1881 (568), which I traced back through

Kew Bulletin, 1891 (309)

Journal of Botany, 1889

Transactions of the Philosophical Society of South Africa, vol. 4, xlii, 1887, the 1886 Presidential Address of P. MacOwan, Director of the Cape Town Botanical Garden, entitled Personalia of Botanical Collectors at the Cape.

I also looked, without success, for some mention of this episode in a number of books on Hooker and Lindley.

The British National Dictionary of Biography, and two further books by Ray Desmond, his *British and Irish Botanists and Horticulturalists*, and *A celebration of flowers: 200 years of Curtis's Botanical Magazine* helped me get a feel for the times.

I also referred back to my earlier articles 'James Bowie' and *The noble family of Clive*, William Aiton , William Hooker and John Lindley', in Newsletters of the Clivia Society (Vol. 11, nos. 3 and 4 of 2002)

Some biographical notes on James Bowie

Extracted and edited from Smith, Gideon F &van Wyk, AE. 1989. Biographical Notes on James Bowie and the Discovery of Aloe bowiea *Schult. & JH Schult. (Alooideae: Asphodelaceae). In* Taxon, *Vol 38, No 4 (Nov), pp. 557-568*

Background

James Bowie spent a total of almost 49 years in South Africa and during his initial stay (1816-1823) undertook four journeys into the interior. Although very little is known about his activities after his emigration to the Cape Colony (1827) he no doubt travelled widely and was a member of many more botanical expeditions (Bowie, 1842). Apart from not having published much about his collecting trips and field experience in southern Africa, Bowie was notorious for providing insufficient and misleading details of the material which he collected, apparently for business reasons. An example is *Clivia nobilis* Lindl. (=*Imatophyllum aitoni* Hook.) which Bowie introduced into England at a time that Cape plants were in high fashion in Europe. He mentioned this species as having been collected from the Orange River, although its natural habitat is known to be in the vicinity of Grahamstown (Obermeyer, 1972; Duncan, 1985). This habit of Bowie has greatly detracted from the scientific value of his collections.

Clivia nobilis in habitat showing notched leaf tip.

James Bowie (ca. 1789–2 July 1869)

It was as the successor to Masson that James Bowie was sent to the Cape of Good Hope, almost 22 years after this great botanical collector had finally left the shores of southern Africa. Bowie was the son of a London seedsman who did business at the west end of what used to be Oxford Street in the early 1880's (MacOwan, 1887; Watson, 1897). In 1810, when nearly 21, Bowie also obtained employment at Kew and spent the next four years working there as a gardener. In 1814 Bowie and a colleague, Allan Cunningham, were sent on what was to be his first collecting trip abroad. They embarked for Rio de Janeiro and collected material in Brazil until 1816 (MacOwan, 1887; Hutchinson, 1946; Gunn and Codd, 1981). This visit lasted until 28 September 1816 (Hutchinson, 1946) [and not 1817 as stated by Smith (1881), MacOwan (1887), and Watson (1897)]. Bowie was then ordered

to the Cape of Good Hope as botanical collector and Cunningham, in a similar capacity, to New South Wales, Australia. .... On 28 September 1816 Bowie boarded the 'Mulgrave Castle' and arrived at Table Bay on 1 November 1816. During the first eighteen months of his initial stay at the Cape, Bowie concentrated his collecting activities to the vicinity of Cape Town. At this time he seems to have been engaged in the normal duties expected of a collector, cultivating and exporting to Kew plants of mainly horticultural interest (MacOwan, 1887; Rowley, 1960). Bowie apparently held his own collecting capabilities in high esteem since he stated in a letter dated November 1826 (quoted by MacOwan, 1887) that he collected and forwarded to Kew almost every plant from the Cape of Good Hope figured in Great Britain after 1817. In identifying the Bowie localities, the presentations of Hutchinson (1946) and Gunn and Codd (1981) have been followed. Hutchinson (1946) based his account of Bowie's travels on information obtained from GH Fourcade, a plant collector and Forest Officer at Knysna, stationed with the Superintendent of Woods and Forests for the Cape of Good Hope from 1882 to 1913. With regard to specific localities little can, however, be gleaned from the above sources. In many cases the only information available is a general locality or district. Bowie began his first collecting trip into the interior of southern Africa on 23 March 1818. On this trip he explored from Cape Town and Caledon in the west to Knysna and Plettenberg Bay in the east, returning to Cape Town almost ten months later along the coastal route. Bowie arrived at Cape Town on 14 January 1819 and probably spent the next three months dispatching to Kew the material that he collected on this journey. During this and subsequent journeys Bowie made Plettenberg Bay his headquarters (Fourcade, 1944). On 9 April 1819 Bowie departed from Cape Town on his second collecting trip. This trip again lasted almost ten months and took Bowie as far east as Knysna where Bowie stayed with George Rex (19 July or 29 August 1765-3 April 1839), a notary and pioneer of this town. The legend that Rex was the legitimate son of Prince George (later King George III) seems to be unfounded (Gunn and Codd, 1981). King George III did, however, act as patron of the overseas collecting trips of, amongst others, James Bowie. Rex was a hospitable man and he received many naturalists of that time at Knysna, Bowie in particular paying him frequent visits (Fourcade, 1944). He is commemorated in *Streptocarpus rexii* (Hook.) Lindl. which was collected by Bowie at Melkhoutkraal, one of Rex's farms at Knysna (Gunn and Codd, 1981). *Streptocarpus rexii* was the first species of this interesting genus to be discovered and was introduced into cultivation from the material sent to Kew by Bowie (Hilliard and Burtt, 1971). After having completed his second journey, Bowie arrived back at Cape Town on 22 January 1820 in the company of George Rex (Fourcade, 1944). Although the exact date on which Bowie departed on his third journey which took him as far east as Bushmans River, Kowie and Graham-

stown is not known, it must have been shortly after 22 January 1820. On 9 March 1820 he was already residing at Knysna, whilst it took him between three and seven months, respectively, to reach Rex on his first two journeys. One would thus have to assume that Bowie was now more familiar with the route from Cape Town to Knysna and that he did not stop to collect along the way. On this third journey George Rex accompanied Bowie from Cape Town to Knysna. This collecting trip, which lasted approximately one year, took Bowie further east than either of his first two journeys. After completing this journey he sailed from Algoa Bay on 15 January 1821, arriving on 29 January 1821 in Tabel Bay where he remained until 23 May 1821. On his fourth journey Bowie seems to have been eager to explore from Algoa Bay eastward since he again sailed from Cape Town (24 May 1821) and arrived at Algoa Bay two weeks later on 5 June 1821. During this last collecting trip that Bowie undertook into the interior of southern Africa during his initial stay at the Cape, he explored the lesser-known eastern and south-eastern parts of the Colony more thoroughly and also proceeded to the north-eastern Cape where he collected plants in the vicinity of Colesberg. He again resided with George Rex at Knysna from 1 June 1822 to 22 September 1822 and eventually returned to Cape Town overland. On his return journey Bowie met Dr George Thom (18 June 1789-11 May 1842), a missionary and minister of the Dutch Reformed Church at Caledon. Thom took a great interest in botany and sent specimens from South Africa to Prof WJ Hooker at the Glasgow University (Stirton, 1986). Sir Joseph Banks, who initially convinced King George III to make funds available for the employment of collectors of foreign botanical material, died on 19 June 1820. Two years later a vote reducing by one half the sum available for such collectors was passed in the House of Commons (Smith, 1881). This meant that either Cunningham, an earlier exploring companion of Bowie in Brazil, had to be recalled from New South Wales, or that Bowie had to be recalled from the Cape. Apparently because of his intemperate habits and lack of perseverance in his collecting duties, it was decided that Bowie should be recalled. On 23 May 1823, six months after completing his fourth journey into the southern African interior, he sailed from Cape Town for England in the 'Earl of Egremont'. After briefly collecting at St Helena, he arrived at London on 15 August 1823 (Hutchinson, 1946). Bowie was now no longer employed by Kew and spent his days working on herbarium specimens collected during his visits abroad. At night he passed his time in public houses and there boasted of his adventures and encounters with wild animals at the Cape and in Brazil (Verduyn den Boer, 1929). These drinking bouts eventually resulted in Bowie becoming an alcoholic. He decided to settle in South Africa and to become a collector of objects of natural history. After four aimless years in England, Bowie finally sailed for the Cape in the "Jessie" in April 1827 (Ffolliot, 1981). For the next 42 years Bowie,

who never married, lead an unproductive life at the Cape. His attempts to take over the business of Villet and Son, who dealt in the export of natural history specimens, failed and his hope of becoming the curator of a botanic garden at the Cape was never realized (MacOwan, 1887; Gunn and Codd, 1981). Later he made an unsuccessful attempt to make a living from selling Cape bulbs and also failed to obtain land for establishing an experimental English nursery (Anon., 1970; Ffolliot, 1981). By 1836, some nine years after having settled in Cape Town, he seems to have been employed as gardener and collector to Baron Carl von Ludwig of Ludwigs Garden in Kloof Street (Marloth, 1915; Stafleu and Cowan, 1983). This engagement lasted less than five years and, by 1841, he was again working independently and making a meagre living from horticultural tuition and inspection and from selling plants collected on field trips (Bowie, 1842). During the latter part of his life he was in poor health and, as an act of charity, was employed as a gardener by Ralph H Arderne at his magnificent garden in Claremont, Cape Town (Gunn and Codd, 1981). James Bowie died on 2 July 1869 (not in 1853 as stated by Smith, 1881) and was buried in Cape Town. Specimens that Bowie collected at the Cape of Good Hope are kept at the British Museum (Natural History) and at Kew. Drawings of plants sent to England by Bowie are in the Kew collection (Hutchinson, 1946; Reynolds, 1982).

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1854

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Clivia miniata

Hooker, W.J. 1854. *Imantophyllum miniatum*. Curtis's Botanical Magazine 80: t. 4783.

Imantophyllum miniatum

Brick-coloured Imantophyllum

Gen. Char. IMANTOPHYLLUM*. ***Perianthium*** superum corollaceum, 6-partitum, patenti-campanulatum, tubo brevissimo, laciniis late obovato-lanceolatis subæqualibus, 3 int. paulo majoribus. ***Stamina*** 6. ***Filamenta*** crassa, subulata, patentia, summo tubo inserta, ***perianthii laciniis*** subbreviora. ***Antheræ*** versatiles, brevi-oblongæ. ***Ovarium*** inferum trigonum, 3-loculare, ***loculis*** oligospermis, ***ovula*** subsex in quolibet loculo biseriatis, angulo interno affixa. ***Stylus*** crassus, decurvato-adscendens, perianthio longior. ***Stigma*** 3-fidum. ***Capsula*** carnosa, indehiscens. ***Semina*** (abortione) in singulo loculo solitaria, bulbiformia, rugosa, subpulposa, magnitudine seminis *Fabæ vulgaris* (horse-bean).—Herba *acaulis*. ***Radix*** *e fibris numerosis fasciculatis carnosis crassis*. ***Folia*** *radicalia ampla lorata disticha, basi latissima amplexante.*

Previous page: *Clivia miniata* near Mponde Falls, Pondoland, 25 October 1981. Painted by Auriol Batten and completed 21 July 1983.

Typical *C. miniata* in bloom at Umtamvuna.

Scapus *plano-convexus, latus, apice umbellato-multiflorus.* ***Spatha*** *polyphylla, marcescens, colorata.* ***Flores*** *ampli, miniati, unicolores, pedicellati, bracteolati;* ***bracteolis*** *linearibus, longitudine fere pedicellorum.*

IMANTOPHYLLUM? *miniatum.*
VALLOTA? miniata. *Lindl. in Gardeners' Chron.* 1854, *p.* 119; *and at p.* 149, *observations by Mr. Backhouse.*

*[Not *Imatophyllum* (more correctly *Imantophyllum*) of ourselves, at Tab. 2856. It was unfortunate that that plate of *I. Aitoni* appeared on the same day on which the same plant was figured by Dr. Lindley in the 'Botanical Register' as *Clivia nobilis*. The name may, we think, thus with propriety be transferred to the present genus, a near ally of, but certainly distinct from, *Clivia*, Lindl.]

