

# *Aloe kouebokkeveldensis*

A new species of aloe, endemic to the Cape fynbos

by **Barrie Low** and **Uschi Pond**, Coastec Coastal and Environmental Consultants, Rondebosch and **Ernst van Jaarsveld**, South African National Biodiversity Institute (SANBI), Kirstenbosch

## The intrigue of the Thee

Lying south of Citrusdal and Middelberg Pass in the Western Cape, the Kouebokkeveld Mountains are well known for the Hexberg (1800 m) and Olifants River Dome (1600 m). And it is the fiercely dissected nature of this rugged landscape that provides the hiker with an awe-inspiring panorama of the sheer cliffs buttressing the base of the Dome: high waterfalls plunging into forested valleys and splendid views towards the Groot Winterhoek range in the south. Gorges are steeply cut, reflecting an abrupt transition from peak to foothill, with the mountains barely 11 km across at their widest.

As part of a regional survey of river plantlife undertaken by an informal group, the River Dancers, the Theerivier, flowing out of this area, has been chosen for intensive botanical study. Its 12 km length, with its source in the Maermerrie kloof south of Drie Koppe peak, provides a wide variety in habitat and plant species composition, at the same time offering some challenging hiking. Aably led by Mountain Club stalwart, Dr Peter Blignaut, the River Dancers have visited the system several times between November 2002 and December 2004, delighting in the area's uncompromising scenery.

Although the work undertaken along the Thee will be reported elsewhere, at least seven riverine species represent major distribution extensions for the Cape flora, with *Ilex mitis* Cape holly, *Cyathea capensis* Cape tree fern and *Psoralea pinnata* fonteinbos all with an 'officially recorded' distribution from the Cape Peninsula eastwards. But this clear lack of flora collection in the area is typified by the recent discovery of a new species of *Aloe*. Originally encountered in our first expedition to



the Theerivier in 2002, this species ironically (and as the reader would guess!) is not a river dweller, but is found in clumps on rocky north-west and north-east-facing cliffs and steep slopes. *Aloe kouebokkeveldensis*, as we have named this remarkable plant, is not only intriguing as a new find for a relatively well-researched group of succulents, but is also a fynbos endemic.

## Succulence in the fynbos

The occurrence of another major

ABOVE: *Aloe kouebokkeveldensis* in its natural habitat of steep slopes above narrow gorges – in this case, Lower Maermerrie kloof, which forms part of the Theerivier system in the Kouebokkeveld mountains. Photo: Barrie Low.



succulent species in the middle of mountain fynbos vegetation also begs the question: why evolve a succulent habit in a relatively wet area? Of course there are never simple answers to such posers; but we do know that there is a fair degree of succulence within the fynbos and that much of this has developed in locally dry habitats such as hot, north-facing slopes. However succulence appears to have evolved independently in fynbos, with the distribution of many mesemb, crassula and aloe species localized in this region. In fact there are few regions in the fynbos where succulents are not found; from the highest peaks of the Fold Belt to the Cape lowlands, succulent plants are well represented! Succulence is not only a successful strategy in dealing with summer drought – where this group has the ability to store water in its leaves or stems. They are also often fire-avoiders, growing on rocky cliffs and slabs in sparse vegetation which rarely burns. Here a multiple strategy of drought-resistance and fire avoidance, coupled with shallow root systems in parts which lack any meaningful soil development, has enabled this group to colonize local habitats within the more mesic (less extreme) fynbos. Species that have been successful at such colonization include the mesemb genus

*Antimima*, the crassulas *Adromischus* species and klipblom *Crassula coccinea*, the daisy *Senecio serpens*, and aasblom *Orbea variegata*. Melkbol *Euphorbia tuberosa* and some of the geophytic crassulas escape fire through possessing subterranean tubers. *Aloe commixta*, a Peninsula endemic, simply re-sprouts after fire and *A. plicatilis* has a protective corky bark.

