Grafting: 2019 Specimens Part 1

Six GBald-on-MGeo grafts in a row in late December 2019, 8½ months since they were grafted. The tallest specimen (second from right) would be the first to flower, in March 2020. The second plant to flower is the leftmost specimen.

The following piece is part of a collection of writings published on the [Practical Small Cacti Malaysia site](#).

Introduction

By early 2019, it was easy to conclude that making more GBald-on-MGeo grafts is a simple way to get an endless amount of cactus flowers in the hot and humid tropics. The flowers are only in various tints of red though, but it's a very bright and intense red[1]. So in April 2019, I gathered some MGeo stems and set about making a new bunch of GBald-on-MGeo grafts.

1 It is possible to get other flower colours for GBald, if you can find (or import) GBald hybrids.

Nicknames for Scientific Names

PMag = *Parodia magnifica*	GBald = *Gymnocalycium baldianum*
PClav = *Parodia claviceps*	MGeo = *Myrtillocactus geometrizans*
GStella = *Gymnocalycium stellatum*	GSteno = *Gymnocalycium stenopleurum*

This naming scheme is purely for convenience. Just think of them as webchat nicknames.

Two trays of harvested MGeo stems, to be used for grafting. (March 2019)

Using the Shrink Wrap Method (Badly)

This time around, I tried the shrink wrap method of holding the grafted joint in place.

It wasn't a roaring success.

The primary issue was the amount of shrinking of drying cactus tissue. The MGeo rootstocks were fat and juicy; the GBald scions were small and juicy. According to my notes, one MGeo stem even squirted a bit of juice when cut. Cut or exposed tissue shrinks a lot when drying, and so the shrink wrap became loose (see photo on the next page.) Also, I wasn't very good at wrapping them up, so I still affixed MGeo spines to hold the joints in place. Some of the cut surfaces had brownish bruised tissue – this may be due to a dull box cutter blade. Altogether a less than impressive operation.

In order to keep the grafted joints together, I later added cellophane tape to the shrink wrap. On some wrapped joints, condensation appeared on the inner surfaces of the shrink wrap. For these, I made some holes in the shrink wrap for ventilation, because it's better for the cut surfaces to dry faster.

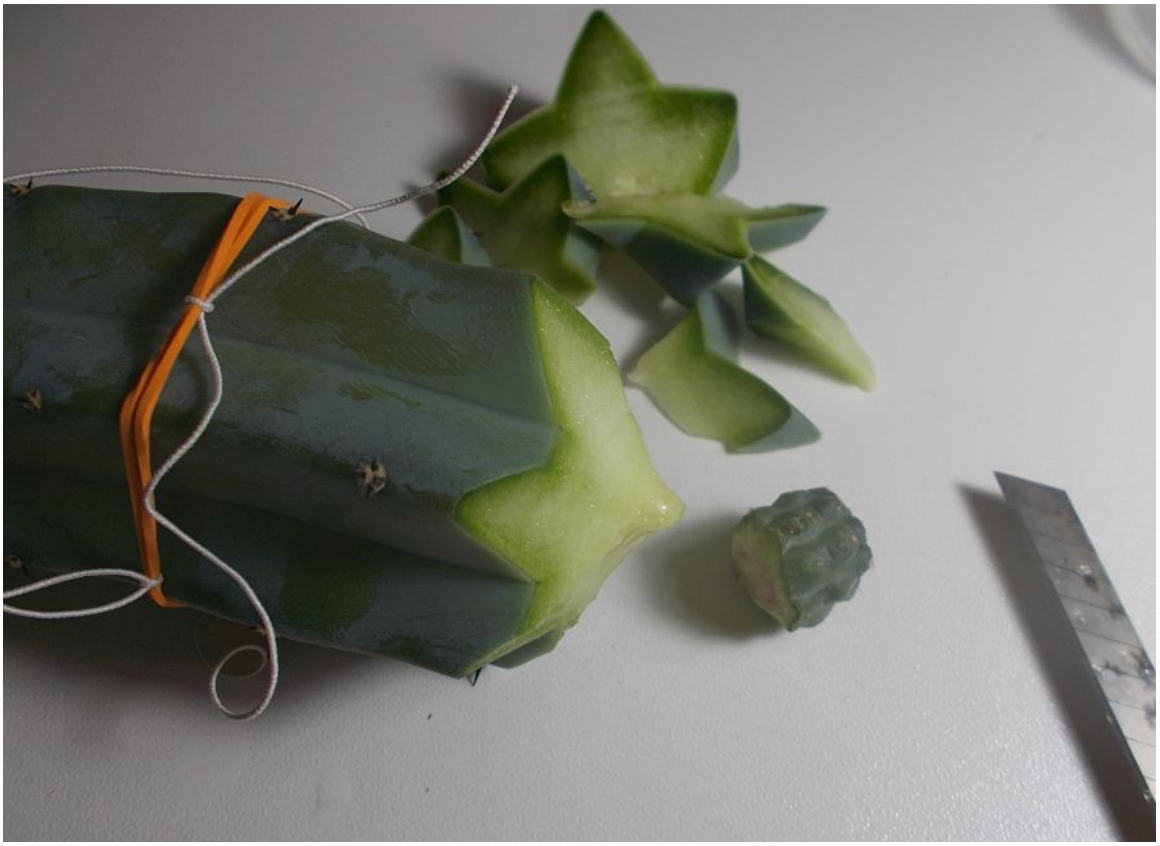
Four of six grafts held. The other two grafts were redone two days later.