[We have ourselves also received living plants of the same direct from Natal.]

Greig Russell notes on his website [http://pennypoint9.itgo.com/clivia/bosse/miniatum.html]: "Plate 4785, a plate of the orchid species Coelogyne testacea, was published on the 1st June 1854. It was followed by a description which had at its end a piece of open space, in which Hooker published the following short note: ... at Tab. 4783 there should be no note of interrogation after the word "Imantophyllum". It is obvious from this that the question mark should not be included in any reference to this work – and I will make a point of deleting it wherever I have made mention of it. The reference to this would be: Hooker, W.J. 1854a. At Tab. 4783 ... . Curtis's Botanical Magazine 80: sub. t. 4785.

A flowering specimen of this fine Amaryllidaceous plant was exhibited at a meeting of the Horticultural Society in February of the present year; and in the following month the Messrs. Backhouse, of the York Nursery, who imported the plant from Natal, obligingly forwarded from their greenhouse the specimen here represented. Dr. Lindley noticed the plant doubtfully as a *Vallota*: it wants the peculiar duplicature of the faux of the corolla of that genus, and it has not a bulbous root. Mr. Backhouse agrees with us that it is nearer *Clivia* than *Vallota*: so near, that I am not sorry to transfer one of the two generic names which that plant has borne to the present. Mr. Backhouse alone has imported ripe fruit; and the seeds which he describes are in appearance similar to the so-called bulbiform seed of other Amaryllidaceous plants, *Crinum* for example. We shall conclude this article with a description from the living plant, by Mr. Backhouse , which accompanied the specimen.

DESCR. "After removing the flower-stem, the plant was taken out of the pot, and the earth thoroughly washed from it, so as to allow a complete investigation of its root. This was done with a view of relieving the plant from the encumbrance of a ball of exhausted hard earth. The vertical ***root-stock*** is about four inches long, cylindrical, and truncated; the lower two inches are bare and like a section of a broomstick, about an inch in diameter. From the upper two inches protrude numerous whitish branched ***fibres***, about the thickness of a goose's quill, clothed with a short pubescence on their younger portions. The ***leaves*** on our

C. miniata growing along the steep banks of the Qwantinga River.

oldest plant were twenty-three in number, in opposite rows, the widened base of each leaf embracing that of the opposite one; and in this respect, as well as in the root, resembling *Clivia*. The leaves of our plant are not linear nor rigid, like *Clivia*, but are linear-lanceolate and stout, and exhibit not only the longitudinal nerves, but some of the stronger transverse partitions; like those of *Clivia*, they are perennial. In strong plants they come up from the centre in series of four to five at once, quickly succeeding each other; and about the time that the first of the new series is matured, the flower-stem is protruded between the outer one of these and the last of the next older series. The new leaves are of a rather brighter green than the old ones. The ***flower-stem*** is flattened, about a foot long, and supports an umbel of twelve to fifteen pedunculate flowers, at first enveloped in a sheath, composed of membranous and membranous-margined bracts.

A rare yellow *C. miniata* growing amongst typical oranges.

The ***stamens*** and ***style***, when the flowers begin to open, are decidedly declining; but the expansion of the flowers carries the upper stamens a little out of this position, and spreads the whole of them. So far as we have seen, but one ***ovule*** in each cell swells. Once, one in each of two cells was matured, and the third was abortive. In two other instances only one in one cell matured, and those of the other cells were abortive. I did not examine minutely the original number of rudimentary ovules. The seeds, being valuable to us, were not cut, so as to examine their internal structure; but their size was that of a smallish horse-bean, and, though less rugged than those of *Crinum*, decidedly 'bulbiform,' at least so both William Wood and myself considered them. They were sown immediately, under the idea that they would not keep, and they quickly pushed up each a leaf. The ***capsule*** turned of a brownish colour and became soft, and the integument of the seed was moist; and on a portion of the exterior being accidentally rubbed off, a silvery membranous coat, like that of the bulb-seeds of *Crinum*, was exhibited. Our old plant has for the last two years produced fresh leaves and a flower-stem about every four months. It has sent off several suckers from the portion of the root-stock which produces the fibres (if so the thick roots I have described may be called). If the flower-stem be kept in water, possibly some of the capsules may swell a little, so as to exhibit the number of the rudimentary ovules. The ***corollas*** are deciduous, as in *Clivia*, to which I certainly think the plant nearer than to *Vallota*. The flowers expand about two at a time daily, or in two days or longer periods, but remain so long as to form, along with the others also expanded, a fine head for from two weeks to a month, according to temperature."

A sympathetic domestic planting.

An attractive habitat scene at Umtamvuna.

Clivia miniata painted by Kathleen Lansdell in 1914.

Some biographical notes on James Backhouse

Extracted, edited and expanded from K[arstens], M[ia] C. 1968. Backhouse, James in De Kock, W. J. (Editor-in-chief). Dictionary of South African Biography Volume 1. Pretoria: HSRC. Pp. 31–32

Expanded from notes by Peter Davis of the Durham County Local History Society, Selected Biography No. 5 'The Backhouse Family – Bankers and Horticulturists'

James Backhouse, born in Darlington, England on 8.7.1794, the fourth child of James Backhouse, a banker at Darlington, and Mary Dearman, of Thorne, was to become renowned as a Quaker minister and missionary, nurseryman and botanist. In November 1822 he married Deborah Lowe (1827), daughter of the Rev. Richard Lowe, of Worcester. They had three children.

As a child he showed a great interest in religious matters, and in later life, after attending a Quaker (Society of Friends) boarding-school at Leeds, he became assistant to two Friends at Darlington in a grocery, drug and chemical business. For reasons of health he spent the summers farming, during which time he studied botany, helped by relations well versed in various branches of natural history – a great-uncle, Stephen Robson, who had published a British flora on Linnaean lines in 1777, and his uncle, Edward Robson, known as an enthusiastic botanist.

In these early years, he and his son, James, frequently visited Teesdale, west of Darlington, with its limestone and alpine flora, and made certain botanical discoveries. It was his love of botany that led him to gardening. He went to learn his business at Norwich, staying there for about two years, and making the acquaintance of Sir William Hooker, with whom he sometimes went botanizing. In partnership with his brother Thomas, he took over the well-established nursery business of J. and G. Telford at York, this being the start of the Backhouse Nurseries, renowned as suppliers of alpine plants, and in clivia circles, for the introduction of the Clivia miniata as a horticultural plant in England in 1854.

Though by profession a nurseryman and seedsman, he felt called to devote his life to the ministry, noting that:

In the study of Botany, as well as in other things, I found it necessary to keep ' to the limitations of the Spirit of Truth,' lest these things should gain an undue place in my mind, and become as idols, drawing my attention from that love and service to God, which was needful to my growth in grace, and due from me to the Author of all the mercies I enjoyed.

One of his engagements was a mission with his friend, George Washington Walker, to Australia, Mauritius and the Cape Colony, sailing for Australia with Walker on 3.9.1831 being primarily for preaching to colonists and convicts, and of visiting penal settlements, gaols, schools and other public institutions to suggest improvements and to promote temperance. Leaving his two children and his business in the hands of his brother, they stayed there for the next six years.

They spent the first three years (1832–34) in Van Diemen's Land (Tasmania) proceeding to New South Wales (1835–37) and Backhouse sent a valuable herbarium of inland species to Kew gardens. After a return visit to Hobart in 1837, they left at the end of the year and, after visits to Melbourne, Adelaide and Perth, left for Mauritius in February 1838.

After a three-months stay on this island they sailed in the schooner Olivia for Cape Town, entering Table bay on 27.6.1838. They set out on their journey into the interior by ox-wagon on 27.9.1838. During two and a half years in the country, they travelled 6,000 miles in the interior of the colony, visiting the various mission stations, B. also taking a keen interest in the indigenous vegetation. The route covered was as follows: Swellendam, Grootvadersbosch, the Little Karoo ('Kannaland'), Riversdale, Mossel Bay, George, Knysna, Plettenberg Bay, Essenbosch, Bethelsdorp, Port Elizabeth, Uitenhage, Grahamstown and Fort Beaufort. They left their ox-wagon on the banks of the Kat River and departed for Kaffraria on horseback. They travelled beyond Butterworth, by way of King William's Town and Bethel. Then they returned to the Cape Colony, picking up their ox-wagon at the Kat River. On their return journey, which took over a year, they visited Bechuanaland, Basutoland, Griqualand West and Little and Great Namaqualand.

They reached Cape Town on 11.5.1840, James sailing for England on 9 December, arriving in London on 15.2.1841.

C. miniata shown in a typical habitat of rocks and rotting vegetation.

In England he kept in touch with the colonies, sent books to Africa, and raised money for Robert Moffat's Tswana translation of the Bible. He published two large octavo volumes on his journeys, A narrative of a visit to the Australian colonies (London, 1843) and A narrative of a visit to the Mauritius and South Africa (London, 1844), which give full accounts of his activities, experiences and observations and include etchings and wood-cuts by his second cousin, Edward Backhouse. Although he writes in his introduction "The descriptions in this volume do not, however, pretend to much scientific nicety; they are rather designed to give, in few words, general ideas of the objects described," his second Narrative (1844) contains countless botanical records. The plants are given their scientific names, with, often, their common names. These notes on trees and shrubs, succulents and bulbous plants in great variety, orchids and many other plants, give a vivid picture of the vegetation of the various regions visited. The etchings illustrating the work include a plate showing the camel-thorn with the nests of weaver birds and community finches, and other depictions of South African plant life.

Backhouse was also interested in South African fauna, various mammals, birds, reptiles and insects being mentioned in his book. His contributions to the knowledge of the flora are based entirely on his own observations as a field botanist. He had an herbarium of Australian, but not, unfortunately, of South African plants. He, however, became the joint author, with W. H. Harvey, botanist and colonial treasurer, of a South African genus of the Iridaceae: Schizostylis. When the widely-distributed type species, *S. coccinea*, with its showy crimson flowers, was first identified and named, it formed part of a batch of plants received from the Backhouse Nurseries at York; the bulbs had originally been collected near rivers such as the Keiskamma, in the eastern Cape, although the name of the collector is unknown. Backhouse collected fungi in 1838 in the Albany Division; in the Cape peninsula he went on several excursions with Harvey. His Narrative is also important from an ethnographical point of view, as it gives detailed information on the way of life and the customs of various tribes, and an eye-witness account of the freeing of the slaves in Hankey.

Continuing his business in York, with his son, James, who was also a gifted naturalist, Backhouse travelled extensively in England on botanical expeditions, and paid three visits to Norway in connection with his religious work. He wrote tracts and short lives of prominent Quaker associates, and published a biography (with Charles Tylor) of his companion in Australia and South Africa: The life and labours of George Washington Walker (London, 1862).

His writings display his sense of humour, genial good nature and practical sense. Backhouse was an agreeable companion, plain of dress, with no pretensions, a strict Quaker in his daily conduct, but tolerant towards all, and one with the marked gift of moving with friendly ease among all conditions of men.

He died 20.1.1869 at his home, Holdgate House, in York.

J.F.W. Bosse and *Clivia miniata* – A question of question marks?

Greig Russell

The author of *Clivia miniata* was generally given as Regel alone, this having been the case from the latter part of the 19th century and onwards for the first three quarters of the 20th century. The reason for this appears to be that some of the earlier descriptions of this species had question marks associated with the given names – and most early taxonomists considered these names to be thus invalid. Prof. Piet Vorster formerly of the Botany Department of the University of Stellenbosch, and a man with a great interest in clivias, addressed this problem in a paper published in 1991 in the SA botanical periodical *Bothalia*. He pointed out that "Clearly *Vallota miniata* is validly published in terms of Art. 34.2 which states that 'a name is validly published when published with such a question mark or other indication of taxonomic doubt, yet published and accepted by the author'". He thus corrected the authorship, saying: "The correct author citation is therefore *Clivia miniata* (Lindley) Regel, based on *Vallota miniata* Lindley."

