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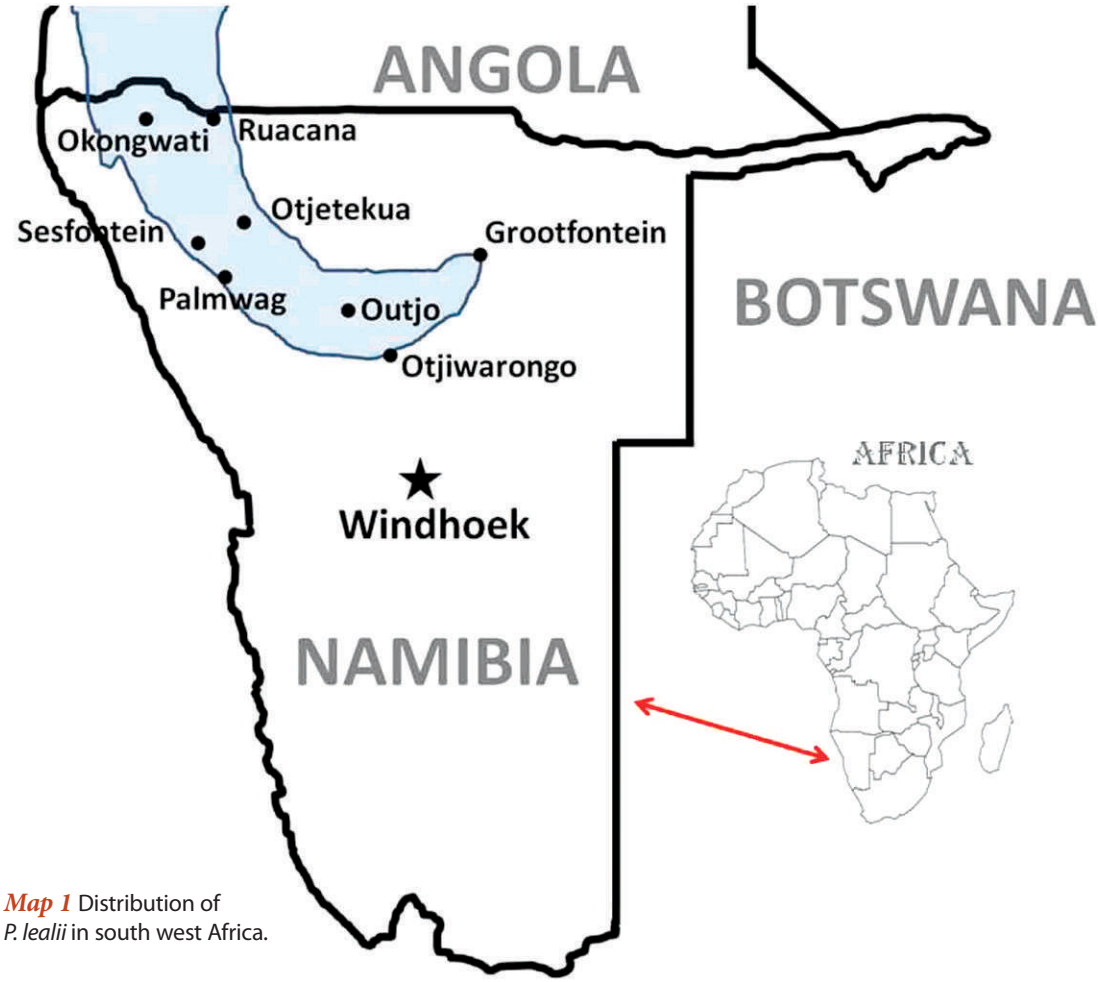
The Many Faces of *Pachypodium lealii*

If you like pachypodiums, you really couldn't ask for a toilet with a better view.

