

AMARYLLIDACEAE

A NATURAL HYBRID IN THE GENUS CLIVIA

The genus *Clivia*, with six described species, is endemic to South Africa and Swaziland (Duncan 1999; Rourke 2002; Swanevelder 2003; Murray *et al.* 2004).

The group is of considerable horticultural significance and its members, including many cultivars, are extensively grown all over the world (Swanevelder 2003).

Artificial hybridization between the different species of *Clivia* results in attractive progeny, currently highly sought after in cultivation (Koopowitz 2002; Swanevelder 2003). Numerous references to such hybrids between *C. miniata* (Lindl.) Regel and *C. nobilis* Lindl.; *C. miniata* and *C. gardenii* Hook.; and *C. miniata* and *C. caulescens* R.A.Dyer have been recorded in the literature (Koopowitz 2002; Rourke 2003; Swanevelder 2003). Natural interspecific hybridization in the genus has, however, rarely been documented. Rourke (2003) reported a natural hybrid between *C. miniata* and *C. caulescens* from the Bearded Man Mountain near Barberton, Mpumalanga, and its subsequent cultivation at Kirstenbosch National Botanical Garden. Swanevelder (2003) reviewed both the natural and artificial hybrids known in the genus.

The recognition of hybrids in nature is sometimes regarded as somewhat speculative and the existence of such entities is usually based on circumstantial evidence. Generally, the possession of intermediate morphological features, proximity to the putative parents, hybrid fertility with segregation recognizable in the F₂ progeny, preferably supplemented by the artificial hybridization of the putative parents, are applied as criteria in support of a natural hybrid (Stewart & Manning 1982).

Hitherto, no natural hybrids (nothotaxa) have been formally described in *Clivia*—despite the existence of numerous records indicating that at least two species grow sympatrically in different localized populations (over the full distribution range of the genus). Here, for the first time, we formally describe a natural hybrid in *Clivia*. The identity of the hybrid is supported by the four criteria stipulated above (Stewart & Manning 1982). The new nothospecies is intended to cover all hybrids between *C. miniata* (both var. *miniata* and var. *citrina*) and *C. caulescens*.

Clivia* × *nimbicola Z.H.Swanevelder, J.T.Truter & A.E.van Wyk, nothosp. nov., hybrida naturalis inter *Cliviam miniatam* et *C. caulescentem*. Rhizoma aerea inter illos specierum parentalium intermedia. Folia arcuata, 250–350 mm longa, 55–70 mm lata, marginibus integris, apice acuta. Flores numero 10–20(–30); pedicellis suberecto, perianthio tubiformi, 30–60 mm longo, suberecto, segmentis patulis.

TYPE.—Swaziland, 2531 (Barberton): Bearded Man Mountain, (–CB), 30-05-2003, Pearton TP01 (PRU, holo.).

Rhizomatous, solitary or clumping, stout, evergreen perennial, 0.4–1.2 m tall. *Leaf sheath* green to pale red. *Leaves* long-lived, arching, strap-shaped, 250–350 × 55–70 mm, apex acute; margins usually entire, rarely ± serrated. *Scape* 200–600 × 10–30 mm, green. *Inflorescence* umbel-like, 10–20(–30)-flowered, usually loose/open and ± flat-topped; pedicels stiff, erect to drooping, 15–40 mm long, green. *Flowers* semi-erect to drooping, *Perianth* tubular to trumpet-shaped, 30–60 mm long, segments spreading, pastel orange to pastel pink, occasionally with green apices. *Stamens* 6, variable in degree of exertion at anthesis. *Style* 30–55 mm long; stigma trilobed, apex penicillate. *Ovary* ovoid, green, trilocular. *Fruit* 10–30

berries, green maturing to red. *Seeds* 1–4, subglobose, ± 10–15 mm in diam., pearly white. Figure 13.

