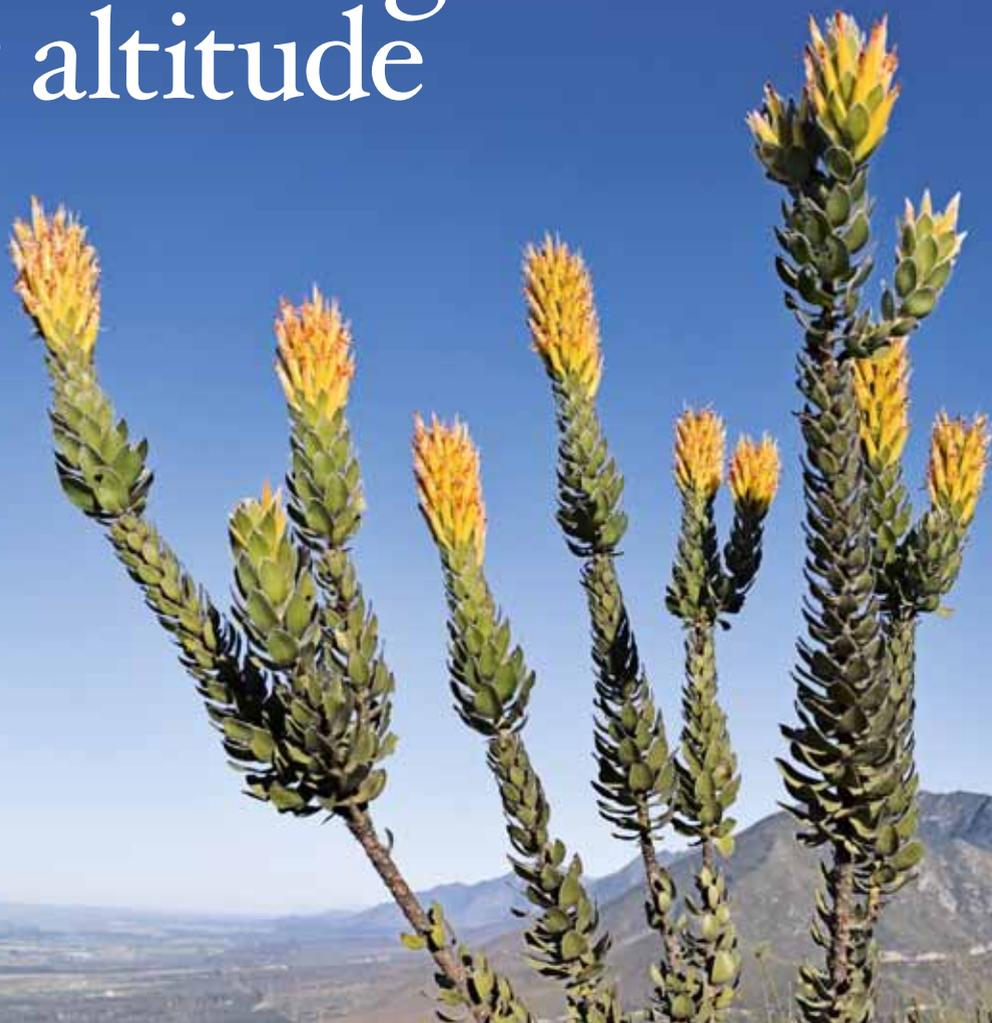


# Collecting *Proteaceae* at altitude



**I**N 1809 JOSEPH KNIGHT wrote a book entitled *Horticultural Essays. I. On the Natural Order Proteœæ*. The book could not have been more highly anticipated or timely. *Protea* cultivation was at the height of fashion in Europe, yet the book caused controversy by pre-empting the publication of a paper on the matter by notable botanist Robert Brown. Knight's book was soon relegated to the most inaccessible shelves.