Succulence (presence of species, not cover) ranges from 2.8% for the southern Langeberg and Helderberg (wet fynbos) to 18.4% in the arid Swartruggens, with one of us (Ernst van Jaarsveld)

reporting 7% (164 species) for the Cape Peninsula. As one would expect, this proportion increases significantly in the Succulent Karoo with 37.4% at the old Whitehill Karoo Garden site in the Great Karoo (see article on page 34), 48.4% at Groenefontein (Little Karoo), 34.5% in the Matjies River area (Tanqua Karoo) and 39.2% in the Gamsberg (Northern Cape Karoo). The greatest number of aloe species for a local flora is in the Baviaanskloof Wilderness Area (10), with a general and dramatic decrease towards the Western Cape. Correspondingly, the drier Karoo



ABOVE: Fruits of *Aloe kouebokkeveldensis*. Plants are being propagated at Kirstenbosch by Ernst van Jaarsveld and his team, and we plan to have these available for release to the public in 2007.

BELOW: Our party enthusiastically inspecting a population of *Aloe kouebokkeveldensis*. This is one of only a few localities of this species found over an area of no more than 6 km across. Photos: Barrie Low.







ABOVE: The paniculate inflorescence of *Aloe kouebokkeveldensis*. This feature places it in the Paniculatae section of the aloes with close affinities to *Aloe reynoldsii*, *Aloe striata* and *Aloe karasbergensis*.



RIGHT: An adult plant of *Aloe kouebokkeveldensis* with a tall inflorescence of over 2m, and thick, fleshy leaves. Photos: Barrie Low.

National Park and Sperrgebiet both support eight species.

#### Relict and survivor?

So, is this species a relict from a clime when locally dry pockets of normally wetter mountain habitat provided opportunity for succulent speciation? One possibility is that an ancestral species evolved during periods of global glaciation when rainfall decreased due to a lowering of evaporation rates from cooler oceans. As the region moved into a warmer, wetter interglacial period, populations of our ancestral species became fragmented and restricted to localized drier habitats, with both *Aloe kouebokkeveldensis* and *A. reynoldsii* evolving as a result. If this is so, is *A. kouebokkeveldensis* then a sole survivor from such a period or are there other species with similar evolutionary histories awaiting discovery? Certain authors claim that the succulent mesembs originated in the fynbos (and not the Karoo). However, we believe the origin of fynbos succulents was influenced by evolutionary drivers quite different from those operating in the Karoo, where the latest theory seems to

indicate cyclical change in climate was a key factor in succulent evolution. Soil infertility, notoriously ubiquitous in fynbos, possibly played a role – personal observation has shown that succulents are remarkably well-adapted to slow growth on soils with low nutrient status, the radiation of the Tanqua Karoo succulent flora on Witteberg quartzite being a prime example. In addition, the evolution of several succulent mesemb taxa in fynbos is well-documented, for example *Erepsia* and *Machairophyllum*, both of which have a distinct fynbos rather than Succulent Karoo origin.

#### Taxonomically distinct?

But what makes *Aloe kouebokkeveldensis* taxonomically so distinct? The species belongs to the series Paniculatae (stemless coral aloes); common features shared by the group are their non-toothed, greenish-greyish leaves and large panicles. Their distribution is throughout most of the southern Karoo as well as thicket, the Kouebokkeveld species from this group being a fynbos-dweller.

The most widespread (and perhaps most closely related to the group's

common ancestor) is the coral aloe *Aloe striata* distributed mainly in the eastern Karoo. *Aloe karasbergensis* is very similar but is more robust, occurring in the north-west Nama Karoo. Apart from our aloe, two other species in this group have restricted distributions. These are *Aloe komagassensis*, the rarest, being endemic to Komaggas just west of Springbok where it occurs on a fairly isolated granite inselberg, whilst *A. buhrii* is represented in a solitary dry river system on the Knersvlakte, and is closest in morphology to *A. kouebokkeveldensis*. Young individuals of the latter are not unlike immature specimens of *A. reynoldsii*. Here there is an uncanny similarity in habitat (cliffs) with localized distribution along the Bashee River (Eastern Cape) in thicket and grassland.

Remarkably, 40% of aloes found in the Cape flora are endemic to this region, with several species sporting a restricted distribution. These include *Aloe bowiea* (Uitenhage to Port Elizabeth), bergalwyn *Aloe succotrina* (Cape Peninsula) and *A. haemanthifolia* (Hex River Mountains to Jonkershoek). *A. kouebokkeveldensis* on the other



hand, is an extremely narrow endemic, with a distribution range of no more than 6 km across. If the Thee system is its sole locality then are we seeing an early result of global warming and/or atmospheric CO<sub>2</sub> increase? Or are we observing natural extinction propelled by the absence of an environmental life-support system since lost?