The International Code of Botanical Nomenclature (Vienna Code of 2006) says the following:

34.1. A name is not validly published

(a) when it is not accepted by the author in the original publication;

(b) when it is merely proposed in anticipation of the future acceptance of the taxon concerned, or of a particular circumscription, position, or rank of the taxon (so-called provisional name), except as provided for in Art. 59;

(c) when it is merely cited as a synonym;

(d) by the mere mention of the subordinate taxa included in the taxon concerned. Art. 34.1(a) does not apply to names published with a question mark or other indication of taxonomic doubt, yet accepted by their author.

52.2. Note 1. The inclusion, with an expression of doubt, of an element in a new taxon, e.g. the citation of a name with a question mark, does not make the name of the new taxon nomenclaturally superfluous.

Aside from Lindley's *Vallota* ? *miniata*, the original material of which can been examined on the website http://pennypoint9.itgo.com/clivia/, Hooker's "*Imantophyllum*? *miniatum*", usually said to contain a question mark, was an illegitimate name (see my 2010 article "*Imatophyllum*? ... Tut-tut, Dr Hooker." – *Clivia* **12**: 5–12.). I have recently discovered that it was not Hooker's intention for that question mark to be printed. See my page on the original material related to this name, as well as the note from Hooker. And then there is Bosse's ?*Clivia miniata* – too many question marks?

Various botanists have accepted this latter name as the first valid transfer of '*miniat-*' to the genus *Clivia*. There is no reason not to accept this name. The ICBN says the following:

33.2. Before 1 January 1953 an indirect reference to a basionym or replaced synonym is sufficient for valid publication of a new combination...

An examination of Bosse's entry regarding this species will readily show that he directly referred to Lindley's basionym *Vallota ? miniata* (this name rendered in full, including the question mark), as well as Hooker's illegitimate *Imantophyllum miniatum* (as "Imatophyll. miniat. *Hook.*"); so we cannot be in any doubt as to which plant he had in mind. Bosse's new combination saw the light five years before Regel published his notes on the species – and thus Bosse has priority.

Bosse may have had his concerns regarding the placement of the species in *Clivia*, but he did it, and did not offer any alternate option in his work; eg. he did not also place it under *Imatophyllum* – the other genus name he published in his work, from which entry he simply referred the reader to the genus *Clivia*, giving no other notes. Rafaël Govaerts of Kew, England, the Prince of Monocot botanical nomenclature, has accepted Bosse as the author of the combination, as "*Clivia miniata* (Lindl.) Bosse", on his World Checklist of Selected Plant Families (WCSP) (based upon my research). In my opinion Rafaël is the premier world authority in his field.

These four photographs show some of the variation which can be observed in *Clivia miniata* in habitat at a single location.

I am quite delighted that we are able to discard the work of Regel; it is just so shoddy and poorly researched that it was never worth much.

Julius Friedrich Wilhelm Bosse (1788–1864) was a German landscape gardener, horticulturist and botanist, who was the Curator of the Ducal Gardens at Oldenburg, Germany. He was of the fourth generation of the Bosse family who had all been deeply involved in German horticulture, his father being the more famous Carl Ferdinand Bosse (1755–1793). In 1807 J.F.W. finished his apprenticeship at the Royal Botanical Gardens in Berlin and then worked in the parks of Potsdam and from 1810 in the Karlsaue in Kassel. From 1812 to 1814 he worked, like his ancestors, in Lütetsburg; and then took care of Oldenburg Castle Gardens of Duke Peter Friedrich Ludwig for 42 years, eventually as curator (Grossherzoglich garten-inspector). J.F.W. Bosse added to the work of his predecessors in designing the palace gardens as 16 acres of garden art in the English style of the early 19th Century [his father having worked in England with the famous Lancelot (Capability) Brown]. This garden is said to look like a walk-in painting.

Bosse's major work was his *Vollständiges Handbuch der Blumengärtnerei, oder genaue Beschreibung fast aller in Deutschland bekannt gewordenen Zierpflanzen, mit Einschluß der Palmen und der vorzüglichsten Sträuche und Bäume, welche zu Lustanlagen benutzt werden, nebst gründlicher Anleitung zu deren Cultur, und einer Einleitung über alle Zweige der Blumengärtnerei.* (which translates as *Complete Guide to the flower garden, or a clear description of almost all known ornamental plants in Germany, with the inclusion of the palms and the principal shrubs and trees, including those plants which serve to delight, along with thorough instructions for their cultivation, and an introduction to all branches of flower gardening.*) ed. 1, 1829, 2 Volumes; ed. 2, 1840–1842, 3 Volumes; ed. 3, 1859–1861, 3 Volumes; Hannover : Hahn'sche Hofbuchhandlung.

I have prepared a translation of the applicable Clivia entry from the 3rd Edition, which was printed in Fraktur Gothic font (which offered me a great learning curve), and this may be downloaded in PDF at http://pennypoint9.itgo.com/clivia/bosse/.

The original pages concerning Clivia and *Imatophyllum* from the 3rd Edition of Bosse's Vollständiges Handbuch der Blumengärtnerei are also available here.

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1856

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Clivia gardenii

Hooker, W.J. (1856). *Clivia gardeni*. Curtis's Botanical Magazine, series III 12: t. 4895.

Clivia gardeni

Major Garden's Clivia

Nat. Ord. AMARYLLIDACEÆ – HEXANDRIA MONOGYNIA

Gen. Char. Perigonium superum, corollaceum, tubuloso-infundibulare, 6-partitum, irregular, deciduum; tubo brevi, tereti; laciniis imbricates; exterioribus lineari-lanceolatis; interioribus paulo longioribus, spathulatis ex his inferiore magis product, apice leviter recurvate, ex illis superiore breviore, convexo-curvata, cæteris rectiusculis. ***Stamina*** sex, summo tubo inserta, decurrentia, erecta; petalina paulo longiora, parum exserta. ***Filamenta*** filiformia. ***Anthera*** oblong, dorso supra basin bifidam affixae, erectæ (versatiles, *Lindl.*). ***Ovarium*** inferum, subovatum, obsolete trigonum, triloculare; ***ovula*** 6–7 in quolibet loculo, angulo interno affixa, biseriata, hemianatropa. ***Columna*** stylina filiformis, teretiuscula, erecta, stamina superans. ***Stigma*** trifidum; laciniis patulo-recurvatis. ***Bacca*** abortu monosperma (sub-6-sperma, Hook.) ***Semen*** adscendens, subgloboso-compressum; testa carnosa, areolata; hilo et chalaza lateralibus, raphe brevi elevata conjunctis. ***Embryo*** axilis, albumine carnoso dimidio brevior, extremitate radiculari hilo parallele contigua infera. – ***Herba*** *acaulis, Capensis.* ***Bulbus*** *imperfectus; fibris fasciculatis, carnosis, tuberoso-incrassatis.* ***Folia*** *crebra, disticha, lorata, rigida, persistentia.* ***Scapus*** *plano-convexus, solidus, apice umbellato-multiflorus.* ***Spatha*** *polyphylla, marcescens.* ***Flores*** *pedicellati,*

In the Ngome forest a distinct form of *C. gardenii* occurs, often bearing yellow and pastel orange flowers.

Previous page: *Clivia gardenii* painted by Barbara Jeppe.

Clivia gardenii type illustration from Curtis's Botanical Magazine, series III 72: t. 4895.

A variety of *C. gardenii* in habitat, showing the diversity of colour and shape of the flowers.

bracteolis linearibus distincti, nutantes, luteo-crocei, apice virescentes. **Semina** *sæpe in fructu germinantia. Kunth.*

CLIVIA *Gardeni*; foliis obtusiuscule acuminates, umbella sub-14-flora, floribus falcato-curvatis, sepalis apice patentibus.

Clearly a species of *Clivia*, Lindl. (Imantophyllum, *Hook.*), and perfectly distinct from the only hitherto known species of this African genus, figured at our Tab. 2856. The leaves are longer, and they taper gradually into an acuminated but not sharp point; the umbel has fewer flowers, but these flowers are twice the size of *C. nobilis*, and more brightly coloured, very much curved or falcate, and the apices of the sepals, instead of being incurved so as to form a very contracted mouth, are spreading, thus forming an infundibuliform corolla. *Clivia nobilis* is an inhabitant of the Albany Tracts, near the Great Fish River, South Africa; *C. Gardeni* was discovered in the Natal Colony by our excellent friend Major Garden, and by him introduced to the Royal Garden of Kew. Treated as a greenhouse plant, it flowers finely in the winter months, and continues for several weeks in blossom.

DESCR. ***Root*** exactly as in *C. nobilis*, of several stout, fleshy ***fibres***. Leaves distichously inserted, numerous, all radical, the bases sheathing; the blade one and a half or two feet long, gradually tapering towards the extremity into a rather blunt point. ***Scape*** erect, very much and ensiformly compressed, flat on one side, slightly rounded (subsemiterete) on the other. ***Bracts*** few, small, membranaceous, among the pedicels. ***Umbel*** of about fourteen flowers. ***Peduncles*** two inches or more long, erect or erecto-patent, curved upwards. ***Flowers*** full two inches long, independent of the ovary, very much falcate or curved downwards, of a dull orange or brick-red colour, gradually passing upwards into yellow, and that again into the green of the upper extremity: their shape is infundibuliform, curved: the ***sepals*** (united only at the base) overlap each other for their whole length, except at the apices, which are patent, and thus give their flower a very different appearance from that of *C. nobilis*. The ***stamens*** are inserted above the base of the perianth, longer than it: the ***filaments*** white, curved: ***anthers*** oblong, yellow. ***Ovary*** subglobose, but three-lobed or angled. ***Style*** longer than the stamen, much inserted beyond the sepals. ***Stigma*** trifid.

C. gardenii on a favoured rocky slope with unripe seeds.

Clivia gardenii Hook. Collect: L.E. Codd. Locality: Ngome Forest. Nat. Herb No: 29814. Artis's No: C. L. No. 718 PNGB. Flowered Bhekintaba. Sept 1965.

Some biographical notes on Robert Jones Garden

Edited and expanded from: Leverton, BJ. 1977. Garden, Robert Jones. In HSRC. Dictionary of South Africa Biography, Volume III. Pretoria: Tafelberg for HSRC.

Garden, Robert Jones (•United Kingdom, c. 1820 – United Kingdom, after 1853), British soldier and artist of whose parentage nothing is known, joined the British Army as an ensign in the 45th Foot Regiment in June 1839. He was promoted to the rank of lieutenant in April 1842 and captain in August 1848 and retired from the army in 1854. G. arrived at Simonstown with his regiment in 1843 and took part in the Seventh Frontier War (1846-47). He marched against Shiloh and for some while served under Major W. Sutton against other chiefs, and was commended for his work.

In 1848 G. came to Natal and for most of his time there was stationed at Pietermaritzburg. With H. F. Fynn he unsuccessfully tried in 1851 to raise a force of Bantu levies in response to an appeal from the Governor of the Cape Colony for assistance on the eastern frontier. In the winter of 1853 he endeavoured with T.W Fannin to find a new way through the Drakensberg for a shorter road to Bloemfontein, but could not find a suitable pass. In that year he was sent on a mission to Pondoland to bring to heel a recalcitrant chief. A heavily built man, Garden possessed little sense of humour. He quarrelled with most of the Natalians, including his own commanding officer, and on this account he was very much disliked in the colony, particularly as he was most critical of the Natal people (both English and Boer emigrants) and of the missionaries, wagon drivers and Bantu. During his sojourn in Natal G. made numerous journeys, both official and private, and with an easy pen recorded most of what he saw and heard, historical, botanical and ethnologic al. On Bantu matters his main informant was H. F. Fynn and the story of the Boer emigrants in Natal he obtained from J. J. Uys.* From the latter he received an account of the battle of Blood River (16.12.1838) and it was G. who drew the first map of the action.

G.'s account of the colony of Natal is preserved with the Garden Collection in the Natal Archives, Pietermaritzburg. His account narrates several excursions inland and along the coast in 1851 and 1852. Among the collection are also sketches and anecdotes of chiefs, and accounts of Bantu tribes (with Whites residing among them) and of Zulu battles. A description of the country and its wild animals as well as reports on Boer immigration are included. Several of G.'s drawings in black and white and his water colour paintings, which show that he was an artist of some merit, are preserved in the Killie Campbell Africana Library, Durban.