Knight was head gardener to George Hibbert whose Clapham

garden was considered, by some, finer than Kew. It housed a huge collection of plants from the southern hemisphere. With a particular interest in the flora of what was then known as the Cape colony, he spared no expense in commissioning James Niven to scour this land for new and interesting species. Hibbert's particular passion was the *Proteaceae* and this led Knight to being the first to propagate and flower many of these plants successfully in the UK.

Alas, as fashions passed, the

*Proteaceae* fell out of favour. New greenhouse design and modern horticultural practices did not suit these plants and the botanical trailblazers of the time turned their attention to the plants of the tropics. *Proteaceae*, it seems, were relegated, like Knight's book.

## Evolution and origin

The story of the *Proteaceae* certainly did not start in the days of Hibbert and Knight. Their history dates to the mid Cretaceous, when proteaceous plants known from

ROBBIE  
BLACKHALL-  
MILES undertook  
an expedition to  
collect seed of  
various *Proteaceae*  
from high altitudes  
in South Africa.  
He hopes his  
introductions will  
be harder than  
previous collections  
and will revive the  
popularity of these  
spectacular shrubs  
in the UK.

Seed of *Mimetes pauciflorus* collected in the Outeniqua Mountains will be the first introduction of this high-altitude species to UK cultivation

All photographs by Robbie Blackhall-Miles

fossilized pollen, such as *Trioris africaensis*, had already evolved. It is this fossil record and its significance to the early history of angiosperms that interests my partner Ben and me. We specialize in growing *Proteaceae*, many of which are South African, in our garden in North Wales.

More than 300 million years ago the Falkland Plateau collided into Gondwana, creating the parallel ridges that form South Africa's Cape

*Leucadendron strobilinum* near the highest part of Table Mountain, and growing in very wet conditions

Fold Mountains. These run in a curve from the Cedarberg in the north-west to the Tsitsikamma in the east, and block much of the prevailing, moisture-laden, south-easterly winds from reaching the arid lands to the north. The western end of the range has a mild Mediterranean climate with wet winters and dry summers, whereas the temperate eastern end receives year-round rainfall. This varied climate and geology has led to the region's botanically diverse flora, of which the *Proteaceae* form a key component.

### Sourcing new material

Some members of this family are offered for sale by a small number of specialist nurseries, but often these are little suited to cultivation anywhere other than the mildest UK counties. It is our belief that there should be species more able to cope with the cool, high-rainfall climate of North Wales than those currently available commercially.

Our idea of an expedition to collect seed of these in South Africa arose as news broke regarding what impact the Nagoya Protocol might have on horticulture, and plant hunting in particular. So, apart from the benefit of gaining seeds to trial South

Africa's high-altitude *Proteaceae*, an expedition of this nature would also test the practicalities of South Africa's permit system.

The Western Cape Nature Conservation Board (CapeNature) is responsible for issuing permits for use in Western Cape province. Integral to gaining these permits were the relationships we built and the trust given to us by local conservationists. The initial administrative paperwork was simple enough, requiring a target species list and backing of a South African scientific institution. However, the terms of our permit required further permissions from land owners or reserve wardens where we wished to collect. Often busy fighting fires and dealing with land disputes, getting a response from CapeNature wardens was not always quick.

Finally, after a year of preparation and more than 250 emails, on 20 August 2015 the hard copy of our permit landed on our doormat and our final reserve permission was granted. With just a month to spare we were ready to go.

