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Fig 6. Myrmecodia beccarii. Watercolour by John Frederick Miller from an outline drawing by Sydney Parkinson, made during Captain James Cook's first voyage across the Pacific, 1768-1771.

All material supplied for this edition has been supplied by Ivor Crook

Opuntia humifusa; boring weed or fascinating plant? By Ivor Crook

I was fortunate to visit the area around Orlando, Florida for two weeks over May and June of 2016 and a further 3 weeks across December 2016 and January 2017. Although supposed to be primarily a holiday, several opportunities arose to scour the roadside verges and areas of unspoilt land put aside for nature. In many of these places I came across Opuntia humifusa. Most people in the hobby consider this a pesky weed fit for nothing but the compost heap. But I hope to show that behind the most seemingly uninteresting of plants is a most fascinating story at every step.

What's in a name.

So, let us start with the basics. Opuntia humifusa. The species name is combination of two Latin names: Humus, the ground and fundere, to pour forth. Thus, the ground spreading Opuntia. Like most scientific names there is some history behind this. In 1753, Linneus, who invented the two-part scientific name, described a plant as Cactus opuntia. It is now accepted that from the description given, this plant is what we now know as the tree-like Opuntia ficus -indica. At the time very few cacti had been described so all were included in the same genus. However, as more cacti were discovered, it became apparent that more generic names were required. The following year, Scottish botanist Philip Miller, divided the genus Cactus creating several more generic names including Opuntia. To avoid calling this plant Opuntia opuntia, Miller created the name Opuntia vulgaris. However, he made a most unfortunate mistake. He described the plant as being the same as Linneus's Cactus opuntia (our modern Opuntia ficus-indica) but then described a completely different plant; the one we today know as Opuntia humifusa. Next to enter the story is Constantine Samuel Rafinesque. He was born in modern day Turkey but spent most of his early life was in westernEurope. In 1819 he settled in Kentucky as a professor of botany. The following year he described a plant he found locally as Cactus humifusus, the same species Miller described as Opuntia vulgaris. We have to remember that in these times there was no Internet and early publications were not widely available. By 1830, Rafinesque realised his plant Cactus humifusus was indeed an Opuntia and renamed it Opuntia humifusa. Rafinesque's Opuntia humifusa became the accepted name because of the confusion surrounding Miller's Opuntia vulgaris. It is worth noting here that in Latin names the endings often change with the gender of the noun. So for the masculine noun Cactus, the species name is humifusus but for the feminine Opuntia the species ending is humifusa. Thus in scientific terms, the name becomes Opuntia humifusa (Raf) Raf 1830. Raf is the accepted abbreviation amongst botanists for Rafinesque. The first part appears in brackets because he was the first person to describe the species Cactus humifusus. The second part after the brackets denotes he re-classified the plant as Opuntia humifusa in 1830.As is often the case, the ensuing years threw up several more names for similar looking plants. Opuntias tend to be very variable plants with a tendency to hybridise easily thus

defying robust classification. Being unpopular in cultivation, most research on Opuntias centres around their agricultural uses as human and cattle food. The padded Opuntias are therefore a group in dire need of revision. So step forward Lucas Majure, a botanist and taxonomist with an interest in Opuntias. His latest work was published in January 2017 and was a monumental undertaking. In writing this latest paper he examined over 1200 preserved herbarium specimens and over 200 collected specimens. In summary he recognises 'the Opuntia humifusa complex' as a collection of plants currently ascribed 8 different species names. The plants of central Florida, the area I explored, he attributes to Opuntia mesacantha ssp lata(Small) Majure 2014. Thus we have two validly published names by which we can call the plants I observed. Opuntia humifusa (Raf) Raf 1830 or Opuntia mesacantha ssp lata (Small) Majure 2014. Both are equally valid. In this article I will continue to use the more familiar Opuntia humifusa.

A variable feast.