In 1853 G. went to Durban to command a detachment of troops there and in November of that year he left for England to retire and publish his writings on Natal, but this was never done.

Editors' note:

John van der Linde, in his piece Four 19th Century Clivia explorers (Clivia 9, pp.20–24) remarked:

As for his Clivia, all that we know is that it was found somewhere in Natal. Annoyingly, he did not record where he found it. We know from army records that he served for a short time in Pondoland, which is swampy Clivia robusta country. Who knows, maybe the plant he found and took to London was a *C. robusta* and not a *C. gardenii*! This piece of information has always piqued me, and I wondered if by perusing the Garden papers and watercolour depictions held at the Killie Campbell Africana Library in Durban I might find something revealing. I have also read in his biographical information in Gunn and Codd that he sent a Wardian case (in effect a miniature glasshouse named for its creator) of living plant material, a novelty for the time, to Kew Gardens. I have, as yet, no clarity on the matter, but amongst the papers (which are typed transcriptions) are letters regarding donations of plant material by collectors. Also, his notes on Pondoland seem more focused on ethnology and ethno-botany, with no mention of plant collecting. This all needs to be further and more thoroughly researched. [RCF]

Yellow *C. gardenii* growing happily on rotting vegetation over a stream in Ngome forest.

1943

Clivia caulescens

Dyer, R.A. (1943) *Clivia caulescens*. *The Flowering Plants of South Africa*, 23: t.891.

Clivia caulescens

Transvaal

AMARYLLIDACEAE

Clivia caulescens *R. A. Dyer*, sp. nov. affinis *C. nobili* Lindl. et *C. Gardeni* Hook. f. ab ilia floribus paucioribus ab hac floribus minoribus ab ambabus caulibus usque ad 45 cm. longis productis differt.

Caules non-nunquam basi ramosi usque ad 30 vel 45 cm. longi, 3-5-4 cm. crassi. ***Folia*** plus minusve 15, disticha, lorata, 30-40 vel usque ad 90 cm. longa, 2-5-5 cm. lata, rigida, demum decidua. ***Scapus*** circiter 30 cm. altus, usque 1-5 latus, compressus, plano-convexus, solidus, apice circiter 15-20-florus. ***Pedicelli*** 1-5-3-5 cm. longi. ***Perigonium*** 3-5 cm. longum, tubo 4-5 mm. longo, segmentis apicem versus leviter recurvatis, segmentis exterioribus usque ad 7 mm. latis elliptico vel spathulato oblongis, segmentis interioribus 1-1-2 cm. latis. ***Stamina*** summo tubo inserta decurrentia, plus minusve periauthio aequilonga. ***Ovarium*** circiter 5 mm. longum; stylus filamentis aequilongus. ***Fructus*** subglobosus, circiter 1-5 cm. diametro.

Description:—***Stems*** sometimes branched from the base up to about 45 cm. tall, 15-5-4 cm. diameter, becoming leafless below with age and transversely ringed by leaf-scars at intervals of 0-5-1-2 cm. distance, with a tuft of about 15 leaves at the apex. ***Leaves*** dark green, lorate, distichous, but the blades spreading somewhat spirally, usually about 30-40 cm. long and 3 cm. broad, but may be up to 90 cm. long and 5 cm. broad, widening very gradually from the base for about 5 its length and thence narrowed gradually to the apex, ultimately withering and falling. ***Peduncle*** compressed, sharply 2-edged, unequally convex on the surfaces, about 30 cm. long, 1-5 cm. broad at the base, narrowed to 1 cm. under the umbel. ***Spathe-valves*** 4, membranous, unequal, more or less lanceolate, 4 cm. long. ***Umbel*** about 15-20-flowered. ***Pedicels*** 1-5-3-5 cm.

A red *C. caulescens* on Mariepskop.

Previous page: *Clivia caulescens* painted by Barbara Jeppe.

long. ***Perianth*** deep salmon, with the lobes green tipped with yellow oil the overlapped margins, 3-5 cm. long, with a tube 4-5 mm. long and lobes slightly spreading at the tips: the outer lobes elliptic to spathulate-oblong, 7 mm. broad; the inner lobes 1-1-2 cm. broad. ***Stamens*** about equalling the perianth-lobes in length, inserted at the throat of the perianth-tube and the base of the filaments projecting over the mouth of the tube and fitting closely round the style. ***Ovary*** about 5 mm. long; style extending about the same distance as the anthers. ***Fruit*** a berry, subglobose about 1-5 cm. in diameter.—R. A. Dyer.

Transvaal: Barberton district; in woods, summit of Saddleback Mtn., 4000-4650 ft., Oct., *Galpin* 1102 ft; Pilgrims Rest district; MacMac, 4500 ft., *Van der Merwe in Nat. Herb.* Pretoria, 26,511 (type); near Graskop, 5000 ft., Nov., Reynolds 3037; Pietersburg district; Politzi, Oct., *Repton*, 311.

C. caulescens at God's Window in the early sun.

Red *C. caulescens* en masse near the summit of Mariepskop (1947 metres).

The Pinnacle at God's Window with *C. caulescens* growing exposed on the top.

A mature *C. caulescens* at God's Window. A misty area as evidenced by the moss.

Clivia caulescens has been under observation for several years without being definitely identified. It has been collected several times in the eastern Transvaal, and plants have flowered in October and November at the Division of Botany and Plant Pathology during the past few years. The specimen figured was collected by Dr. F. Z. van der Merwe at MacMac near the margin of forest, usually with its roots in leaf-mould. When the species was first studied there was some doubt as to the justification of separating it specifically from *C. nobilis* Lindl. and *C. Gardeni* Hook. f. Both these are stemless plants; the type specimen of the former, from the eastern Cape Province, is characterised by a dense umbel of comparatively small flowers; while the latter, from Natal, has fewer and larger flowers. Baker, in Flora Capensis 6, 228 (1896–1897), included in *C. nobilis* plants from Natal and Transvaal. Whether the Natal plants are correctly placed is open to doubt, and the specimen, *Galpin* 1102 from Barberton cited by Baker, is here referred to *C. caulescens*. Galpin collected the flowering material in October 1890 and stated on the label "Stem 12–18 inches".

C. nobilis and *C. Gardeni* were illustrated under figures t.2856 and t.4895 of Curtis's Botanical Magazine, in 1828 and 1856 respectively. Our plant is intermediate in the number and size of flowers between these, and differs from both in the produc-

Red *C. caulescens* on Mariepskop.

tion of a stem up to 45 cm. long, which is considered sufficient justification for specific separation.

Besides the above-mentioned species there is only one other described, namely *C. miniata* Regel, illustrations of which are to be found on t.4783 of Curtis's Bot. Mag. and Plate 13 of this work and variety *flava* on Plate 411. The flowers are large and attractive.

Clivia miniata and *C. nobilis* were used in artificial hybridisation work soon after the discovery of the former about 1854, and the number of hybrids and segregates in cultivation to-day is very high. Prominence to *Clivia* hybrids has been given in several horticultural works, notably in Herbertia, the Journal of the American Amaryllis Society.

C. caulescens at God's Window with a stem nearly two metres long. Many plants at this locality grow on top of large rocks which are covered in moss.

Clivia caulescens drawn and painted by ME Connell.

Biographical notes

Compiled from: Glen, H. F. & Germishuizen, G. (Compilers). 2010. Botanical explorations of southern Africa. Edition 2. *Strelitzia* 26. Pretoria: SANBI.

Frederick Ziervogel van der Merwe

Frederick Ziervogel van der Merwe (1894-1968) born in Stellenbosch, died in Claremont, Cape Town. Various medical qualifications from Trinity College, Dublin, Liverpool University and the University of the Witwatersrand. He travelled South Africa widely as Medical Inspector of Schools, which lent opportunity for him to pursue his botanical interests, particularly in Aloe and Merwilla (then Scilla), of which he described a number of new species.

(Glen & Germishuizen, 2010: 431).

Ernest Edward Galpin

Ernest Edward Galpin (1858 12 06 – 1941 10 16) born in Grahamstown, died in Mosdene near Naboomspruit, Limpopo Province (then Transvaal). He was a banker by profession and botanised as a pastime. In 1888, after meeting with and encouraged by GF Scott Elliot, on visit to South Africa, and William Tyson in the eastern Cape, he started a private herbarium. When in 1889, after a brief period in Johannesburg, he was appointed bank manager in Barberton he was fascinated with the little-known flora of this region and made carefully preserved and meticulously labeled specimens with several duplicates, these distributed to Kew, Bolus, Medley Wood, MacOwan and Zurich, these novelties soon making an international impact. Here he met DF Gilfillan, to become his brother-in-law, through their marriage to the two sisters, he to Marie Elizabeth de Jong, who was fond of the outdoors and shared his botanical interests, accompanying him on most of his expeditions and painting some of the flowers he had discovered. In 1892 he was transferred to Queenstown where he spent the next twenty-five years. In 1916 he donated his herbarium, comprising some 16 000 sheets, to the National Herbarium in Pretoria, and when, in 1921, they were housed in a new building opened by General Jan Smuts, he described Galpin as 'the Prince of Collectors'. In 1917 he retired to Naboomspruit and resumed botanizing in earnest, assisted by his wife until her heart attack on one of their trips to the eastern Transvaal, and subsequent death in Durban in 1933, and then his son, EA Galpin.

(Glen & Germishuizen, 2010: 181–184).

Dr Robert Allen Dyer

Dr Robert Allen Dyer, who described *Clivia caulescens* as set out above, collected by Dr FZ van der Merwe from the MacMac forest margin, was born on 21 September 1900 in Pietermaritzburg. Here he did both his schooling and completed his university education, obtaining his DSc in 1937 for a botanical survey of the Grahamstown and Bathurst district, of interest to us as the habitat of the *Clivia nobilis*.

He started employ in the sugar-fields of Zululand where he contracted malaria. In 1925 he was appointed to the Albany Museum Herbarium in Grahamstown, where he spent six productive years, including his field-work on the succulent *Euphorbiae*.

From 1931 to 1934 he was South African Liaison Officer at the Royal Botanic Gardens, Kew. On his return to South Africa he was posted to the National Herbarium, Pretoria, where, in 1944, he became Chief of the Division of Botany. He agitated for better facilities, resulting in the new headquarters building in the Botanic Gardens built in the 1970s. He was responsible for founding the National Botanical Gardens in Pretoria.

He retired in 1963, but remained active in the world of Botany, being awarded the South African Association of Botanists first gold medal in 1971, as the "doyen of South African botanists".

Some interesting aspects of his personality emerge in the Obituary prepared for *Veld & Flora* (March 1988, pages 31–2, on which this article is based) by P. Vorster of the department of Botany, University of Stellenbosch. Besides his many publications, he was instrumental in obtaining subscription for those by others, including W. Reynold's *The aloes of South Africa*, and Cynthna Letty's *Wild flowers of the Transvaal*, in which the *Cliva caulescens* is illustrated, as well as Auriol Batten's *Flowers of southern Africa*, which has the *Clivia miniata* illustrated. He was tenacious when the occasion demanded it. He insisted being included as second author to Alain White in exchange for his own research towards the monograph *The succulent Euphorbiae*.

As a person he was a patriotic South African, which created difficulties during the Second World War, as his staff held widely divergent political views. His wit showed when he named *Encephalartos cupidus* as record of the removal to his own premises by the collector of the almost entire known population, hence recording for posterity "a passionate desire to the extent of greed or lust".

He was a photographer, gardener – priding himself on his production of artichokes and African Marigolds, of which he hybridised the biggest and most spectacular in Pretoria – collected the mown grass from the Botanic Gardens as bedding for his fowls, and tested many untried fruits as jellies.

While not a collector of earthly goods, he had a fondness and respect for books. He died in Pretoria on 25 October 1987.

(Glen & Germishuizen, 2010: 160–161).