Clivia × *nimbicola* is intermediate between *Clivia caulescens* and *Clivia miniata* with regards to rhizome, leaf, umbel and flower morphology (Table 2). Flower colour ranges from pastel orange to pastel pink, with green tepal apices in some specimens. Flowering is erratic, occurring all year round, mainly from July through to December, with some specimens flowering twice yearly—February to May. This long flowering period connects the flowering periods of the two putative parents in the Bearded Man Mountain locality, namely October–November in *C. miniata* and October–December in *C. caulescens*. The extended flowering period of *C. × nimbicola* is regarded as further evidence in support of the taxon's hybrid origin. The formal description of *C. × nimbicola* is also supported by the observation that the hybrid plants bear berries in the wild, thereby inferring fertility and the possibility to maintain populations by means of subsequent breeding among hybrid plants.

Field observations suggest some introgression between *Clivia* × *nimbicola* and its putative parents. Where populations of *C. × nimbicola* occur close to or amongst *C. caulescens*, back-crossing of the hybrid with *C. caulescens* produces umbels with fewer flowers which are tubular, yet more open than in typical *C. caulescens*. Likewise, where the hybrid occurs close to or amongst *C. miniata*, the umbels are less floriferous and the flowers are more funnel-shaped, yet not as open as in typical *C. miniata*. It is suggested that from the inferred initial progeny cross, subsequent generations have resulted from various backcrossings, resulting in a hybrid-swarm. Artificial hybridization between *C. miniata* and *C. caulescens* is usually successful with records dating back to 1945 (e.g. 1945/66, R. Marais PRE37106). Morphologically the resultant hybrids closely match the plants of *C. × nimbicola* in the wild.

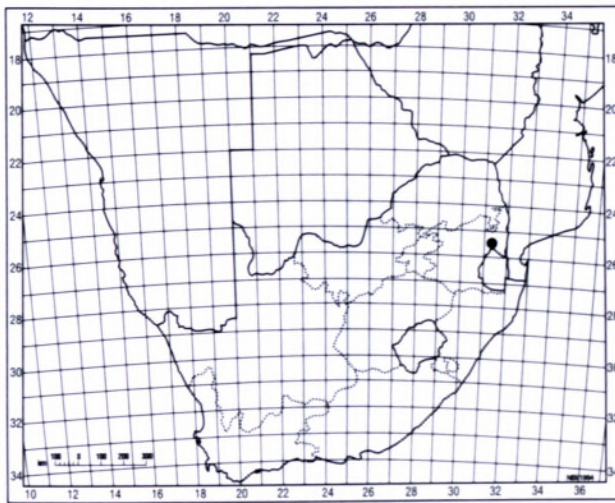
The holotype of *Clivia* × *nimbicola* was collected on the Bearded Man Mountain near Barberton (Figure 14), on the border between South Africa and Swaziland. In this area these natural hybrids are quite common (50 or more individuals) in sympatric stands of *C. miniata* and *C. caulescens*. Judging by plant sizes and the height of aerial stems, original hybrids are as old as their putative parents. Topped plants with long aerial stems, from either parentage of hybrid, freely produce suckers when in contact with the soil. Seedlings, when present, were usually distributed around its putative parent. The natural distribution range of *C. × nimbicola* is confined to the Barberton Centre of Endemism (Van Wyk & Smith 2001), the only known region in which the distribution ranges of *C. caulescens* and *C. miniata* overlap (Swanevelder 2003). At least three separate, well-established populations of *C. × nimbicola* were recorded, with stands extending into both Swaziland and South Africa. *C. caulescens* prefers steep cliff faces or steep rocky embankments, whereas *C. miniata* generally prefers gentler scree embankments or flatter forest habitats. The *C. × nimbicola* plants are distributed between and amongst both parents, occupying both specific habitats found in the Afromontane Forest. The epithet *nimbicola* means dweller in the mist, and



FIGURE 13.—Type specimen of *Clivia x nimbicola*: A, inflorescence; B, flower in l/s. Scale bars: A, 30 mm; B, 15 mm. Artist: Magda Nel.