### Proteas and leucadendrons

*Leucadendron strobilinum* is a species currently thriving in our garden, and was also grown by Knight under the name *L. concolor*. In the grey mists of Table Mountain's 'table cloth' we found one particular plant of this, literally growing out of a pool of water, in the shade of a cliff. Admittedly, it had been raining and we were at the end of the wet winter season. However, horticulturally, these conditions would be considered most unfavourable. It is a common misconception that South African *Proteaceae* will only grow in sunny, very free-draining sites. But many times during our three-week trip we found plants growing in conditions contrary to this. We were unable ➤



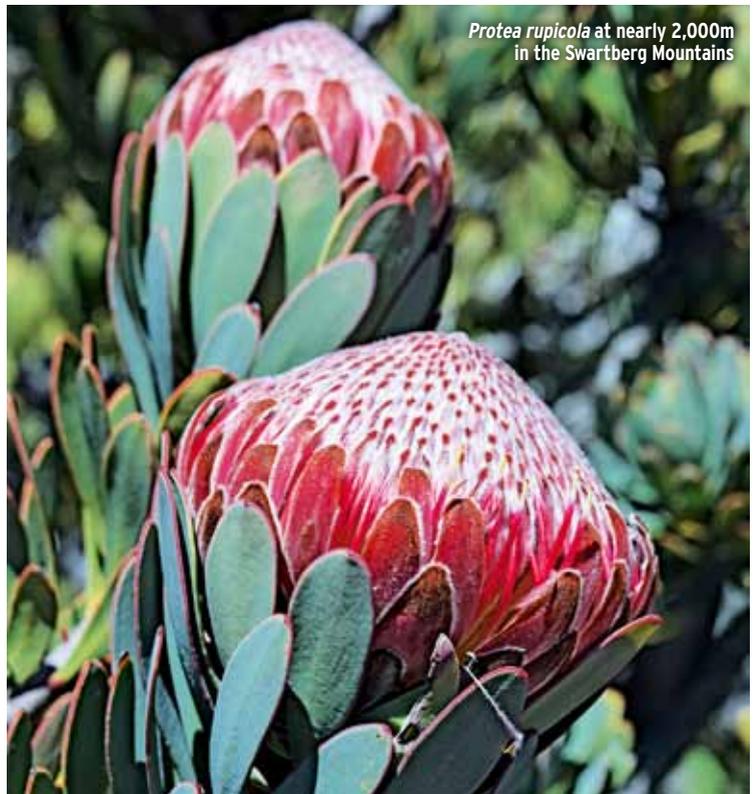
to collect seed of *L. strobilinum* in Table Mountain National Park as a secondary permit was required, which seemed too difficult for the sake of just one species. However, given its distributional range in the wild, the provenance of the seed available commercially would probably make little difference to its hardiness in the UK.

Provenance could well make the world of difference, however, to the ability of *Protea cordata* to grow in our damp climate. Found across the Cape, it is likely that the eastern population would be more able to cope with our summer rain, should we find it growing at high enough altitude. At 1,212m, on the path up to the mountain of Grootberg, in the shade of thick vegetation, at about the most eastern point of its range, we did just that. With insignificant brown flowers, evolved solely for the purpose of attracting its rodent pollinators, it is the glaucous, red-edged and almost perfectly heart-shaped leaves on zigzag vertical stems that are its star feature. In 1809, under the synonym of *Pleuranthe cordifolia*, Knight wrote: 'in our greenhouses, it is liable to suffer from damp more than cold, and therefore should not be crowded among tall plants'. It is known that the seed of the plants at his time came from much further west. So, I wonder, did provenance play its part in Knight's opinion?

Across its range *Protea cynaroides*, king sugar bush, has more than 80 different variants. However, should you hold one against another each is recognizable as this species. We grow and flower one in our garden, but it is obvious that this plant is not the same variant used in the cut-flower industry, as ours has small flowers and narrow leaves. It seems that plants similar to ours are often found growing near the coast and the



*Protea cynaroides* in  
Boomsbos Wilderness Area



*Protea rupicola* at nearly 2,000m  
in the Swartberg Mountains



*Protea aurea* subsp. *aurea* on Grootberg with atypical carmine-pink flowers

larger variants at high altitude. We set out to collect seed from the highest and wettest areas; some of the plants we found were huge. We succeeded in collecting seed from four plants, each morphologically distinct, growing at 1,000m or higher. *Protea cynaroides* is renowned for resprouting after fire, and it reacts the same way to frost or pruning. This species has much horticultural potential in the UK and we have particularly high hopes for a plant we found growing at 1,577m on Grootberg in the Boosmansbos Wilderness Area.