2002

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Clivia mirabilis

Rourke, J.P. (2002). Clivia mirabilis (Amaryllidaceae: Haemantheae) a new species from Northern Cape, South Africa Bothalia 32: 1–7

Clivia mirabilis (Amaryllidaceae: Haemantheae)

a new species from Northern Cape, South Africa

J.P. ROURKE*

Keywords: Amaryllidaceae, arid Mediterranean climate, *Clivia* Lindl., new species, Northern Cape

Abstract

Clivia mirabilis Rourke is a new pendulous tubular-flowered species from Oorlogskloof Nature Reserve in Northern Cape. Its distribution area is some 800 km outside the Previously accepted range of the genus *Clivia*. This sun-tolerant species is adapted to an arid Mediterranean climate, producing vegetative growth in winter and maturing its seeds rapidly in late summer/early autumn to synchronize with the arrival of winter rains.

Introduction

The genus *Clivia* Lindl., consisting of four currently recognized species, *C. nobilis* Lindl. (1828), *C. miniata* (Lindl.) Regel, *C. gardenii* Hook. (1856) and *C. caulescens* R.A.Dyer (1943), is presently considered to be endemic to southern Africa (Vorster & Smith 1994; Snijman 2000). These species occur in coastal and inland Afromontane forest from Eastern Cape through KwaZulu-Natal, Swaziland and Mpumalanga to the Soutpansberg in Northern Province. Rumours of the occurrence of *Clivia* in Mozambique have not yet been confirmed by accurately localized herbarium collections.

Left: *Clivia mirabilis* painted by Leigh Voigt.

Clivia is an evergreen, rhizomatous genus in the Amaryllidaceae, characterized by distichous strap-shaped leaves, umbellate solid scapes and red subglobose berries containing one to few cartilaginous, pearly-white seeds embedded in soft yellow pulp.

In February 2001 material of a further species was submitted to the Compton Herbarium for identification in a batch of herbarium specimens from the Oorlogskloof Nature Reserve near Nieuwoudtville, in Northern Cape, collected by the nature conservation officer in charge, Mr Wessel Pretorius. The author confirmed this astonishing discovery during a site visit to Oorlogskloof on 22 February 2001 when two fruiting populations were examined. The new species is here described as *Clivia mirabilis*. Rarely can such an extravagant epithet as mirabilis be confidently applied, yet in the case of this extraordinary *Clivia*, so unusual in its distribution and characters, its usage seems entirely appropriate.

Clivia mirabilis *Rourke*, sp. nov., a speciebus affinibus, corollis actinomorphis rectis tubularibtis bicol-oribus (miniatis/luteis); pedicellis cernuis, 22–40 mm longis, miniatis per anthesin (demum viridibus post anthesin); foliis lineamentis medianis albis et apicibus acutis, distinguitur.

A lone *C. mirabilis* greets you immediately below the escarpment as you enter Oorlogskloof, growing between Peninsula Formation Sandstone boulders. These plants grow where the scree is kept moist by underground seeps or springs.

Rhizoma perenne solitarium, erectum; caespite foliorum 0.6–1.2 m alto. ***Folia*** disticha, rigida, erecta, 0.6–1.2 m longa, 30–50 mm lata, glabra, coriacea, lineamentis medianis albis; margines cartilagineae, plerumque laeves, interdum leviter scabra; apices acuti. ***Scapus*** 300–800 mm longus, carmineus, late ancipitius. ***Inflorescentia*** umbellata, 20–48 floribus; spathae 5–7, cymbiformi-acutae, papyraceae, 35–50 mm longae, 10–15 mm latae. ***Pedicelli*** cernui, graciles, 25^40 mm longi, miniati per anthesin, abrupte viridescentes post anthesin. ***Perianthium*** rectum, tubulosum, 35–50 mm longum, dilatatum versus orem; miniatum sed viride ad apicem per anthesin, tandem flavescens distale. ***Antherae*** 6, basifixae, leviter exsertae; filamenta 30 mm longa, basaliter adpressa circa stylum. ***Stylus*** 40–45 mm longus, trilobatus; apices subtiliter penicillati. ***Ovarium*** ovoideum, nitidum, miniatum per anthesin; viride post anthesin; loculi 3–4 ovulati. ***Baccae*** pendentes, irregulariter ovoideae, glebulosae; (l)2–5(–7) semina continentes, pericarpium maturum scarlatinum. ***Semina*** irregulariter ovoidea, ±10 mm in diam., alba.

TYPE.—Northern Cape, 3119 (Calvinia): Nieuwoudtville, Oorlogskloof Nature Reserve, eastern margin of Oorlogskloof Canyon at Agterstevlei Farm, (–AC), ± 900 m, 18–10–2001, *J.P. Rourke 2220* (NBG, hole; BOL, K, MO, NSW, PRE, iso.).

Stout, rhizomatous, solitary, evergreen perennial, 0.6–1.2 m tall; stem reduced to a vertical rhizome, up to 250 mm long terminating in a tuft of leaves. ***Root system*** massive, up to 0.7 m diam., horizontally spreading; roots perennial, very stout, fleshy, up to 20 mm diam., outer surface covered in a corky, velamen-like layer. ***Leaf sheath*** prominent, flushed deep carmine (RHS 183A greyed-purple). ***Leaves*** long-lived, stiffly erect, distichous, strap-shaped, 0.6–1.2 m long, 30–50 mm wide, flattened to slightly V-shaped with a distinct pale whitish grey striation in the midrib area on upper surface, striation becoming less distinct in older leaves, coriaceous, glabrous, deep dull green, flushed carmine-maroon at base, apex obtuse-acute; margins entire, cartilaginous, usually smooth, occasionally irregularly scabrous, becoming slightly revolute in old, mature leaves. ***Scape*** 300–800 mm long, broadly ancipitous, longitudinally ridged, 10–14 mm wide, glabrous, carmine-flushed. ***Inflorescence*** umbel-like, 20–48-flowered, subtended by 5–7 brownish/carmine, papyraceous spathe valves, narrowly cymbiform-acute, 35–50 × 10–15 mm; pedicels drooping, slender, 25–40 × 1.2 mm, orange-red, abruptly turning green in post-pollination phase. ***Perianth*** straight to imperceptibly curved, tubular, becoming progressively flared towards apex, 35–50 × 5 mm below ovary, 10–12 mm diam. at mouth, orange-red (RHS 32B) proximally, green-tipped (RHS 145A) distally on opening, the green changing to yellow (RHS 22B) distally, entire perianth becoming deep orange-red (RHS 33A) after anthesis; tepals fused distally to form a tube 10–15 mm long, outer tepals narrowly oblong, apices acute, inner tepals slight-ly wider, apices obtuse, outwardly flared. ***Stamens*** 6, dorsifixed, 2 mm long, very slightly exserted at anthesis; filaments 30 mm long, attached to tepals 10 mm above ovary; inwardly bowed proximally, adpressed around style at point of attachment forming a 10 mm long nectar well above ovary. ***Ovary*** ovoid, shiny, greenish yellow in bud, becoming orange-red at anthesis, changing to bright green in post-pollination phase; ovules 3 or 4 in each locule; style 40–45 mm long, terete, glabrous, tapering distally, included

A variety of colours and forms found over three *C. mirabilis* sites. In general, the more sun they get, the redder they are.

at anthesis, later elongating and becoming exserted 5–8 mm in post-pollination phase; stigma trilobed, lobes 0.4–1.0 mm long, penicillate at apex. ***Fruiting heads*** with 25–35 pendent berries. ***Berries*** irregularly oblong to ovoid, 10–30 × 10–15 mm, glebulose to submoniliform, often narrowed to a distinct neck above pedicel, apex often tapering to an eccentrically angled beak, containing (1)2–4(–7) gongyloid seeds projecting prominently and irregularly through thin pericarp; pericarp glossy, pale apple green, maturing through yellow, orange to pinkish red; mature berries red (RHS 40B eventually becoming RHS 45B). ***Seeds*** somewhat ovoid, slightly faceted, ± 10 mm diam., pearly white; embryo green. (Colour references according to Royal Horticultural Society colour chart.) Figure 1; Plates 1&2.

Diagnostic characters

Clivia mirabilis is distinguished by its straight, actinomorphic, bicolored (orange/yellow) tubular corolla, long drooping pedicels, 25–40 mm long, that are orange-red at anthesis and green when fruiting; the distinctive single median white striation on the upper surface of the leaves with smooth cartilaginous margins; and irregularly shaped glebulose-gongyloid berries. The basal part of the leaves forming the leaf sheath is flushed a deep carmine maroon, unlike any other *Clivia* except *C. nobilis*, which occasionally produces similarly coloured leaf bases. The orange-red coloration of the pedicels in this species during anthesis is a unique character in the genus *Clivia*.

Distribution and habitat

Apparently confined to the Oorlogskloof Nature Reserve in Northern Cape (Figure 2), *Clivia mirabilis* is restricted to a small area on the eastern margin of the Oorlogskloof Canyon. Populations are known to occur just north of Eland se Kliphuis adjacent to Agterstevlei Farm and a little further south around the Driefontein Waterfall. The distance between these sites is ± 5 km. The species also occurs at a few sites between these two localities.

The margins of the Oorlogskloof Canyon are capped with 30 m cliffs of Peninsula Formation Sandstone. This has eroded to form coarse sandstone talus screes below the cliffs that are partly covered in a light woodland of relictual Afromontane evergreen forest elements, principally *Olea europaea* subsp. africana, *Maytenus acuminata*, *M. oleoides*, *Cassine schinoides*, *Halleria lucida* and *Podocarpus elongatus* with additional shade provided by outsize, (4 m tall) specimens of *Phylica oleaefolia*. Small groups of *C. mirabilis* grow rooted in humus between cracks in the sandstone talus of the rock scree, either as solitary individuals or in small groups. Occasionally some clumps occur in full sun but these tend to have shorter leaves and often show signs of water stress (dried leaf tips). However, the remaining leaves show no signs of sunburn, despite the intense insolation experienced for several months each year. The main population extends over several hectares and probably consists of well over 1 000 individuals. Due to the position of these two sites under the eastern cliffs of Oorlogskloof Canyon, most plants experience shade until about mid-morning after which they are in direct sun.