Flashback: just a few months earlier I had contacted Alex Fick with a problem. Alex was President and rogue-in-residence of the Succulent Society of South Africa and one of the principals in Gariep Travel, a company dedicated to fulfilling the southern African field fantasies of normally couch-bound succulentists. I had just spent nearly two years working on a Madagascar trip for the CSSA Field Trips Program, when a presidential election resulted in two self-declared winners whose supporters were shooting at each other. In desperation, I contacted Alex with a request (maybe more of a plea) to organize a replacement trip to Namibia and the Richtersveld of South Africa. Flash forward: it is now sunrise on May 18, 2002, and the members of CSSA "deTour 2002" are camping on the Kunene River—which forms part of the border between Namibia and Angola to the north—somewhere just west of Ruacana Falls on the track to Swartbooisdrif. It was our first night of bush camping, meaning you bring (or create) your own "facilities". Our tour operators provided, er, … basic facilities:

1 The attractive white, frilly flowers of *Pachypodium lealii* are produced in the dry winter months, with peak flowering in August and September in habitat. Outjo, September 1998.



Map 1 Distribution of *P. lealii* in south west Africa.

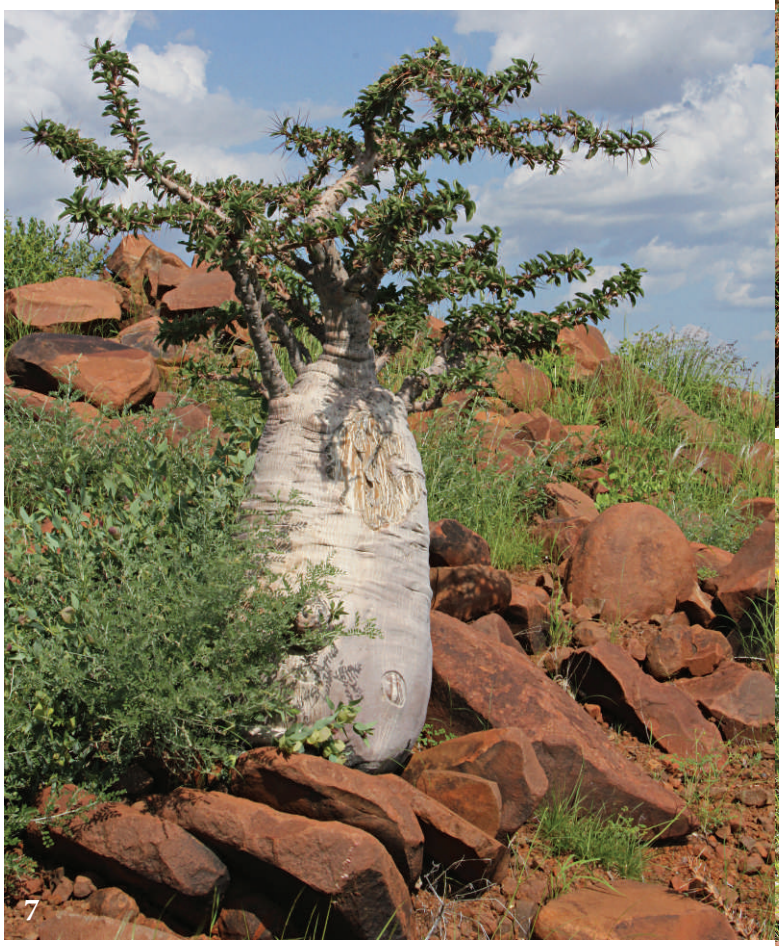
a folding chair equipped with a toilet seat, strategically placed over a hole dug in the ground. The ladies' room was behind a bush and facing north, with a beautiful view of the rushing Kunene. The gents' facility was in the other direction, behind another bush, and facing to the west. So, there I sat, with the warm glow of the early morning sun reflecting off the trunks of numerous towering plants of *Pachypodium lealii* dotting the nearby hillside. As much as I knew I should be moving on, as others would be waiting their opportunity for … this view, I couldn't help but linger just a couple more minutes. Could life be sweeter?

Pachypodium lealii is one of the giants of the genus; it is the largest of the continental African species, occasionally attaining a height of over 8 m (26 ft) and, within the genus only the Madagascan *P. rutenbergianum* is consistently substantially taller (to 12 m). Of the continental species, *P. lealii* has the most arborescent form. It grows with a single, or sometimes double trunk, though damaged plants may have multiple trunks. Even in areas where plants are stunted, the norm is for plants to be single or double trunked. The bark is pale and varies in color from grey to creamy to tan to pinkish. The trunk is generally conical, tapering gradually from base to top. In very old plants the trunk can be more parallel-sided, somewhat reminiscent of cylindrical-trunked Madagascar species such as *P. lamerii* and *P. geayi*. Plants are sparsely branched, with rather slender stems, most of which are self-pruned as the plants increase in height, leaving a mostly bare trunk. The canopy is usually sparse, but in very old plants the apical branches persist, thicken, and continue to ramify, forming a denser and more spreading canopy. The main branches are armored with spines in groups of three, with the paired lower two usually much longer than the single upper spine. In age, the trunk spines disappear. The leaves develop at a