Mountain refugia in the Cape provide a safe place for many species, with some becoming specialists of these fire-safe areas. Little grown, and thus little known, are a whole range of these species that form small shrubs, creeping subshrubs and prostrate mats. Some of the most exciting of these are in the Swartberg Mountains, where the three species we found are classed by the IUCN as Endangered or Vulnerable. The first we encountered was *Protea montana*, at the summit of Waboomsberg at 1,929m. It was on this summit that we also discovered, again in fire-safe

areas, large mats of the endangered *Protea venusta*. However, *Protea rupicola* stole the show in these mountains. One of the longer lived members of the genus, it is little understood in its natural environment, due in part to the inaccessibility of the cliffs on which it grows. It is certainly a species that demands further study. Its continuing decline brought on by climate change surely places it high on the list of priority species. As a cultivated plant in South Africa it performs poorly, probably due to an unsuitable climate at low, and thus warmer, altitudes.

Some plants, such as *Spatalla nubicola* and *Protea rupicola*, we found growing exactly where we expected them. But others, it seems, had not read the book. On our way down from Grootberg we discovered *Protea aurea* subsp. *aurea* with flowerheads of rarely seen carmine. Normally white or pale cream, this colour came as quite a shock, not least because they were growing 642m above their documented altitudinal range. Cultivation of these commoner species could prove just as important for conservation as cultivating the rare ones. If these

plants prove to be hardy and easy to grow in the UK climate then some other more threatened species, such as *Leucadendron radiatum*, which are found growing in the same area, may be able to grow here too.

In strong winds, 3°C, horizontal rain and with freezing wet hands, collecting seed of *Leucospermum oleifolium* (syn. *L. criniflorum*) was no easy task. But it was an indication that it might thrive in the UK. We were pleased to find it with ripe seed on the old Boland Trail, on a south-facing slope at more than 200m above its described 1,000m upper altitudinal range.

Of the 50 species of *Leucospermum* we could have encountered we only came across five in the wild, and managed to collect seed of just this one. *Leucospermum mundii* was found on the Kristalkloof Trail, within 100m of leaving the car, but *L. winteri* was the main objective. It is described as inhabiting high summit ridges at 1,100–1,300m, and Rourke's type specimen was collected at 1,158m on a summit ridge in 1974. However, we could only find recent recorded observations of it between 400 and 800m. This lower range makes more sense, since it is believed that *L. winteri* is a hybrid of *L. mundii* and *L. calligerum*, the latter of which we also found here, and both occur at altitudes lower than is described for *L. winteri*. We never did find plants of *L. winteri* and would be very interested to hear of any records of this species in its described altitudinal range, in order to solve this conundrum. Interestingly Knight grew *L. calligerum* under the names *L. gnaphaliifolium* and *L. xeranthemifolium*, with the former being found at low altitude and the latter at height.

We were surprised at the abundance of critically endangered *Protea caespitosa* growing at 1,558m ➤



*Leucospermum mundii* on Garcia Pass



*Leucospermum calligerum* on Garcia Pass

on the slopes of Somerset Sneekop, the highest peak of the Hottentots Holland. It has four geographically distinct populations, isolated from each other and therefore slowly evolving a unique set of characteristics. Each of these populations share a common habitat type – mineral-rich, clay soils derived from eroded, soft, Cedarberg shale being washed down from above. However, it seems the critically endangered status of *P. caespitosa* is based only on the variant from the Kogelberg, which was once known as *P. oleracea* and grown by Knight as *P. turbiniflora*. While both the species as a whole and each population is certainly threatened, the current red-listing system does not allow the threat levels of local variants to be distinguished, and fails to describe the large population we observed on Somerset Sneekop.