After the first round of grafting in April 2019.

A closeup of three grafts. Note the brownish bruising. (April 2019)

Fixing Two Failed Grafts

Two days later. Shrinking tissue caused the joint to separate. (April 2019)



Cutting the stock at a steeper angle to accommodate shrinking. (April 2019)

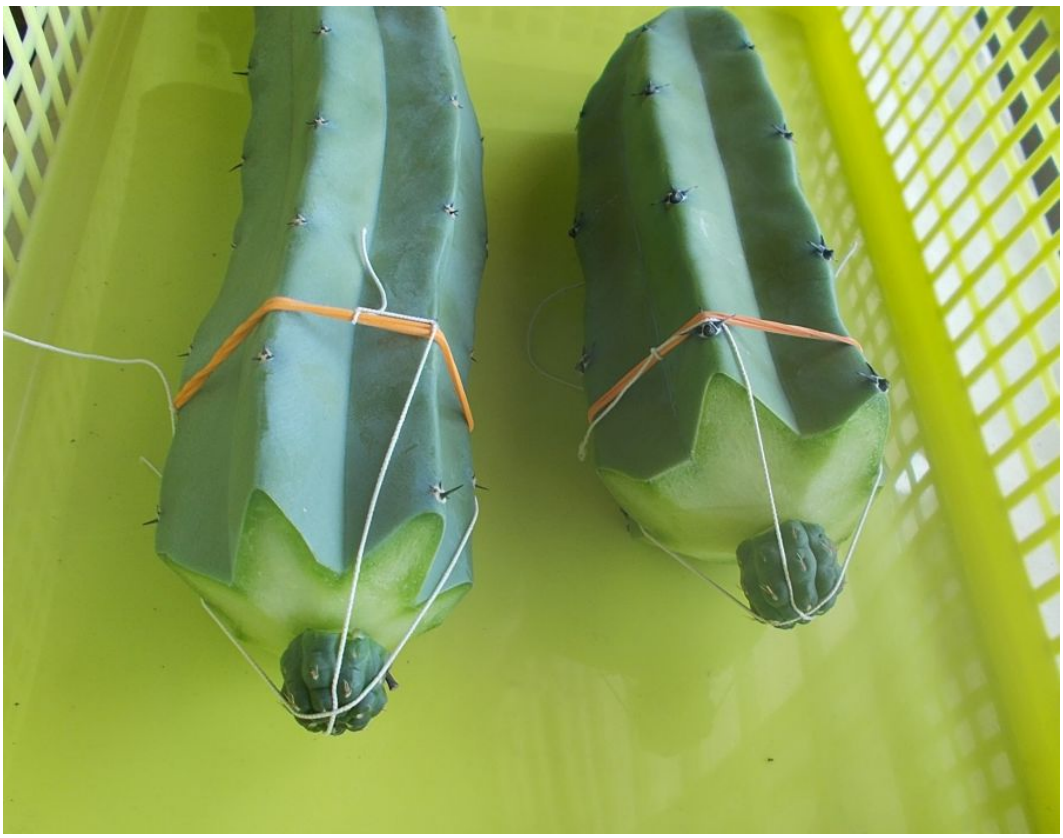
The GBald scion is recut and affixed to the MGeo stock with a spine or two. Then the joint is held in place using rubber band and elastic thread. The GBald scion is more or less spineless; they were cut from the tops of indoor specimens. (April 2019)

The two failed grafts were re-grafted using the same stocks and scions. This time, I remembered to trim the MGeo stock at a generous 45° angle (with a new box cutter blade to minimize bruising) so that the exposed and drying surfaces can shrink without bumping into anything.

I think I will stick to rubber bands and elastic thread to hold grafted joints in place. Plus a spine or two of course. No more shrink wrap techniques for me. Since I will probably be doing mainly GBald-on-MGeo grafts, the material I work with is almost always quite juicy. Juicy cactus stems shrink too much for the shrink wrap technique to be reliable. Also, I like cut surfaces to dry quickly because of fungi concerns in the humid tropical climate.

The grafted specimens spent a few days indoors before being moved outdoors. But that's just because I started this round of grafting using MGeo stocks without roots for the shrink wrap method. My earlier 2014 GBald-on-MGeo specimen was grafted outdoors, and the exposed cut surfaces dried quickly in the hot tropical weather without any fungi issues. I will probably do more of such grafts in 2021 using rooted MGeo stems in individual pots.

The two completed grafts, April 2019.