The area is characterized by a semi-arid Mediterranean climate with a strictly

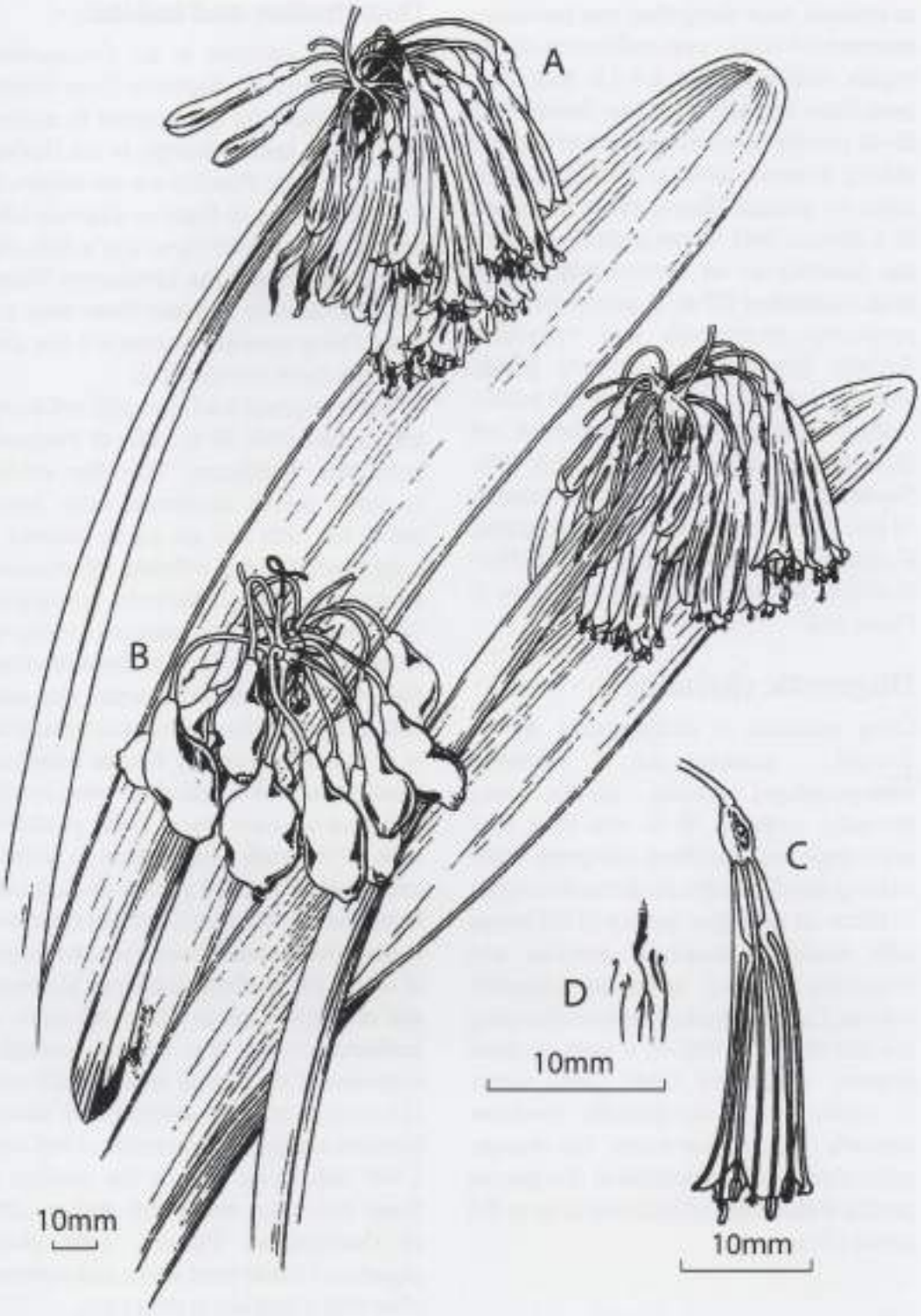


FIGURE 1. *Clivia mirabilis*: A, mature inflorescence; B, fruiting head with irregularly shaped berries; C, longitudinal section through flower; note filament bases adpressed to style forming nectar reservoir; D, detail of filament bases. Scale bars: 10 mm. Artist: John Manning.

winter rainfall regime— exactly the opposite climatic conditions experienced by the other four species in this genus. The mean annual rainfall for Oorlogskloof is 414 mm, falling mainly between May and September. Vegetative growth is thus restricted to a brief winter growing period. Situated at 850–900 m, some 100 km inland from the coast, these populations are subject to brief but light frost in winter.

Morphology and biology

Root system

On excavating several plants in the habitat for cultivation at Kirstenbosch, the enormous root system characteristic of this species was revealed. Large adult plants have a mass of fleshy, succulent roots radiating between ½–¾ m from the base of the rhizome, each root ± 20 mm in diameter. This disproportionally large volume of subterranean biomass gives mature plants an extensive water storage capacity, allowing them to survive the prolonged rainless summers of the Oorlogskloof environment.

Flower colour, development and pollination

The general impression of a fully open scape is of bicoloured, perianths, orange-red at the base, yellow towards the mouth and with orange-red pedicels. During the development of the flower, both perianth and ovary progress through a series of well-marked colour changes. The unopened bud is yellowish, but prominently green-tipped, and the ovary is also pale green. At anthe-

More examples of the variety of colours and forms found over three *C. mirabilis* sites.

sis the green coloration slowly disappears from the tips of the tepals which take on the same yellow tones as the basal half of the perianth. The pedicels and upper half of the perianth are deep orange-red at this stage. After pollination the yellow coloration disappears and the whole perianth and ovary take on a uniform orange/red colour. As the perianth begins to wither, the ovary swells and undergoes an abrupt colour change from orange to bright green, as do the pedicels. No other Clivia has pedicels the same colour as the perianth when the flower is fully open. The pedicels abruptly change to green as the perianth abscisses and the ovary swells in the post-pollination phase.

The purpose of these colour changes is not yet understood, but is probably related to pollinator cues. Pollination appears to be by sunbirds. A single sighting of a malachite sunbird probing the perianths was made at Oorlogskloof in October 2001 suggesting that sunbirds could be involved in pollen transfer. However, like the other three tubular-flowered species, C mirabilis may also be a selfer as between 80 and 90% of the flowers in each umbel are pollinated and produce viable berries. Flowering time: ± six weeks, from October to mid-November.

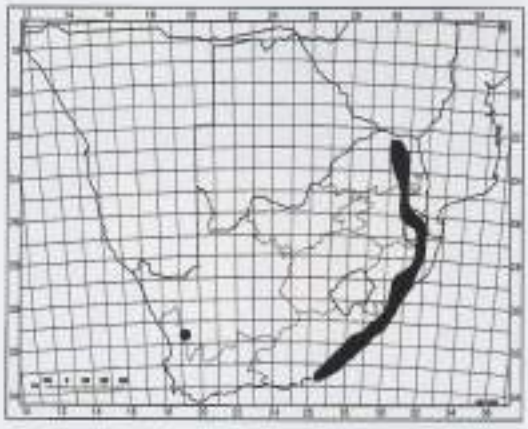


FIGURE 2. Distribution of *C. mirabilis*, •, in relation to the distribution of the remainder of the genus *Clivia* (black shaded area).

Fruiting

The berries mature more rapidly than in the other *Clivia* species. By the end of February, four months after flowering, the fully developed berries turn from yellow and orange to pinkish and later red by the end of March and are shed shortly thereafter prior to the onset of the first winter rains in April/May. This rapid autumn maturation of berries is in sharp contrast to the summer rainfall area clivias which mature slowly, usually 12 months for *C. miniata* and *C. gardenii*, about nine months for *C. caulescens* and *C. nobilis* (Duncan 1999) to coincide with the commencement of October/November summer rains.

Seed dispersal and germination

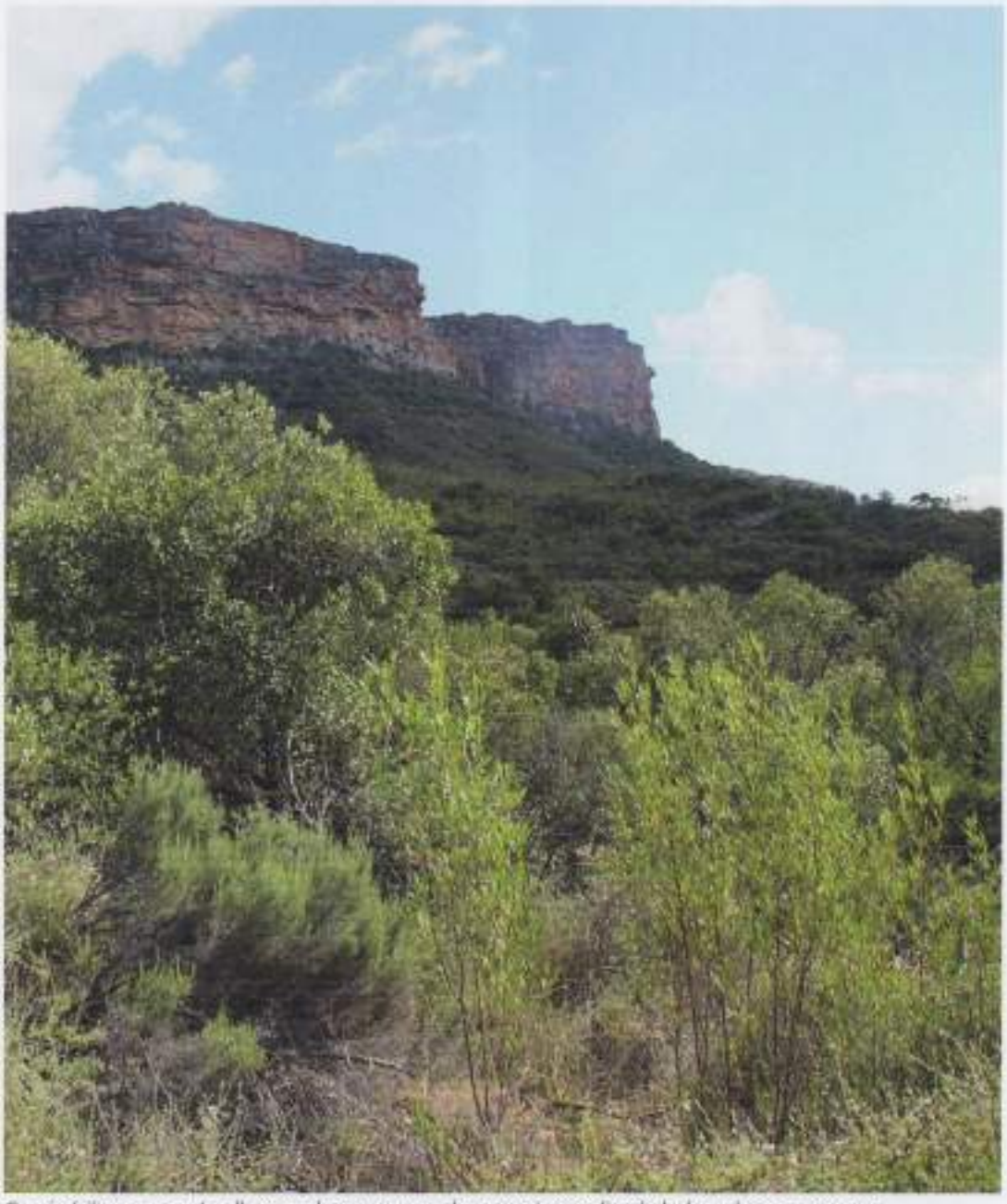
Berries commence falling from late February to early April. Germination appears to be rapid in response to the onset of autumn/early winter rains. At Kirstenbosch seeds sowed on 18 March 2001 had already developed a 10 mm radicle by 10 April 2001.

On germinating, the primary root develops into a swollen, white, succulent cylinder up to 50 × 5–6 mm. During the moist winter months (May–September), it swells, accumulating water in its succulent tissue. By October, two short (5–10 mm long) leaves have been produced, whereafter further vegetative growth of the seedling slows or largely ceases with the onset of summer dormancy (November–April). During the rainless phase of ± six months the seedling survives on water reserves stored in the greatly enlarged primary root. Vegetative growth commences again in autumn. Thus the biology of a *C. mirabilis* seedling in its first year is much akin to a winter rainfall area geophyte with the swollen primary root being functionally equivalent to a corm or bulb.

Plate 1. *Clivia mirabilis*, A, inflorescence in habitat showing orange/red pedicels; B, plants in habitat between Peninsula Formation Sandstone boulders; C, leaves showing prominent median white stripe on upper surface and variation in dimensions. D, E, fruiting head; D, immature berries; E, mature berries; F, seedlings five months after germination, note large radicle and prominent carmine pigmentation on cotyledon and at base of first pair of leaves. Photo: C. Paterson-Jones.

The phenology of the germinating seed described above is clearly an adaptation to a semi-arid Mediterranean climatic regime—exactly the reverse of the summer rainfall region *Clivia* species.

Within a few months of germinating, the plumular bud (cotyledon plus first true leaf) (Boyd 1932), becomes densely pigmented with anthocyanins (Plate IF). This prominent development of anthocyanins at the base of the leaves is later evident in the leaf sheaths of adult plants which are heavily suffused with purple-carmine pigments. Why the seedlings of *C.*



C. mirabilis country. In all cases they grow on the areas immediately below the escarpment.

mirabilis are so densely pigmented with anthocyanins is not clear, but it may be a response to the intense levels of sunlight experienced in the natural habitat, thereby providing effective screening during the seedlings' critical establishment phase.

Relationships

The distribution ranges of all four previously known *Clivia* species are contiguous or overlap, while at many localities different pairs of species occur sympatrically, *C. nobilis* with *C. miniata*, *C. gardenii* with *C. miniata*, and *C. caulescens* with *C. miniata*. Geographically, populations of *C. nobilis* in Eastern Cape, though more than 800 km distant, are the closest spatially to *C. mirabilis*. *C nobilis* also appears to be the closest relative to *C. mirabilis* on morphological grounds: tough stiffly erect coriaceous leaves with a median pale striation on the upper surface (some populations of *C. nobilis* occasionally have a faint median striation), and the small seeds.