2 An old *Pachypodium lealii* from a high rainfall area (350-400 mm). The cylindrical trunk, rather heavy branches, and spreading canopy are not usually seen on plants in lower rainfall areas. Otjetjekua area, March 2011. *3* Tall, slender trees with a tapering trunk are typical in high rainfall areas. Ruacana Falls area, on the Kunene River, May 2002. *4* In moderate rainfall areas (200-250 mm) *P. lealii* is thicker and shorter in stature, but still arborescent with a tapering trunk. Near Okongwati, March 2011.

point just above the upper spine from an area that, in age, develops into a short branchlet armored with numerous small spines. The inflorescences are produced from the tips of the branches as clusters of 6-20 flowers that progressively open over a period of a few weeks. The buds are pinkish to reddish. The flowers are showy, pure white, sometimes pale yellow or red in the throat, and the petals are attractively crinkled. Flowering time in habitat is May to August, after the rainy season. As with all other pachypodiums and the Apocynaceae in general, the fruits consist of a pair of seed horns (follicles). The seeds are tufted for wind transport.

Although *P. lealii* is certainly an arborescent species, in habitat its form varies considerably with location. Map 1 shows the distribution of *P. lealii* in south west Africa. In some areas the plants are towering trees. At the opposite extreme they are magnificently stunted barrel-shaped caudiciform plants. The environmental factors that result in such substantial differences in growth habit are unknown, but rainfall is a likely contributor. For example, according to the rainfall maps in Mendelsohn et al. (2002), the giant illustrated in Fig. 2 grows a couple miles south of Otjetjekua, an area that receives an average of 350-400 mm (14-16") of annual rainfall; the tall plant shown in Fig. 3 is growing on the Kunene River west of Ruacana, an area that receives 300-350 mm; the plant shown in Fig. 4 is representative of those growing near Okongwati, which receives 200-250 mm annual rainfall; and the plant shown in Fig. 5 is about half way between Sesfontein and Palmwag, in an area that

