

Visiting *Pediocactus knowltonii* in the field

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An introduction to *Pediocactus knowltonii* and its harsh, restricted habitat, with additional notes on its conservation status and hints on cultivation. Photography by the author.

It is often said that the economic crisis worldwide has revived an increased interest in and demand for frost- and winter-hardy cacti and succulents, because of the high cost of heating glasshouses in temperate climates. Whatever the truth is in reality, the frost-hardy cacti from the south-west of the USA (and those of southern South America) continue to attract considerable attention from enthusiasts. Growers covet especially the spiny genera *Echinomastus* and *Sclerocactus* and the geophytic species of the genera *Pediocactus* and *Navajoa*.

Another aspect to these genera is that there is a general consensus among growers that they represent some of the most demanding of cacti to cultivate, especially on their own roots. However, there are several exceptions and the tiny *Pediocactus knowltonii* is most certainly one of them.

Fred G Knowlton discovered this miniature cactus on the boundary between Colorado and New Mexico in May 1958, and two years later it had been described



Fig. 2 *P. knowltonii* in fruit, 23 May 2003

by Lyman Benson as *Pediocactus knowltonii*. It was named for its discoverer who tragically died in a house fire only a couple of weeks after his wonderful discovery. The brief, one-paragraph description (Benson

1960) was followed soon by a full detailed account and illustration in a revision of the whole genus *Pediocactus* (Benson 1961).

The plant is unique and has such stable, hardly varying characters that there are no synonyms of *P. knowltonii* apart from considerations of rank. It was transferred later to the lower taxonomic rank of variety under the related *Pediocactus bradyi* by Backeberg, and to *Pediocactus simpsonii* by Halda. The widespread *P. simpsonii* may be perhaps the closest relative to



Fig. 1 *Pediocactus knowltonii* in flower, 25 Apr 2004



Fig. 3 Group of *P. knowltonii* among pebbles. The freshly open flowers are usually darker (often pink) before the colour fades away due to strong sunlight, 25 Apr 2004

P. knowltonii, but nevertheless the Knowlton Cactus continues to be accepted as a good species by most authorities (eg Hunt 2006).

The first time I searched for *P. knowltonii* was without having proper locality information at the end of March 2003, in southern Colorado near the small town of Ignacio and La Boca Ranch. Frustration from being unsuccessful led to our postponing our return home and eventually to my companion, Jiri Kroulik, missing his flight from Salt Lake City to Reno. Fortunately he was able to catch another flight next morning.

Several weeks later, after obtaining detailed information from Gerhard Häslinger from Austria, describing exactly where to look, I found the tiny cactus very easily. As it happened, I had passed the exact same place earlier without realising. This time, at the beginning of May 2003, the field trip was really rewarding as the whole population of *P. knowltonii* was in full flower and looking for them turned out to be very easy. I saw probably 50 to 60 plants that day. It grows either solitary or in small clusters in the clearings of mixed juniper and pine forest with sagebrush scrub (Juniper-Pinyon woodland). The associated succulent flora comprised *Coryphantha vivipara*, *Echinocereus fendleri*, *E. triglochidiatus*, *Opuntia polyacantha*, and a tiny *Yucca* species, but the tiny pediocactus is easily the most abundant cactus species at its habitat.

Since my first encounter with this interesting cactus I have visited the habitat a further three times. I was there when they were loaded with fruits (23 May 2003), when the plants were in full flower again (25 Apr 2004), and when they were buried in deep snow (3 Mar 2010).

