Aloe pearsonii – a unique species in habitat and in cultivation

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Aloe pearsonii inhabits an extremely harsh environment in Namaqualand, southern Africa, a consequence of which is that it is notoriously difficult to grow well and flower in cultivation. It is described here both in the wild and in cultivation and its conservation status and close relatives are also discussed. Photography as indicated.

Historical perspective

Aloe pearsonii was first discovered by Professor Henry H W Pearson. With the assistance of funds from the Percy Sladen Memorial Trust, Pearson undertook two collecting trips in the arid western parts of southern Africa. The second of these, from November 1910 to January 1911, is relevant here, as he travelled north through Clanwilliam to O'okiep, concentrating largely on the Khamiesberg and the Richtersveld. In the latter region on 31 December 1910 he first encountered the aloe that later became his namesake, *A. pearsonii*. He wrote "Like many other species, this one is gregarious. It is so thickly spread over the hill slopes (especially those with a more or less westerly aspect) that, when seen from a short distance, they appear to carry no other vegetation. It has not been found outside the Richtersveld area, within which it is extremely abundant from Numees Mine southwards to the settlement of Kuboos (some 20 miles). Its slender, erect stem, rarely more than 2.5–3ft (76–92cm) high, is closely beset with drooping leaves; the reddish-bronze colour of these gives to the plant a remarkable and characteristic appearance. From its summit there arises the slender raceme, bearing flowers varying in colour from a delicate lemon yellow to bronze-pink. It is a very striking plant, with good claims to be regarded as ornamental". His short travelogue is accompanied by a habitat photo of his aloe near the top of Helskloof (Pearson, 1911: 190–191, Fig. 89).

Pearson was more famous for his studies of the iconic genus *Welwitschia* and, most importantly, for establishing the National Botanical Gardens at Kirstenbosch of which he became the first director in 1913, only to die in 1916 at the regrettably young age

Fig. 1 General view of Helskloof Pass (Photo: Alice Vanden Bon)

Fig. 2 Closer view of Helskloof with clumps of *A. pearsonii* dominating the landscape (Photo: Alice Vanden Bon)

of 46. He is buried in his beloved Kirstenbosch (Glen & Germishuizen, 2010).

At the time of Pearson's discovery of his aloe, Selmar Schönland was Professor of Botany at Rhodes University (later to become the University of Cape Town). Schönland was the leading South African expert on succulents, having discovered or named many new species most of which are currently still recognised, notably *Aloe broomii*, *A. castanea*, *A. chabaudii*, *A. ciliaris* var. *tidmarshii*, *A. davyana*, *A. greatheadii*, *A. parvibracteata* and *A. peglerae*. Schönland went on to study other genera of southern African succulents, famously publishing a monograph of *Crassula* in 1929. So at the time of Pearson's discovery of an exciting new *Aloe* from the Richtersveld, Schönland was the obvious botanist to describe it, which he duly did (Schönland, 1911). Later, in 1934, Schönland was co-author of another iconic species, *A. polyphylla* Schönland ex Pillans. He himself is commemorated in the name *Aloe schoenlandii*, but unfortunately this has turned out to be a rather nondescript natural hybrid (*Aloe striata* × *A. maculata*) rather than a distinct and worthy species (Reynolds, 1950; Carter et al, 2011). In summary, *A. pearsonii* joined the substantial list of distinct southern African aloes named by Schönland that also commemorates one of South Africa's most influential and ground-breaking botanists.

This species is well-known but rarely encountered in cultivation, where it has a reputation for being difficult to grow well. It has been well described and illustrated by, amongst others, Reynolds (1950), Jeppe (1969), Bornman & Hardy (1971), Carter et al (2011) and van Wyk & Smith (2014).