The literature describes Opuntia humifusa as being found as a native plant over a wide area of the eastern United States of America. From just North of the Canadian border to the southern tip of Florida and inland to Montana, Colorado and New Mexico, an area of over four million square kilometres. Any plant found over such distance and wide variety of climatic conditions will usually show great variability in form. As such the plant is described as being a low bush forming clumps or mats from 10 to 30cm tall by about 2 metres across. The pads too show a great deal of variation. They can be round or oval and spineless to having 5 spines per areole. I observed plants in several places close to Orlando. In all cases, the plants were usually one pad tall but did occasionally reach 3 pads in height. Similarly all plants did not attain large mats and were usually of 2 to 10 segments in size. In most populations, variability of pad size and spination was observed consistent with the description above. Despite this, most of the plants in an area the size of a football field looked very similar suggesting vegetative rather than seed propagation as the main means of reproduction. However, there were always a few plants with different shaped pads or different spination to this majority. The plants tend to grow in a range of habitats but all with one similarity, sand. In the recent geological past much of Florida was under water. Today, most of the State is barely above sea level, indeed its highest point is only 345 feet (about 100 metres) above sea level. So it is hardly surprising that for a large tract of central Florida the underlying substrate is sand. However, the plants do grow in full sun, partial shade, quite deep shade, pine scrub, oak scrub or beach sand dunes.

Chromosome numbers also vary across the species as a whole. The reproductive code of any organism is packaged into chromosomes that are visible under the microscope and present in every cell of the plant body. .For cacti, there are usually 11 pairs of chromosomes. . For the plants Majure examined in central Florida, all the plants had 11 pairs of chromosomes. However, some plants from further north exhibit

polyploidy. That is, they have two or even four times the number of chromosomes per cell. Polyploidy allows plants to survive in harsher environments so it is not unexpected that plants in sunny Florida have lower chromosome counts than those in the harsher northern climates.

Fig 1&2.The largest plants of Opuntia humifusa seen during the holiday on the roadside verge into Bok Tower Gardens.

Fire!

Opuntia humifusa often grows in areas subject to wild fires. I was fortunate to witness this at Lake Louisa State Park near Clermont in late December 2016. The park is mixed oak and pine scrub. Several small wildfires had passed through fuelled by the dry dead leaves on the ground only days earlier. The effects of the wildfires were variable. In some areas there was only superficial damage as the fires seem to pass through quickly and caused incomplete burning of leaf litter. This left most of the Opuntia plants scorched but viable. In other areas the woodland under storey was completely burnt back to bare sand. The mature trees were undamaged except for some mild charring of the lower couple of meters of bark. The effect on the Opuntia plants here was more variable. Some were charred but still viable whilst others were completely dead. It is known that regeneration of new plants from the rootstock is possible in some plants where all plant material above ground has been completely burnt away. In areas where the fires cleared all ground vegetation exposing areas of sand, Opuntia plants are the first to recolonize the land.

So, the moral to this story is this. Do not dismiss a plant as merely a weed because it does not look 'choice'. I hope I have convinced you that by looking deeper into the story of a plant there may be many interesting facts to discover even if you do not want to grow a specimen in your own greenhouse.

Fig 3. Fire! General view of the damage to the landscape in Lake Louisa State Park.

Fig 4. A small Opuntia humifusa survives the wildfire.

Myrmecowotsits? By Ivor Crook

Myrmecophytes.

Ant plants. A group of over 100 different genera, of unrelated plants, that have a mutually beneficial relationship with ants. In many cases both the ants and the plants can survive without their partner, but in nature they each have a better chance of survival by their co-operation. They all have adapted structures to shelter and feed ants, which in turn offer protection to the plants. I freely admit that despite twenty years in the hobby I had never heard of them until I was offered one at a branch meeting last year. Even so, not all of these plants fit into the guide for shows. They include acacia trees and bromeliads. The plants of interest to our hobby are mainly caudex-forming plants from South East Asia and Australia that live on trees. They belong to the genera Myrmecodia and Hydnophytum.

What's in it for the ant?

Myrmecophytes have special adaptations to the plant body that benefit the ants. The genus Myrmedodia is a caudex forming plant. In other words the base of the stem is swollen. Usually this is simply a water storage devise for the dry season. However, in this case the caudex often contains hollow chambers called dormatia.