My last visit was at the beginning of March 2010, while returning from a one-month-long trip to Mexico. Our trip started and ended in Albuquerque, New Mexico. On our return to USA, we had one spare day before our flight back to Europe, and since my friends had never visit-

ed the location of *P. knowltonii*, I promised to show them. There was an almost continuous snow cover when we were crossing the Colorado and New Mexico border. When we arrived at the habitat, my colleagues could not believe at first that any cactus could grow there, since there was about 20-25cm depth of snow. Since it was sunny during the day and freezing during



Fig. 4 Single, flowering *P. knowltonii*, 25 Apr 2004

the night, the surface had melted then frozen again, so that we could actually walk carefully on top of the thick blanket of snow. Although we realised that the chances of finding any cacti under this blanket of snow were slim, unbelievably we succeeded eventually. At one spot, six plants of *P. knowltonii* were found in a clear patch of ground under the shelter of some pine branches. It was only at that moment that my friends finally realised that we were truly at the right location for this tiny and rare pediocactus. Here was the compelling evidence of the extreme cold-hardiness of

this plant. The plants that we saw were actually sitting in mud and water during the day when the sun had warmed the air and soil and the snow was melting. Then they had to stay frozen in ice all night, waiting for the sun to rise and change the ice into water again the next day.

There was always a feeling of privilege to stand at the habitat of this endemic cactus with the realisation that



Fig. 5 Two flowering *P. knowltonii* specimens accompanied by *Echinocereus fendleri*, 25 Apr 2004

it was not known from any other locality. The place consists of only one hill that lies exactly on the Colorado and New Mexico border. In some earlier reports only one of the two states was mentioned as a homeland of this cactus and an erroneous assumption arose that there are actually two separate locations for this species. As far as I am aware now, there is no other verified location of *P. knowltonii* reported.

This pediocactus has been included among the CITES App.I protected species from the earliest enactment of the legislation in 1979, and it still deserves the highest level of protection and conservation today. Interestingly, Knowlton's own notes indicated that the habitat of this cactus was disturbed and that "... there were acres of coarse gravel that 'dozer has ramped around in. Found a few dead plants but 'dozer has cut everything down and little white spined balls were coming up all over the place ..." (Benson 1961).



Fig. 6 *P. knowltonii* cluster growing under the pine trees and 'sitting' in pine needles, 25 Apr 2004



Fig. 7 (left) *P. knowltonii* habitat under a thick cover of snow, 3 Mar 2010



Fig. 8 (below left) Astonished Jaroslav Šnicer examining *P. knowltonii* in a clearing free of snow, 3 Mar 2010

site somewhere nearby. Such attempts at introduction require careful and long-term monitoring of the population, including measurements of the survival rate, and whether the plants can be pollinated successfully and be able to regenerate without further intervention. As yet there is no follow-up supporting data on this particular attempt.

The cultivation of *Pediocactus* and related genera from south-western USA is usually considered to be very difficult and in this respect, the Knowlton Cactus certainly is an exception. It is not a very demanding species and actually, contrary to its rareness in the field, it is the most widespread *pediocactus* in cactus collections. It can often be seen grafted on frost-hardy stocks, but this is hardly necessary as it can easily be grown on its own roots. It is an extremely hardy cactus, resisting temperatures below -20°C , and even in central Europe it is fully winter-hardy. After my winter visit to its habitat I can easily understand why. The only major cultivation error is the watering of *P. knowltonii* during the hottest weeks of mid-summer, which may have fatal consequences even though it is not as sensitive to this mistake as other species of the genus.

Although seeds are available in a number of catalogues, it is quicker and more conveniently propagated by offsets that root readily. When rooted, *P. knowltonii* can be grown without much attention either in an unheated glasshouse or in suitable rockeries outdoors where only some protection from extensive summer rains has to be provided.

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The described habitat destruction might be connected to the construction of the road that is present to this day and which snakes around the *P. knowltonii* habitat. Nevertheless, in a habitat report by P Pierce of Albuquerque in 1960 it was stated that the ground was not disturbed at all and the area was untouched wilderness (Benson 1961).

The flowers of the Knowlton Cactus, when fully open, are similar to those of the other smaller *pediocacti* species. It usually blooms in April and May and its flowers are mostly melittophilic. That means that smaller American native bees are the main pollinators of *P. knowltonii*, although *Apis mellifera* (European Honey Bee) also plays an increasing role in the pollination of this cactus (and many other species in the American flora). The Honey Bee was introduced repeatedly by colonists from Europe and has now become naturalised (Janeba 2009).

In his latest book on *pediocacti*, Hochstätter (2007) has mentioned “partially successful” attempts to introduce a new colony of this endemic cactus to another