Phytogeographic implications

Palynological evidence indicates that in Western Cape and southern Namaqualand, subtropical forests were present during Miocene and Pliocene times (± 5.3 million years BP) (Scott *et al.* 1997). Since then, apart from more recent cyclical changes in the Quaternary, there has been a progressive eastward retreat of these forest elements. Assuming that the genus *Clivia* has not changed its dependence on a forest environment significantly since pre-Quaternary times, it can be argued that the Nieuwoudtville species is relictual and that its survival in the Oorlogskloof Canyon is partly fortuitous and partly due to its adaptation to a different climate. The berry maturation period, seedling and germination biology are so perfectly in harmony with an arid Mediterranean climatic regime that *Clivia mirabilis* is able to survive environmental conditions inimical to all other *Clivia* species.

It is currently believed that the late Miocene also saw the development of a Mediterranean climate in the western part of the Cape (Axelrod & Raven 1978). This would have interrupted the further spread of an essentially summer rainfall genus like Clivia into the forests of the southern and western part of the Cape. It would also have left the precursors of *Clivia mirabilis* to adapt to increasing aridification and the onset of a pronounced Mediterranean type climate. Thus if *C. mirabilis* evolved from forms with an essentially summer rainfall phenology, the adaptation to an arid Mediterranean type climate is a derived condition dating from late Miocene times.

Long distance dispersal should also be considered as a possible explanation for this bizarre distribution pattern, but this

Typical habitat showing some offsets but mostly seedlings where they have been caught by the existing clump as they roll downhill.

Plate 2. *Clivia mirabilis*, × 0.75, showing flowering and fruiting scapes against a background depicting Oorlogskloof Canyon. A fully open inflorescence on left shows the red/yellow colour pattern. A younger inflorescence with green tipped perianths is on its right. From the type collection, *Rourke* 2220. Artist: Auriol Batten.

seems highly unlikely as no living vectors for the long-distance dispersal of *Clivia* seed have yet been identified nor has biotic dispersal been recorded for any other species of Amaryllidaceae (Meerow & Snijman 1998). Birds are probably the main seed dispersal vectors. *Clivia miniata*, *C. gardenii* and *C. caulescens* have all been observed by the author growing epiphytically in forest trees, five or more metres above ground level. It is probable that frugivorous birds deposited seeds in these positions, leading one to postulate that forest dwelling birds are responsible for the dispersal of large scarlet *Clivia* berries. While the dispersal of *Clivia* seed by birds between closely adjacent forest patches is a strong possibility, dispersal over distances of 800 km of arid country seems highly unlikely.

Conservation status

No populations are known outside the Oorlogskloof Nature Reserve where the species currently enjoys maximum protection. Yet there is no reason why *C. mirabilis* should not occur further down the Oorlogskloof Canyon, outside the reserve, as numerous suitable habitats occur there. If this proves to be the case, special efforts will have to be made to protect these populations as the species' horticultural potential will render it vulnerable to exploitation.

Other material examined

NORTHERN CAPE.—3119 (Calvinia): Oorlogskloof Nature Reserve, (–AC), 10–11–2000, *W. Pretorius 651* (NBG).

Acknowledgements

I am most grateful to the Northern Cape Department of Nature and Environmental Conservation for granting permission to collect the type material of this species; also to Wessel Pretorius, officer in charge of the Oorlogskloof Nature Reserve for his generous assistance in the field. Colin Paterson Jones patiently photographed various stages in the life history of C. mirabilis and John Manning skilfully prepared the line drawings reproduced here. Dee Snijman and John Manning provided critical comments on early drafts of the manuscript. I thank all of them for their invaluable assistance.

Auriol Batten's fine painting of *C. mirabilis* was prepared from the type material. I am especially grateful to her for loaning this plate to the National Botanical Institute for reproduction in this paper.

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Clivia robusta

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A new species of *Clivia* (Amaryllidaceae)

endemic to the Pondoland Centre of Endemism, South Africa

B. G. MURRAY FLS[1]*, Y. RAN[1], P. J. DE LANGE FLS[2], K. R. W. HAMMETT[3] J. T. TRUTER[4] and Z. H. SWANEVELDER[5]

[1]School of Biological Sciences, The University of Auckland, Private Bag 92019, Auckland, New Zealand
[2]Science and Research Unit, Department of Conservation, Private Bag 68908, Newton, Auckland, New Zealand
[3]H88c Don Buck Road, Massey, Auckland, New Zealand
[4]PO Box 5085, Benoni South 1502, South Africa
[5]Department of Botany, Forestry and Agricultural Biotechnology Institute (FABI), The University of Pretoria, Pretoria 0002, South Africa

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Clivia robusta B.G. Murray, Ran, de Lange, Hammett, Truter et Swanevelder **sp. nov.** (Amaryllidaceae) is a tabular, pendulous-flowered *Clivia* species, restricted to the Pondoland Centre of Endemism, South Africa. The unique morphology, distribution, karyotype and molecular fingerprint distinguish it from all other pendulous-flowered species in the genus. © 2004 The Linnean Society of London, *Botanical Journal of the linnean Society*, 2004,146, 369–374.

ADDITIONAL KEYWORDS: *Clivia gardenii* – Haemantheae – taxonomy.

*Corresponding author.
E-mail: b.murray@auckland.ac.nz

Left: *Clivia robusta* painted by Claire Smith. This painting originally appeared as *Clivia nobilis* in Flowering Plants of Africa, Vol 53. Page 74. Plate 2094.

Introduction

Clivia Lindl. (Amaryllidaceae), with five described species, falls within the African tribe Haemantheae (Meerow *et al.*, 1999; Rourke, 2002a). It is indigenous to South Africa and Swaziland and forms part of the southern Africa centre of diversity for the family Amaryllidaceae (Meerow & Snijman, 1998; Snijman, 2000).

This perennial genus is well known for growing in diverse habitats ranging from coastal forest and secondary coastal dunes, to swamps, riverbanks and rock screes; specimens are even reported to grow as epiphytes in some localities. The genus generally favours cool, shaded, well-drained habitats with the exception of *C. mirabilis* Rourke, which is found in a semi-arid area with a Mediterranean climate. The genus is linked directly to the inland and coastal Afromontane forests of southern Africa, with *C mirabilis* found in relictual evergreen Afromontane forest elements in the south-western corner of the Northern Cape province, South Africa (Duncan,

1999; Winter, 2000; Rourke, 2002a, b).

In July 1960, W. L. Chiazzari deposited specimens of an unidentified *Clivia* species at the National Botanical Institute (Pretoria) (FSB 37066 and PRE 37058). These specimens were later identified as *C. gardenii* Hook., with the differences in morphology attributed to natural variation. Subsequently, chromosome and DNA sequence analysis by Ran and coworkers (Ran, Murray & Hammett, 1999, 2001; Ran, Hammett & Murray, 2001a, b), carried out to establish relationships between and within species, further showed that plants identical to Chiazzari's specimens and known in horticulture as the 'robust form' of *C gardenii*, 'Swamp Forest *Clivia*' or 'Robust *gardenii*' (Hammett, 2002) had a distinct karyotype and unique DNA marker pattern. The chromosome studies used Giemsa C-banding, fluorochrome banding with DAPI (4'–6-diamidino-2-phenylindole) and CMA (chromomycin A3), which preferentially bind to AT- or GC-rich regions of the genome, respectively, and the location by fluorescent *in situ* hybridization (FISH) of the 45S and 5S rRNA genes to identify the chromosomes of the complements.

Little intraspecific karyotype variation was observed and all the described species plus 'Robust *gardenii*' could be identified on the basis of their karyotypes (Ran *et al.*, 1999, 2001b). Two different approaches were used to investigate the phylogeny of the group. DNA sequences from the nontranscribed spacer between the nuclear 5S rRNA genes and the internal transcribed spacer of the 45S rRNA genes and the RAPD (random amplified polymorphic DNA) profiles were used to construct phylogenetic trees. In all cases 'Robust *gardenii*' was sister to *C. gardenii* and *C. miniata* Regel (Ran *et al.*, 2001; Ran *et al.* 2001b). Further investigation indicated that these plants have a distinct morphology, but appear to be closely related to *C. gardenii*. In tandem with the unique karyotype and DNA profiles, the morphological characters amply distinguish these plants from *C. gardenii* and all other known *Clivia* species. We therefore recognize these plants herein as a distinct taxon at the rank of species.

Material and methods

Plants of 'Robust *gardenii*' were grown outdoors in Auckland, New Zealand from seed collected from seven localities in the Pondoland Centre of Endemism, Transkei, South Africa. The localities were: (1) Nkambati Nature Reserve, subsequently cultivated at Kirstenbosch Botanic Garden, Professor Kobus Eloff (133/86); (2) near Lusikisiki at the Fraser Falls, S. Venter (885); (3) swamp at Mkambati, M. Dower (8988); (4) Lambasi Village, KRW Hammett, J. Winter & J.P. Rourke (81141); (5) Dimfi, between Ndindindi and Mkambati River mouth, KRW Hammett, J. Winter & J.P. Rourke (8144); (6) Umtamvuna Nature Reserve, KRW Hammett, J. Winter & J.P. Rourke (81147); (7) cultivated material ex. A. McLeman.

Right: Figures 1–6. Fig. 1. *Clivia robusta* sp. nov. growing at Kirstenbosch Botanic Garden, South Africa to show plant size. Fig. 2. Inflorescence of *C. robusta*. Fig. 3. Leaf apices of (left to right) *C. nobilis*, *C. miniata* (narrow leaved variant), *C. miniata* (broad leaved variant), *C. gardenii*, *C. robusta* and *C. caulescens*. Fig. 4. Single flower of *C. robusta* (centre) with flowers from four different accessions of *C. gardenii*, two on each side, showing the clear difference in stamen exsertion between the two species. Fig. 5. *C. robusta* growing at Umtamvuna showing stilt roots. Fig. 6. *C. robusta* growing in water at Lambasi.

[Anne-Lise Fourie of SANBI is thanked for her assistance in obtaining these illustrations – Eds.]


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Material from natural populations was collected in accordance with the rules and regulations of the particular provinces and with permits from Ezemvelo KwaZulu-Natal Wildlife, South Africa (permits, 27110/2001, 30443/2002 and 966/2003) and Department of Economic Affairs, Environment and Tourism, Province of the Eastern Cape, South Africa (General Permit 01/07/2001). Seeds and plants in South Africa were grown outdoors and under shade netting.

In addition to field observations, we supplemented our knowledge about the environment, habitat and natural populations of 'Robust *gardenii*' through correspondence with *Clivia* enthusiasts familiar with the species. Data supplied by these individuals were verified by comparison with available herbarium records.

Measurements of morphological features were made from random samples selected in the different populations and compared with observations made by the enthusiasts. These are given as ranges with outlier values given in brackets. Observations and measurements from live plants were made from cultivated material grown from seed collected from throughout the distribution range of the species.

Description of new species

CLIVIA ROBUSTA B. G. MURRAY, RAN, DE LANGE, HAMMETT, TRUTER & SWANEVELDER **SP. NOV.**

Diagnosis: *Clivia gardenii* Hook. affinis sed qua habitu robustiore majoribus, apicibus foliorum apiculatis, staminibus et pistillis inclusis, habitatione silva palustri anteferenti, et ab omnibus aliis speciebus generis Clivia karyotypo chromosomatum et ordinationibus DNA indicibus differt.

Holotype: [South Africa]: Eastern Cape, Transkei, Port St. Johns, Mt. Sullivan (Topo. Ref. 3128 UMTATA 1:250 000): southern flanks of mountain, growing in wet seepage on ledge against cliff face, roots in humus and leaf mould, 100–200 m, I.i.2001, J.T. Truter 4072 (PRU).