These chambers act as a place of safety for ants. Perhaps the most spectacular example of this was a specimen of Hydnophytum moselyanum in Marie Selby Botanic Gardens, Sarasota, Florida. The caudex has been sectioned to show the dormatia for the ants within the body of the plant (fig1).

Myrmecophytes also provide food for their ants. This is usually in the form of sugars. Some plants secrete solid carbohydrate nodules onto the surface of the stem whilst others have extra-floral nectaries. These are areas of the leaf where plants secrete nectar as liquid food for ants.

What's in it for the plant?

Ants can benefit their plants in four ways. They can act as pollinators for the plant. Later in the flowering cycle they may act as a means of dispersing seed. They can provide food for the plant. Lots of these plants live epiphytically in the boughs of trees. Ant excrement is high in nitrogen, an essential element for plant growth often in short supply for epiphytes. Finally, they can act as a defence mechanism for their host plants. The ants discouraging animals that may wish to eat the plant by stinging those which may approach too close to the plant. They can also act as gardeners by pruning vegetation which may grow over the plant thus allowing more access to light and therefore energy production.

The Genus Myrmecodia.

Myrmecodia is a genus of 27 plants native to South East Asia and as far south as Queensland Australia. They are epiphytic, attaching themselves to the trunks or branches of trees and often hang downwards. Coming from tropical areas of the world, I suspect they may not do well in the average English greenhouse where temperatures regularly fall below 10^{o}C in winter. Currently I am growing two plants from this genus in my house.

Myrmecodia tuberosa. (figs2+3)

This species is reported as coming from North Borneo, East Malaysia, New Guinea and North Australia. I have had my plant about 6 months and it is growing well in a four inch pot on a South-facing windowsill. In that time, the caudex has grown significantly and it is beginning to take on the appearance of more mature plants with the early folds developing on the outer surface. This plant is in a modified cactus mix. To my usual mix of 1 part sieved John Innes No2 and 1 part Jonjo gravel I added perlite to increase drainage. The plant is usually watered weekly and fed with tomato fertilizer every second or third week. It survived a recent holiday with a dry spell of nearly four weeks with no apparent damage. To the best of my knowledge it is ant free!

Myrmecodia beccarii. (figs4-6)

A native of wetlands and mangroves of tropical North Queensland, Australia this plant grows on Melaleuca trees and others with spongy bark. I have only had this plant a few weeks and it came to me potted in orchid compost. It currently sits in its four inch pot on a South-facing windowsill as seems to be establishing itself well in its new home. The spiny surface of the caudex makes it unusual amongst the caudiciform plants in most collections I have seen. Whilst researching this article I came across fig 6 on the Internet detailing the discovery of the species and its internal structure.

These unusual plants remain rare and difficult to come by in this country. There seems to be a real paucity of information about them in the literature and on the Internet. So, if one should come your way, my advice is to snap it up fast and enjoy growing and learning about these unusual plants.

Fig 1. Caudex of Hydnophytum moselyanum sliced in half to show dormatia

Fig 3. Close up of caudex of Myrmecodia tuberosa. At the base of the caudex you can just make out the pores that admit ants to the dormatia are starting to develop.

Fig 2. My plant of Myrmecodia tuberosa

Fig 4.My plant of Myrmecodia beccarii.

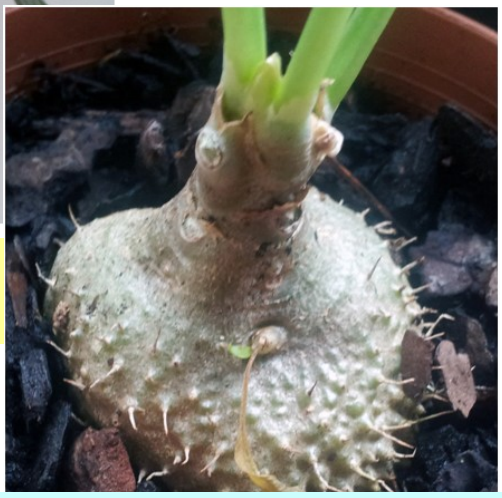

Fig 5.Myrmecodia beccariii. Close up view of the caudex with its soft spines.