#### Aloes and the Khoisan

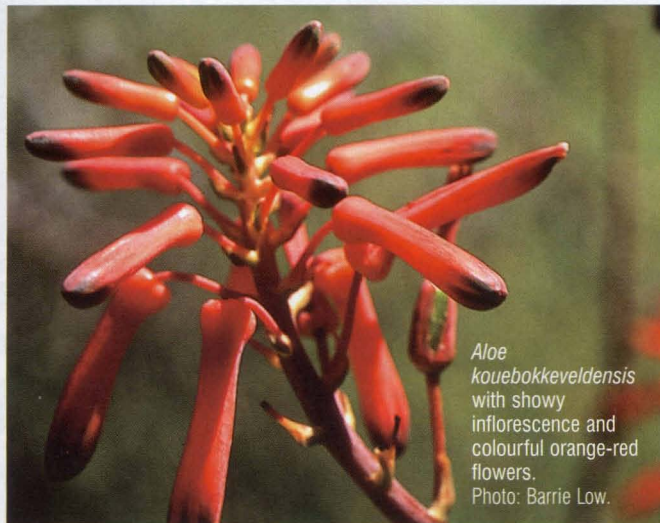
Another facet of great intrigue is the location of several Khoisan paintings in caves and overhangs in the area, often

in direct association with our aloe. Is this association coincidence or did the Khoisan derive some benefit from this plant? Certainly leaves of the genus have renowned medicinal properties, including treatment of stomach complaints, arthritis and skin ailments. Preliminary analysis at the University of the Western Cape's Pharmacy School suggests medicinal properties are present but with about a 20% lower activity than the commercially successful *A. ferox*.

The lesson from the discovery of

*Aloe kouebokkeveldensis* is quite clear – botanical exploration in the fynbos is as satisfying as it is vital for investigating these remote and untapped ecosystems. But the intrigue of this special species will lie in its restricted distribution, possible imminent extinction in the wild, and potential medicinal and horticultural value.

For those of you who would like to receive the River Dancers news or even join us on one of our river expeditions, send your email address to [coastec@mweb.co.za](mailto:coastec@mweb.co.za). 



*Aloe kouebokkeveldensis* with showy inflorescence and colourful orange-red flowers.  
Photo: Barrie Low.

#### Growing *Aloe kouebokkeveldensis*

Like many aloes, *A. kouebokkeveldensis* is a strong candidate for cultivation and we hope to soon see this extremely attractive species making its way into the gardens of Cape Town and beyond. It sports a healthy inflorescence which reaches 2 m, with reddish-orange flowers. Leaves are thick and fleshy, and grow to about 1 m long. It is well-suited to potting, but would require a large container.

Ernst van Jaarsveld is propagating *Aloe kouebokkeveldensis* plants for release to the public at a Botanical Society Annual Plant Fair, possibly in 2007, depending on the growth rate of the over fifty seedlings in cultivation.

A list of references is available from the Editor at [voget@kingsley.co.za](mailto:voget@kingsley.co.za).

BELOW: Another fynbos succulent, a species of the genus *Oscularia* cf. *lunata*, growing in association with *Aloe kouebokkeveldensis*. Photo: Barrie Low.



#### Acknowledgements

Joepe and Elna Burger (Theerivier) and Charl and Roelien du Toit (Vredelus) for giving permission to access their land. Our forays into the Thee system have been ably supported by several stalwarts including Peter & Jill Bignaut, Ann MacGregor, Lucille Krige and Mark Liddle. Species lists used in the analysis were provided by South African National Parks (Hugo Bezuidenhout and Francine Rubin) and conservation agencies in the Northern Cape (Tania Anderson), Eastern Cape (Alan Southwood) and Western Cape (Tom Barry). Analysis of succulent information was made possible using our plant species database (SaSFlora). We are grateful to Reuben Roberts who amended the database to accommodate a number of succulent-related features which enabled generation of succulent presence in the various regional floras. Prof. Peter Eagles at the University of the Western Cape's School of Pharmacy undertook the leaf analysis.