Aloe pearsonii in habitat

This species is very localised and occurs only in the Richtersveld and just across the Orange River in southern Namibia, so it can be described as a Namaqualand endemic. In Namibia plants have been observed in the Namus Kloof and on the farm Spitzkop near Witputz (Hardy, 1970). Jankowitz (1977), in his survey of the distribution of Namibian aloes, recorded that *A. pearsonii* "is limited to three farms south of the Lüderitz district and it is also known to occur in some of the mountains in Diamond Area No. 1". He summarised by saying that "although the aloe is very limited in its distribution the fact that it occurs in such large numbers sometimes many thousands, is to some extent, reassuring". Rothmann (2004) expands on this by saying that "In Namibia it

Fig. 3 Close-up of a large clump of *A. pearsonii* (Photo: Alice Vanden Bon)

seems that plants prefer southerly or westerly slopes in some of the driest parts of the Namib Desert. Temperatures are frost-free but can often reach +50°C while the winter rains are few and far between…The most western *A. pearsonii* can be found 18km from the mouth of the Orange River while large colonies can be found both inside and outside of the Sperrgebiet south of Lüderitz".

As in Namibia the environment of the Richtersveld, South Africa, is extremely harsh. Annual precipitation is minimal and falls mainly in the winter, ranging from 43mm on the coast at Alexander Bay to 300mm in the high inselbergs (isolated rock hills) such as Cornellsberg. Not only is the Richtersveld dry but it is exceptionally hot too. Williamson (2000) recorded temperatures in midsummer in the sand at the base of plants of *Opophytum aquosum* (Aizoaceae) of around 65°C with the plant bodies at 45°C, about the same as the surrounding air temperatures. This is truly an extreme environment.

In the Richtersveld the largest and densest populations of *A. pearsonii* occur in the Helskloof Pass. Reynolds (1950) wrote that "When the author made a special journey to the Richtersveld in December 1947, in the hopes of securing material for colour plates [for his monograph on South African aloes], he met a Bondelswart shepherd at the top of Hells Kloof, who stated that there had been no rain at all there in the previous 4 years. On that occasion, plants presented a very sorry shrivelled-up appearance, and it seems that in periods of prolonged drought they are more concerned with survival than with using up vital storage to produce flowers for reproduction and propagation".

In September 2015 one of us (Alice) followed in the footsteps of Pearson and Reynolds into the Helskloof Pass, in the company of Chris Rodgerson, Andy Young, Ivor Crook, Mike Thewles and Alan Vanden Bon. Following an overnight stop at De Hoop campsite on the Orange River the group was met by Pieter van Wyk, a ranger for the Richtersveld National Park. Four vehicles with the addition of Pieter's travelled in convoy through a misty drizzle (most unusual in the Richtersveld – could it have been the presence of so many people from the UK!), to a site east of Helskloof. On the way many succulents were spotted including *Aloidendron ramosissimum*, *Conophyum loeschianum*, *Crassula columnaris*, *C. deceptor*, *C. grisea*, *Othonna herrei*, *Tylecodon buchholzianus* and *T. rubrovenosus* to name just a few. A stop was made close to Paradyskloof where a visit to

Fig. 4 Close-up of single stem of *A. pearsonii* showing the characteristic 5-tiered leaf arrangement (Photo: Alice Vanden Bon)

the cliff-dwelling endemics, *Amaryllis paradisicola* and *Bulbine pendens*, was scheduled. From this location vast stretches of *A. pearsonii* were witnessed as far as the eye could see, a truly breathtaking sight. Such a profusion of plants makes it difficult to comprehend its rarity in cultivation. At the top of Helskloof Pass *A. pearsonii* is the dominant feature of the vegetation (Figs. 1 & 2). The plants are generally prominently reddish (Figs. 3 & 4) giving a vivid colour to the landscape.

Growing close by were numerous plants of *Tylecodon paniculatus* standing well over a metre tall. Here *Tylecodon racemosus* and a red-flowered *Astridia* sp. (Aizoaceae) were also found. Interestingly many of the growing shoots of *A. pearsonii* were lying on the ground. Pieter explained that the troop of baboons that inhabited the area was systematically chewing off the tops of the plants. Although baboons are omnivorous they are mainly herbivorous and are known to eat the sap of plants as well as leaves and roots. The baboons eat the lower leaves of the shoot and leave the top untouched. This must obviously affect the flowering of the plants but is it an aid to vegetative propagation? It is difficult to estimate the potential effect of damage by these animals or whether they are indeed helping its survival.

Aloe pearsonii is believed to be one of the slowest growing of all aloes. It will eventually grow to two metres tall and it is thought that such plants could be several hundred years old. It is humbling to consider that the view in Fig. 2 could be much as that viewed by Professor Pearson over 100 years ago.