### Spatallas

At the summit of Grootberg we stuck our noses over what we had presumed to be a cliff edge. There we saw the pink, hare’s-tail-like inflorescences of the diminutive *Spatalla nubicola*, Medusa spoon. It was growing in a wet, steep, often cloud-filled, south-facing gully at



*Protea caespitosa* on the slopes of Somerset Sneekop

1,629m. Discovered and described in 1966 by John Rourke, the tiny altitudinal range and specific habitat requirements of *S. nubicola* leave it vulnerable to a changing climate, with a distribution of no more than 34km<sup>2</sup>. The orographic clouds that are often trapped on the southern slopes of Boosmansbos result in high precipitation, causing podzolized, peaty, nutrient-impooverished soils of pH 3.2, equivalent to that of malt vinegar. Spatallas are deemed difficult from seed and, as far as we are aware, the only species in

cultivation is *S. incurva*, which is propagated from cuttings. That said, a number of species were grown in the UK in the 1800s, with Lee and Kennedy’s nursery finding some took well to cultivation. I hope we can get *S. nubicola* to grow in North Wales where our conditions are so similar to its mountain top refuge.

Another *Spatalla* that had not read the field guide was *S. barbiger*. We stumbled across this plant not far from the south-eastern end of its range. It was just over the edge of a slope next to a large boulder where



The upper southern slopes of Grootberg where *Leucadendron radiatum* and *Spatalla nubicola* were found



*Spatalla nubicola* on Grootberg

we, and probably many others in the past, had stopped to eat lunch. The leaves and general habit suggested *S. barbiger*, but its flowerheads did not fit the description, being far too small. Also, it is described as growing at altitudes of 400–620m, whereas we found it at 1,115m. We passed on photographs and coordinates to the herbarium team at the Garden Route Botanic Garden who confirmed our identification. It made me wonder if those small inflorescences were due to the altitude, regional variation or some other factor. Having subsequently looked at herbarium specimens of *S. barbiger*, it seems that its description is based on plants collected from just one locality.

### Pagodas

Related to *Leucospermum*, and sharing a seed dispersal mechanism, are the 13 species of *Mimetes*, commonly known as pagodas, of which we already grow *M. cucullatus* (syn. ➤

*M. lyrigera*). These often short-lived plants have an unusual ecological niche – growing quickly after a fire, they stand above the rest of the fynbos, attracting bird pollinators and producing ant-distributed seed long before the next fire passes through. The ants drag the seed underground, out of reach of the fires, ready to start the process again.

It was while ascending Cradock Peak, near where we had found *S. barbiger*a at 1,196m, that we found *M. pauciflorus*, a stately plant commonly known as torch pagoda. We only just beat the ants to its mature seed. Patience is now required for the embryos to mature fully. We will then work through the complicated process of degrading its three sequential seed coats in order to break its dormancy. As far as we know, this will be the first time this species has been tried in cultivation in the UK. It was encouraging to see seedlings of this species growing at more than 1,500m, near the summit, in an area where there had been fire just a couple of years earlier and where there is almost certainly frost.

Of the 13 species of *Mimetes*, 11 have a Red List status of vulnerable, endangered or critically endangered.

**Conservation**

Current conservation efforts are often informed by regional, national and international red lists, but without up-to-date data these lists are certainly not going to give accurate representations of the species they are there to help. With this in mind it was important to us, and written into the terms of our permit, that we should provide the South African authorities with accurate information about all the species of *Proteaceae* we found. For us, one of the easiest ways of doing this was to upload this information