TABLE 2.—Comparison of *Clivia* × *nimbicola* with its putative parents at Bearded Man Mountain, Mpumalanga and Swaziland

Character	<i>C. caulescens</i>	<i>C.</i> × <i>nimbicola</i>	<i>C. miniata</i>
Aerial stem	present in mature plants, length age-dependant	present in mature plants, length age-dependant but shorter than in <i>C. caulescens</i>	present in populations when plants are mature, length age-dependant, usually shorter than in hybrid
Leaf			
sheath colour	green to pale red	green to pale red	green to pale red
orientation	arching	arching	arching
length × width (mm)	300–600 × 35–45	250–350 × 55–70	450–600 × 35–70
apex	obtuse - acute	acute	acute
margin	rarely serrated	usually entire, occasionally serrated	usually entire
Umbel form	usually compact, flattened on one side	loose/open, ± flat-topped	loose, almost globose
Pedicel			
orientation	stiff, erect, drooping just below flower usually green	stiff, erect to drooping	stiff and erect
colour	usually green	green	green
length (mm)	15–35	15–40	30–70
Flower			
number	14–40(–50)	10–20(–30)	7–10(–15)
orientation	drooping	semi-erect to drooping	erect
length (perianth and ovary)	30–45 mm	30–60 mm	60–80 mm
perianth shape	tubular and curved; inner segments slightly spreading	trumpet-shaped and curved with segments open, funnel-shaped, mostly spreading	open, funnel-shaped, ± straight, segments spreading
Protrusion from perianth tube			
anthers	slight	slight, variable	variable
stigma	< 7 mm	< 5 mm, variable	< 10 mm
Seed			
number	1–4	1–4	1–4
size (diam.)	± 8–10 mm	± 10–15 mm	± 12–15 mm
maturation time	± 9 months	± 9 months	± 12 months
Flowering time	October–December	Erratic, mainly July–December and/or February–May	October–November
Whole distribution range	Limpopo (Soutpansberg) Mpumalanga and Swaziland	Bearded Man Mountain, Mpumalanga and Swaziland	Eastern Cape (Transkei), KwaZulu-Natal, Mpumalanga and Swaziland

FIGURE 14.—Known geographical range of *Clivia* × *nimbicola* in nature.

refers to the mist belt habitat in which this hybrid and its putative parents are found.

ACKNOWLEDGEMENTS

Our thanks to Dr Hugh Glen for the Latin translation of the diagnosis, Ms Hester Steyn for the distribution map and Mr T.N. Pearton for the type specimen.

REFERENCES

- DUNCAN, G. 1999. *Grow clivias*. Kirstenbosch Gardening Series. National Botanical Institute, Cape Town.
- KOPOWITZ, H. 2002. *Clivia*. Timber Press, Singapore.
- MURRAY, B.G., RAN, Y., DE LANGE, P.J., HAMMETT, K.R.W., TRUTER, J.T. & SWANEVELDER, Z.H. 2004. A new species of *Clivia* (Amaryllidaceae) endemic to the Pondoland Centre of Endemism, South Africa. *Botanical Journal of the Linnean Society* 146: 369–374.
- ROURKE, J.P. 2002. *Clivia mirabilis* (Amaryllidaceae: Haemantheae) a new species from Northern Cape, South Africa. *Bothalia* 32: 1–7.
- ROURKE, J.P. 2003. Natural interspecific hybrids in *Clivia*—*C. miniata* × *C. caulescens* hybrids from Mpumalanga. In M. Dower, C. Felbert, J. van der Linde & J. Winter, *Clivia* 5: 78–80. *Clivia Society South Africa*, Cape Town.
- STEWART, J. & MANNING, J.C. 1982. A new *Disa* hybrid in Natal. *The South African Orchid Journal* 13: 35–41.
- SWANEVELDER, Z.H. 2003. *Diversity and population structure of Clivia miniata Lindl. (Amaryllidaceae): evidence from molecular genetics and ecology*. M.Sc. thesis, University of Pretoria.
- VAN WYK, A.E. & SMITH, G.F. 2001. *Regions of floristic endemism in southern Africa: a review with emphasis on succulents*. Umdaus Press, Pretoria.

Z.H. SWANEVELDER*, J.T. TRUTER** and A.E. VAN WYK***

* Corresponding author: Department of Botany & Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, 0002 Pretoria

**P.O. Box 5085, 1502 Benoni South, South Africa.

***H.G.W.J. Schweickerdt Herbarium, Department of Botany, University of Pretoria, 0002 Pretoria.

MS. received: 2005-05-23.