Conservation status of *Aloe pearsonii*

Aloe pearsonii occurs in what has been defined as the Gariep Centre of Plant Endemism, the richest centre of plant endemism in the world, especially rich in mesemb species (Aizoaceae), of which 60% of the species are endemic (van Wyk & Smith, 2001). As outlined above, *A. pearsonii* has a limited distribution in the northern Richtersveld and southern Namibia but where it occurs it is locally common and even dominates whole plant communities. For southern Africa as a whole, Hilton-Taylor & Smith (1994) determine its conservation status as 'Vulnerable' for "taxa believed likely to move into the Endangered category in the near future if the factors causing decline continue operating ... with populations that are still abundant but are under threat from serious adverse factors through their range". More specifically for Namibia, Loots (2005) observes this species as locally common and categorises it as 'Near Threatened', observing that it is known from between eight and twelve subpopulations, inferring continuing decline in the number of mature plants. She records the potential threats as low seedling establishment (in the three subpopulations observed) and mining (but

Fig. 5 Rooted cutting of *A. pearsonii* in the collection of Alice Vanden Bon (Photo: Alice Vanden Bon)

Fig. 6 Flowering plant of *A. pearsonii* GR 372 in the collection of Colin C Walker (Photo: Brian McDonough)

also note the description and observation of baboon damage described above). In terms of conservation measures currently in place, *A. pearsonii*, together with the majority of aloes, is covered by inclusion in CITES Appendix II, which restricts its trade, but there are no specific conservation measures in place to protect this species *in situ*. *Ex situ* conservation measures are unlikely to be successful as discussed below.

Aloe pearsonii in cultivation

This species is notoriously difficult to grow at all well in cultivation (Hardy, 1970), and hence this plant is rarely encountered in collections. We have limited experience of growing this plant and record here our collective successes, along with those of two other growers.

One of us (Alice) has successfully rooted a cutting (Fig. 5). It was potted into a normal mixture of gritty compost, placed in the propagator, watered and then left alone. It was watered directly only very occasionally and most of its moisture probably came from the sandy substrate beneath it when the stapeliads with which it shares a home were watered. Very little attention was paid to it until about a year later when it needed to be moved. It had not only rooted but rooted so firmly into the sand under the pot that it had to be dug out. At this point it was repotted into a larger pot and placed back in the propagator which has now become its permanent home. Whether it needs the extra winter warmth is uncertain but it does seem to enjoy the conditions. Another plant from Rodney Sims grows alongside it.

On 19 August 1971 Gordon Rowley visited the Helskloof (Rowley, 1971) and collected a cutting. Note that this was in the days before conservation awareness and the implementation of measures to protect wild populations. The material has the collection number GR 372 of which one of us (Colin) now has a rooted cutting. However, this has been in the collection for only 16 months and hence has provided only limited experience of growing this plant in cultivation. In June

Fig. 7 Details of leaves of *A. pearsonii* (Photo: Brian McDonough)

Fig. 8 The inflorescence has pushed the growing tip of the stem to one side (Photo: Brian McDonough)

2017 this rooted cutting, for whatever reason, produced an inflorescence (Fig. 6). The plant stands 30cm tall and the leaves (Fig. 7) are up to 8cm long, stacked in five tiers, deltoid in shape and strongly recurved, finely striate with short prominent teeth on the margin. When growing well the leaves are dull blue-green in colour but when under-watered or kept in full sun they easily revert to a deep red colour indicating stress. This plant has an unfortunate tendency for the leaves to dry up and several dead leaves have been removed from the base of the stem (Fig. 6). Production of the inflorescence has pushed the growing tip of the stem to one side (Fig. 8). The inflorescence (Fig. 6 & cover) is 32cm tall and simple, unbranched with a single raceme 12cm long, and flowers arranged in a subcapitate and moderately dense spike. Individual flowers (Fig. 9) are up to 25mm long, brick red in colour but paler golden colour towards the tips of the tepals. The first open flower at the base of the raceme is shown in Fig. 9 and at less than a day old it has the stamens prominently exserted beyond the tepal lobes but the stigma is not yet exserted; exsertion of the stigma followed a day or so later, which is normal behaviour for an aloe flower (hence it is described as being protandrous). The stigma remains exserted after the perianth (tepals) has started to dry up and die, when the flower moves upwards from a pendulous position to being horizontally orientated.