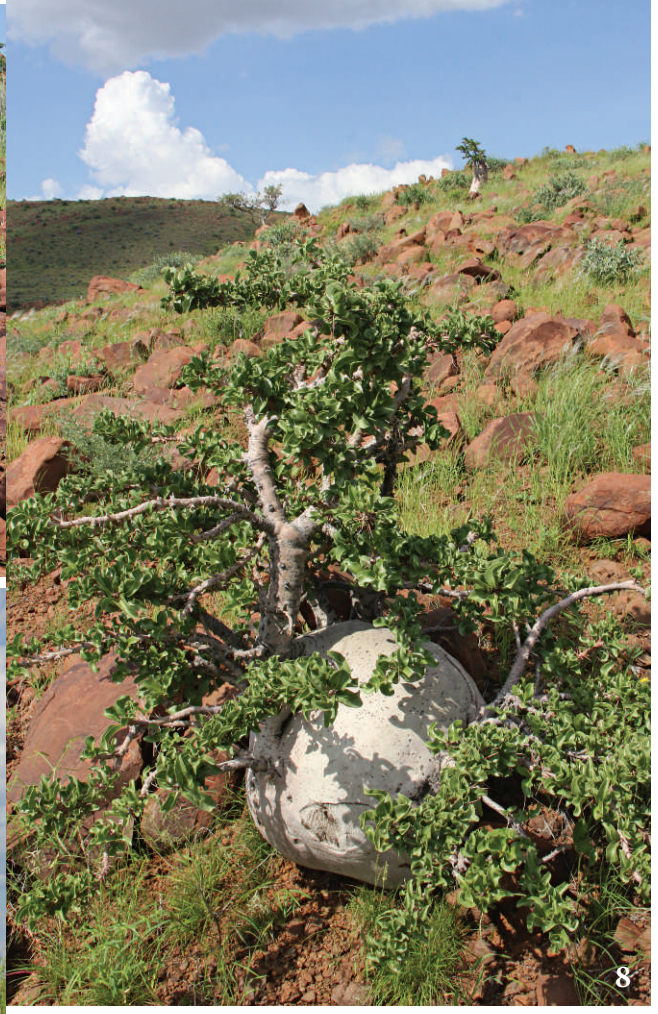


5 Locations with lower precipitation (150–200 mm) have plants with a stout, conical trunk. Between Sesfontein and Palmwag, March 2011. ***6–9*** At Palmwag, annual average precipitation is only 90 mm. Plants are quite stunted and with an enlarged, barrel-shaped trunk. Note the holes in the trunks, possibly resulting from the activities of porcupines seeking moisture. April 2011.

receives 150-200 mm annual rain. The highly stunted plants in Figs. 6 - 9 grow near Palmwag, with an average rainfall of only 90 mm (3.6”), (according to the Palmwag Lodge website), only about 25% of that received by the taller plants in the north. Some of these plants are less than 1 m tall and demonstrate the extreme stunting that can occur in some areas.

The specific microhabitat of each plant may also impact growth form. Growing in the same general area as the plants represented by Fig. 4 are others such as that shown in Fig. 10. These more stunted plants tended to be in rock crevices, likely with less nutrient and water availability.

Another factor that shapes individual plants is their susceptibility to browsing by elephants and



porcupines, especially in the drier areas, and particularly during extended periods of drought when other food and water are unavailable. Figures 11 & 12 are of plants likely damaged by elephants. In some cases large chunks are excavated from the fattened trunk; other plants are pushed over and nearly uprooted, but they survive and persist. In time, many of these plants recover and the old wounds add to their "character". However, some plants are totally uprooted and simply die.

Whether or not there is a genetic component to the differences in regional form is unknown. It would be interesting to harvest seed from the various extreme forms and grow the offspring under identical conditions for several years to observe the resultant forms.

P. lealii is a near-endemic to northwestern Namibia, with much of its range lying in Kunene Region. In Namibia its westward distribution is in the eastern slopes of the escarpment bordering the Namib Desert, from which it extends eastward through the Western Highlands and Karstveld to about Grootfontein, and southward to about Otjiwarongo on the 21st parallel. Its range does extend into southern Angola, but that country has not been well studied botanically and the northern

limit is not precisely known, though there is one record from as far north as the 15th parallel. There is one record from northwest Botswana but Bruce Hargreaves does not list the species in his booklet on the succulents of that country. Throughout its range, *P. lealii* grows in a summer rainfall area.