Description: Perennial plant, stout, rhizomatous, solitary or clumping, evergreen, 0.5–1.6 m tall; stem reduced to a vertical rhizome < 400 mm long, terminating in a tuft of leaves. ***Root system*** massive, horizontally spreading. ***Roots*** perennial covered in a corky, velamen-like layer. 'Stilt/buttress' roots produced along the stem in swampy conditions. Root diameter 5–15 mm. ***Leaf sheath*** green to light red. ***Leaves*** long-lived, arching-erect, distichous, strap-shaped, 0.3–0.8(–1.5) m × 40–70(–90) mm, glabrous, alternate, 6–10 leaves per rhizome, broadly linear to linear-oblanceolate, coriaceous, weakly canaliculate, base markedly plano-convex, broadening and becoming planar from midsection to obtuse apiculate apex. Lamina of adaxial surface dark green, pale whitish grey striatum in the mid-rib area may be present, becoming less distinct in older leaves; abaxial surface markedly paler green, lamina margin entire with extreme distal portion slightly scabrid, teeth antrorse. ***Scape*** hermaphrodite, up to 0.8–1 m long, subterete, somewhat laterally compressed, ellipsoid, grooved with weakly developed median ridge, green, flushed pinkish red, flecked pale yellow or cream. ***Inflorescence*** an umbel, form variable, usually loose and tending to globose, with 15–40(–45) flowers subtended by two chartaceous, deciduous, lanceolate bracts 30 × 40 mm. ***Pedicels*** stiff, erect/suberect, slender 15–60 × 1.2 mm, green but variable. ***Perianth*** tubular, somewhat

Over six foot of Wayne Haselau dwarfed by *C. robusta*.

A clump of orange *C. robusta*. Buttress roots can be seen close to the ground where they support large plants in the soft water-logged soil.

A typical *C. robusta* umbel.

One of a number of large yellow-flowering *C. robusta* plants.

Typical *C. robusta* habitat, wet and swampy with many plants with their feet in the water.

falcate with an increasingly flaring apex, 30–55 × 5 mm, widening to 6–13(–20) mm diameter at mouth. ***Colour*** variable from dark orange-red, with red tips, through pale orange to pink orange; rarely yellow in some plants with light to dark green apices. ***Perianth*** segments (tepals) 6, united only at the base, otherwise overlapping, decurved, slightly asymmetrical, oblanceolate, infundibuliform, slender, involute, dilated at apex to form a somewhat thickened lip; apiculate at apex, the apiculum finely covered in white hairs. ***Stamens*** 6, adnate to perianth, one per segment, usually included within perianth tube, very occasionally extending to, and exceeding the perianth mouth. ***Filaments*** 30–35 mm long, white, terete, glabrous. ***Anthers*** 6, versatile, 3–4x1–1.5 mm oblong dorsifixed, 2-locular; pollen yellow. ***Style***: 28–35(–50) mm, terete, glabrous, included within perianth tube. ***Stigma*** tri-lobed, 5 mm terete, approx. glabrous, usually with sparse, fine, white cobwebbed hairs scattered along inner surfaces, distial portion pale green to pinkish-green, finely papillate near apex. Stigma occasionally protrudes from tip of perianth tube prominently. ***Ovary*** subglobose, dark-greenish in bud, remaining that colour at anthesis, changing to green-orange colour after pollination; 3-locular. Fruiting heads with (1–)10–2(K–35) pendant berries. ***Berries*** irregularly ovoid, 15–40 × 10–20 mm, globulose, containing 1 or 2(–4) large seed (largest in genus), prominently projecting through thin pericarp. ***Pericarp*** glossy, pale green, maturing through orange to bright red. Yellow-flowered clones produce yellow or mustard-coloured berries. SEED large, somewhat globose, 10–18(–20) mm diameter, white in colour. ***Emerging seedlings*** the most robust in the genus exhibiting rapid growth. ***Flowering time*** extended over 5–6-month period from late March to early August, i.e. early autumn to late winter (Southern Hemisphere); 9–12 months for seed to ripen and berries to fall off. ***Chromosome number*** 2n = 22.

Habitat: Afromontane Forest in the Pondoland Centre of Endemism, 0–500 m.

Material examined: SOUTH AFRICA: *Lusikisiki District, Lombazi River, North of Port St. Johns*: Chiazzari 3129BD (PRE); *Transkei, Ntsubane, Mkoziriver valley*, Venter 76/885 (PRE). CULTIVATED ex South Africa: *Transkei, Nkombati Nature Reserve*: Hammett 133/86 (AK) (specimen over four sheets).

Table 1. Summary of the key differences between Clivia gardenii and C. robusta sp. nov.

Morphology	C. gardenii	C. robusta
Habit	Gracile plant, strongly clump-forming, <1 m in height	Massive plant with stout rhizome, often with prop roots, ^ 2 m in height
Leaves	Linear-accuminate, strongly sulcate in cross-section	Broad, strap-shaped with with obtuse-apiculate apex, planar in cross section
Flowers	Stigma and stamens strongly exserted	Stigma barely protrudes and stamens usually retained within corolla tube
Karyology	45S rDNA site + C-band on chromosome 2 No 45S rDNA site or associated C-band chromosome 8	45S rDNA site but no C-band on chromosome 2 45S rDNA site + C-band on chromosome 8
Distribution	Widespread in KwaZulu-Natal	Confined to Pondoland Centre of Endemism

Etymology: The species epithet 'robusta' refers to the massive nature of the plant compared to other species in the genus.

Distribution: *C. robusta* is endemic to the east coast of South Africa, with its distribution as isolated populations from Port St. Johns in the south (Eastern Cape Province) to Mzimkulu River in the north (KwaZulu-Natal) (Swanevelder, 2003), with a few northern outliers at Oribi Gorge, Paddock, Umtentweni, Southport and one southern outlier just south of Port St. Johns. This region is known as the Pondoland Centre of Endemism (Van Wyk, 1994; Van Wyk & Smith, 2001).

Karyotype studies: The unique karyotype initially observed in material collected from Nkambati Nature Reserve, subsequently cultivated at Kirstenbosch Botanic Garden and illustrated in Ran *et al.* (2001b) was also observed in the additional material from the locations listed above in Material and Methods. There are two key features of the *C. robusta* karyotype that differentiate it from that of *C. gardenii*. In *C. robusta* there are two 45S rDNA sites compared to one in *C. gardenii*. One of these sites shares a common location in the two species (on chromosome 2) but in *C. gardenii* it is associated with a Giemsa C-band that is absent in *C. robusta*. The second site in *C. robusta* is on chromosome 8 and is also associated with a C-band.

Recognition and relationships: The key characters that distinguish *C. robusta* from *C. gardenii* are summarized in Table 1 and elaborated upon here. Morphologically, *C. robusta* is distinguished by being extremely robust; specimens approach 1.5–2 m in height (Fig. 1). The very long, broad leaves, abruptly rounded leaf apex with fine serrations (Fig. 3), pale whitish-grey striation occasionally present in the upper leaf midrib, stigma and anthers largely included within the perianth (Figs 2, 4), as well as prominent 'buttress/stilt' roots (Fig. 5) in swamp populations, amply distinguish this from all other known Olivia species. This is the only species in the genus that seems to prefer perennially wet, swampy habitats (Fig. 6) or damp seepages on rock ledges. However, the allied *C. gardenii* does occasionally grow along stream edges or in wetter than usual habitats. Botanically, *C. robusta* was regarded as part of *C. gardenii* although it has commonly been confused with other species also. For example, Vorster (1994) used *C. robusta* to illustrate C. nobilis Lindl.

Using a variety of chromosome techniques, DNA fingerprinting and sequencing, Ran and coworkers (Ran *et al.*, 1999, 2001; Ran *et al.*, 2001b) showed that 'Robust *gardenii*' was sufficiently distinct from the other species to justify naming it as a new species. 'Robust *gardenii*' was sister to *C. gardenii* and *C. miniata* (Lindl.) Regel in their phylogenetic trees based on the two regions that were sequenced and on the RAPD profiles.

Clivia robusta is also distinct from *C. gardenii* with regard to its distribution. Swanevelder (2003) showed that the plant named here as *C. robusta* formed one of three geographically distinct groupings apparent from an examination of herbarium specimens collectively treated as *C. gardenii*. *Clivia robusta* is one of these groups and its distribution is distinct from that of *C. gardenii s.s.*, which is only recorded from the Durban area northwards; no records connect the different distribution regions.

Ecology: The vegetation of the Pondoland Centre of Endemism consists mainly of grassland plateau, with a few isolated for-

est patches in the protected riverine gorges that occasionally spill over onto south- and south-west-facing slopes. Forest is more extensive and exposed in the south of the region. Of all the forest types in this region, Swamp Forests are the most rare, usually comprising small patches associated with marshy areas in grassland. *Clivia robusta* is found in these Swamp Forest patches, either sparsely (c. 5–6 plants 10 m^{-2}) or in extremely dense stands (c. 20 plants 10 m^{-2}) in wetter areas.

Buttress roots, along intervals on the vertical rhizome, act as support for the larger individuals growing in this marshy environment. The swamps are never stagnant: water

A clump of yellow flowering *C. robusta* with orange flowering plants in the background.

moves through these specialized systems, albeit very slowly. The wet soil has a high content of rotting humus and leaf debris. The new species is also found along stream banks where the soil is often moist or wet, but not swampy. Field-work has confirmed that the species also grows in seepage on cliff faces and also relatively dry rocky areas adjacent to the wet swamps. In these situations, plants are noticeably 'stockier'. In all localities, the plants are found under a high understorey of closed canopy trees in light to semi-shade.

The Pondoland Centre is highly diverse, with approximately 1800 specific/intraspecific taxa residing within its boundaries, of which 120 are endemics or near-endemics (Van Wyk & Smith, 2001). This 1880 km² large outcrop of Msikaba Formation sandstone is characterized topographically by rugged plateaus (100–500 m a.s.l.) that are deeply dissected by narrow river gorges in which isolated forest patches, with mixed tropical and Afromontane elements, are confined. Annual rainfall varies from 1000 to 1200 mm and occurs mainly in the summer months, with a mean annual temperature of 20 °C along the coast. Soils in this centre are usually sandy, acidic, highly leached and often shallow (Van Wyk, 1994; Van Wyk & Smith, 2001).

The conservation status of *Clivia robusta*: Human exploitation in the form of habitat destruction and illegal removal of specimens is the main threat to *Clivia* in the wild. Habitat destruction occurs as forests are removed for fuel, agricultural purposes and/or urbanization (Chubb, 1996; Duncan, 1999). Plant collection for medicinal purposes is probably the most serious threat (Chubb, 1996; Duncan, 1999; Lötter & Krynauw, 2002). The high demand by traditional healers for *Clivia* plants was clearly evident when Mander (1998) identified *C. miniata* as the tenth most sought after medicinal plant traded in Durban, KwaZulu-Natal. Williams, Balkwill & Witkowski (2001) found Clivia species in 70% of the Witwatersrand *muti* shops they surveyed. A. Hardinge (pers. comm.) confirmed that the same factors are also threatening the survival of *C. robusta* populations, with only remnants of some remaining.

At present, most *Clivia* species are classified as Lower Risk-Least Concerned, Lower Risk-Near Threatened and Vulnerable (Golding, 2002; Lötter & Krynauw, 2002). This seems insufficient when one considers the restricted ecological niche, geographical distribution and current exploitation. Swanevelder (2003) proposed that plants treated here as *C. robusta* should be categorized as Endangered (EN) B1a +2a (according to 2001IUCN Red List Categories, Version 3.1, as in (Golding, 2002)).

The survival of *C. robusta* is constrained by its limited geographical distribution and human exploitation. Limited to the Pondoland Centre of Endemism, this species is further restricted to microhabitats usually associated with patchy Afromontane forest elements (Swanevelder, 2003). Afromontane Forests occupy *c.*6000 km² of South Africa and Swaziland of which only 17.64% are conserved (Lubke & Mckenzie, 1996). Even though *C. robusta* distribution may be termed 'locally abundant', communities are restricted to specific ecological niches (Swanevelder, 2003).

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Australia: **Ken Smith**: 593 Hawkesbury Rd., Winmalee. NSW 2777
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Tel: 1 805 484 1484; william_g_mcclelland@yahoo.com

PORTFOLIOS

Newsletter & Yearbook: **Joubert van Wyk**: Mobile: +27 83 307 7707; myclivia@iafrica.com
Public Relations: **Clayton Jonkers**: Mobile: +27 83 267 7206; clayton.jonkers@crowehorwath.co.za
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