Coincidentally, a plant of *A. pearsonii* in the collection of Graham Charles was in flower simultaneously with the one in Colin's collection. Graham's plant (Fig. 10) was obtained as a rooted cutting from Tom Jenkins about 10 years ago and was only 10cm tall. Now it is 55cm tall and growing in a raised bed. The first inflorescence it has produced is 37cm tall, with three branches 24–28cm long (Fig. 11); flowers range from 25–30mm long and are bright yellow.

So, we record here two different flowering events: a simple unbranched inflorescence with a single raceme of brick red flowers (Fig. 6 & cover) and a branched inflorescence with four racemes of yellow flowers (Figs. 10 & 11). These two distinct flower colours are well recorded, for example by Glen & Hardy (2000), but what is interesting is that these two flower colours appear to be discrete with no intermediate flower colour (presumably orange) having been recorded.

The most famous specimen of *A. pearsonii* in the UK belongs to Rodney Sims who has had a large plant in his collection for many years. In 2003 it flowered and was exhibited in the BCSS Zone 6 show (Fig. 12). This plant has been exhibited and has been a worthy prize winner at a number of National Shows, most recently in 2016. This plant is a venerable specimen and has branched freely from the base to form a dense clump. Indeed Rodney is to be admired for his skill in

Fig. 9 Details of flower of *A. pearsonii* (Photo: Brian McDonough)

Fig. 10 *Aloe pearsonii* flowering in the collection of Graham Charles (Photo: Graham Charles)

maintaining such a tricky, slow-growing plant in good health for such an extended period of time.

Relatives of *Aloe pearsonii*

Reynolds (1950) placed *A. pearsonii* in *Aloe* series *Macrifoliae* Haworth which included seven species, typified by *Aloe ciliaris*. This is now seen as an inappropriate classification, since this series, except for *A. pearsonii*, has been shown to be so distinctive that the included species now constitute a separate genus, *Aloiampelos*, established to accommodate these so-called 'scrambling aloes', separated from the true aloes (Grace et al, 2013). Species of *Aloiampelos* are generally shrubby with long climbing stems bearing thin barely succulent leaves. These plants inhabit moist environments far removed from the extremely harsh dry habitat of *A. pearsonii* described earlier. Our species bears no close relationship to *Aloiampelos*.

Glen & Hardy (2000) proposed what is now seen as a more acceptable classification for *A. pearsonii*. They placed this species in *Aloe* section *Aloe*, including this species together with *Aloe perfoliata* (with *A. comptonii* and *A. distans* in synonymy, both of which are now considered as subspecies of *A. mitriformis*), *A. dabenorisana*, *A. meyeri*, and *A. arenicola*. In this section the plants are pendent, decumbent or erect, the leaves are very succulent, spirally arranged, crowded, deltoid with margins bearing stout teeth, whilst the flowers are arranged in subdensely subcapitate spikes.

The most recent molecular study of *Aloe* is by Grace et al (2015). Their evolutionary tree for the genus includes a clade (or branch) containing *A. pearsonii* together with *A. arenicola*, *A. distans* and *A. mitriformis*. This evidence is derived from DNA sequence comparisons which supports the classification of Glen & Hardy (2000): the nearest relatives of *A. pearsonii* are *A. mitriformis*

Fig. 11 Inflorescence of *A. pearsonii* flowering in the collection of Graham Charles (Photo: Graham Charles)

Fig. 12 Plant of *A. pearsonii* from the collection of Rodney Sims, exhibited at the BCSS Zone 6 show in 2003 (Photo: Trevor Wray)

(*A. perfoliata*) and the other members of *Aloe* section *Aloe*. Unfortunately *A. dabenorisana* and *A. meyeri* were not included in the Grace et al study so we do not yet know how close or otherwise these more specialised cliff-dwelling (cremnophytic) species are to *A. pearsonii*.

As an aside, *A. comptonii* is shown by Grace et al (2015) to be more distantly related to the rest of this group of species and indeed has its own clade in the tree. This is somewhat remarkable since for Glen & Hardy (2000) this taxon was not even a distinct species but merely a synonym of *A. perfoliata* (=*A. mitriformis*).

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