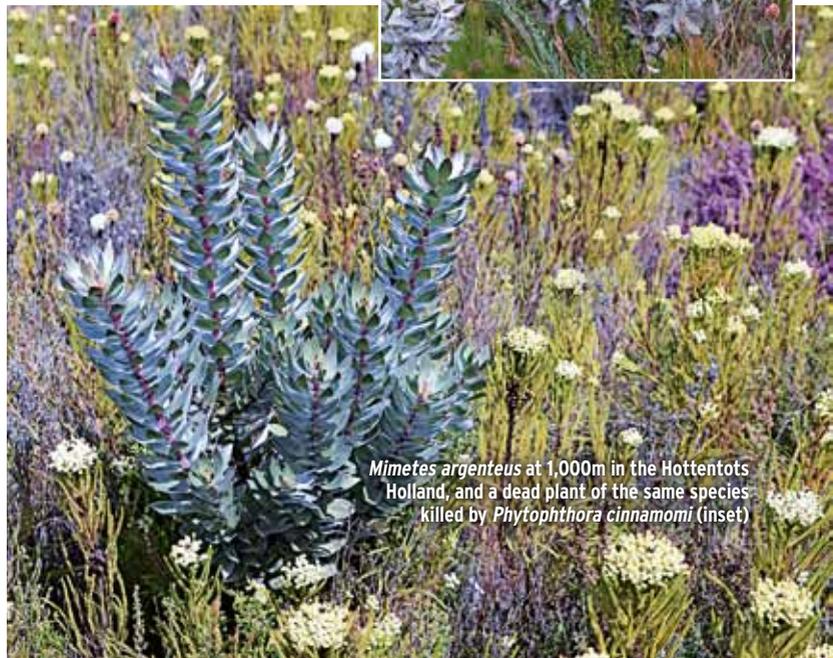
*Spatalla colorata* in Boomsansbos Wilderness Area

to iSpot ([www.ispotnature.org](http://www.ispotnature.org)) and tag it with the term 'redlist'.

A species we found that caused quite a stir when we uploaded its details was *Spatalla colorata*. We would have completely missed this plant, known as shiny spoon, had it not been in full flower. It was growing alone in a very wet seepage line among restios and heathers. This species is found in sparse populations and is threatened by drought and non-native invasive species such as *Hakea drupacea*. It was originally collected by CLP Zeyher on slopes along the river Sonderend in 1830 and has never been common. The last official record of this plant, by the local CREW (Custodians of Rare and

Endangered Wildflowers) group, had been 18 years previous to our discovery.

Our observation of a population of the endangered *Mimetes argenteus*, ravaged by blight (*Phytophthora cinnamomi*), has also been recorded on iSpot. This, the most fatal of diseases of proteas, is spread in soil and water and we found the corpses of these plants on the side of a well-trodden path in the Hottentots



*Mimetes argenteus* at 1,000m in the Hottentots Holland, and a dead plant of the same species killed by *Phytophthora cinnamomi* (inset)



Long ridges and mountain folds as seen from the summit of Cradock Peak in Western Cape



*Mimetes cucullatus* in Boosmansbos Wilderness Area



*Mimetes pauciflorus* in the Outeniqua Mountains

Holland. We wondered what more could be done to ensure hikers' boots are clean before entering these environmentally sensitive areas, to reduce the spread of this disease.

### Conclusion

Over the course of three weeks we made 115 observations of *Proteaceae* at altitudes greater than 1,000m, covering 55 species across 9 genera. Many of these were last recorded as being cultivated in the UK as long ago as the early 1800s. As part of our

permit requirements we are sharing vital conservation data with South Africa. We have more questions now than before we embarked on the expedition and, as such, have a need to return.

The process of sowing the seed we collected has started and we are already seeing good germination. Our permits are non-commercial, but we do intend to site plants at managed locations around the UK to see how they fare in different climates.

Alas, Joseph Knight is no longer around to seek the advice of, but we are lucky he left notes in the form of a book to assist us. We hope that 200 years on we may go some way to updating Knight's pioneering work at our nursery, where we will study 'the cultivation of the plants belonging to the natural order *Proteæe*'.

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