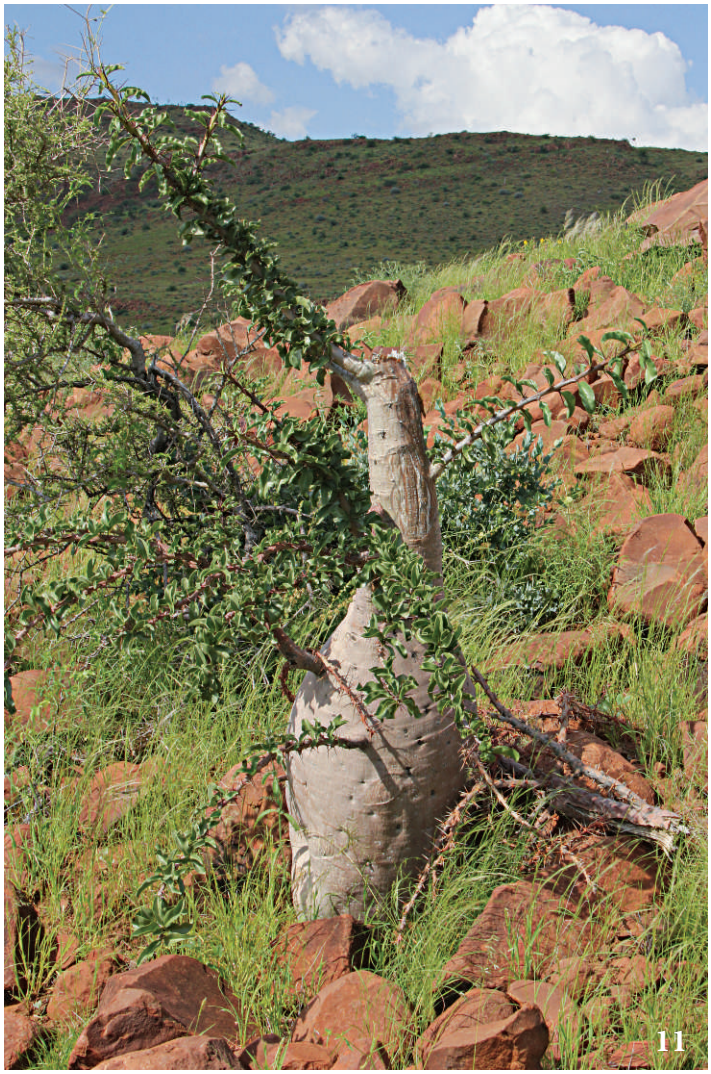
P. lealii is most frequently found in rocky, sloping habitats, usually in areas of relatively open mixed woodlands or shrublands. Individuals or groups of plants can often be found in rock outcrops, seemingly avoiding adjacent, less rocky soils. It is reported to grow on dolomite, granite, schist, and quartzite. It is frequently found with other succulents, including other succulent tree and shrub species such as the baobab *Adansonia digitata*, *Sesamothamnus guerichii* and *S. leistneri nom. prov.*, *Sterculia africana*, *Adenium boehmianum*, *Euphorbia guerichiana*, and various *Commiphora* species. Other succulents I have seen it with include *Cissus* sp., *Ceraria longipedunculata*, *Aloe hereroensis*, *Sansevieria pearsonii*, and various stapeliads.

10 Local microhabitats may influence the growth form of *P. lealii*. Plants such as this, growing in rock crevices, tend to be more stunted than their neighbors growing with better root room. Compare with Fig. 4. Near Okongwati, March 2011.

There are several languages commonly spoken in northern Namibia, and *Pachypodium lealii* has a common name in each. In English it is the bottle tree; in Afrikaans it is *bottelboom* ("bottle tree"); in German it is *flaschenbaum* ("bottle tree"); in the Otjiherero language of the native peoples it is *ohwanga*. The sap contains a glucoside, pachypodin, which is used as a component of arrow poison and is also applied to heal abscesses and wounds of humans and animals.

P. lealii's closest relative is *P. saundersii* from southeastern Africa (Mozambique, Zimbabwe, Swaziland, and eastern South Africa). Some authorities consider *P. saundersii* to be a subspecies of *P. lealii*, but they are on opposite sides of the continent with widely separated distributions, have different flowering times (January to July for *P. saundersii*), and different growth forms. These differences have lead others to consider *P. saundersii* to have full species status.

Although there are reports that this is a species difficult to cultivate in north temperate climates, I have not found this to be the case. I've grown three plants, the oldest now over 20 years and the youngest over 12, without difficulty. Most of this time they have lived with me in Wisconsin, where the summers are short and the winters dark, cool, and damp. *P. lealii* is certainly a summer grower, and under my conditions, I force it into a leafless winter rest, watering my plants only once every 3-4 weeks while they are leafless (November into June). I grow my plants in a purely mineral, coarse, well-drained soil,



11–12 *Pachypodium lealii* plants from drier areas of its range, likely damaged by elephants seeking moisture during extended dry periods.

without organic matter. My plants are summered outside where they get the full benefit of our abundant summer rains. However, my area is prone to periods of extended rain with cool nights during summer, and I am careful to protect the plants during such times. My two larger plants, grown substantially in greenhouse cultivation, are now over 5 ft tall and have bloomed reliably since they were about 3 ft. Buds begin to develop shortly after the winter solstice and flowering occurs in late winter (though in years of prolonged periods of dark, cloudy days, many or all of the buds abort without opening). I believe this species is not as common in cultivation as *Pachypodium saundersii*, perhaps because seeds are less readily available, perhaps because it is indeed more difficult to grow, or perhaps because it simply is not as popular with caudiciformists as the more compact *P. saundersii*. Regardless of horticultural interests, *Pachypodium lealii* is an amazing plant in habitat where it exhibits a multitude of personalities.

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