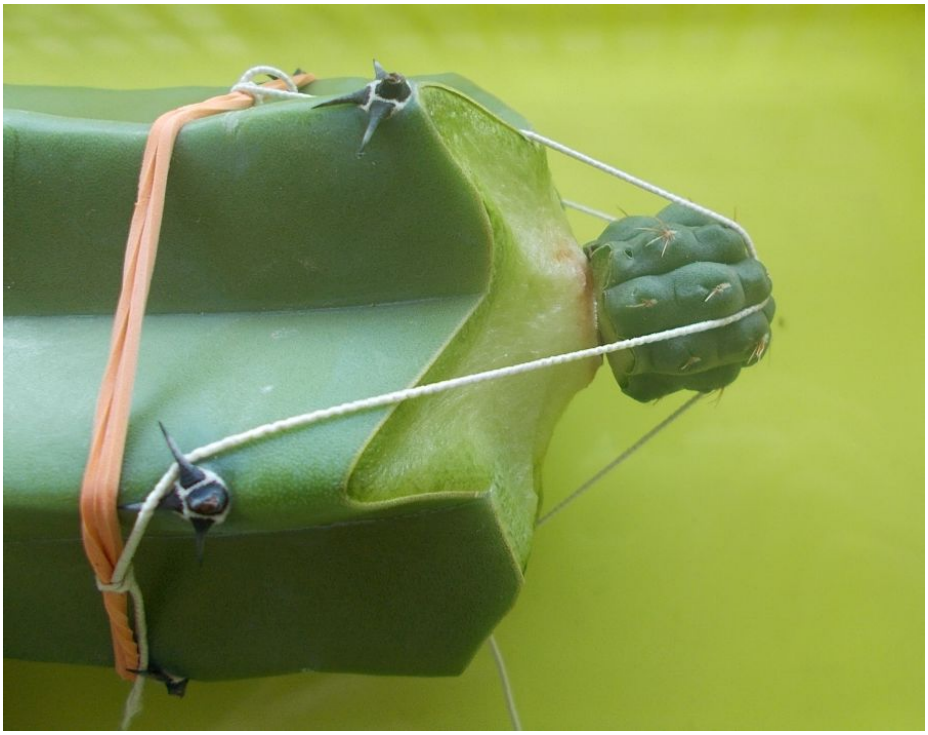


Another view. Note the MGeo spine visible on the left GBald scion. (April 2019)

Post-Grafting Notes

At +3 days. These did not detach. Note the loose shrink wrap. (April 2019)

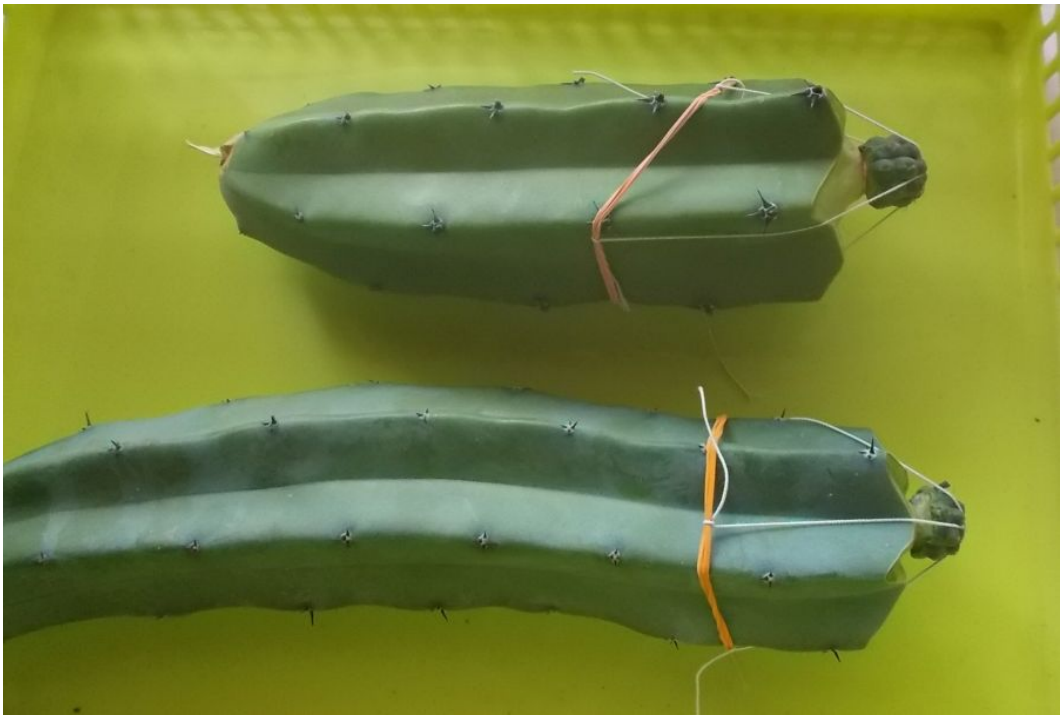
At +1 day after these two specimens were re-grafted. (April 2019)



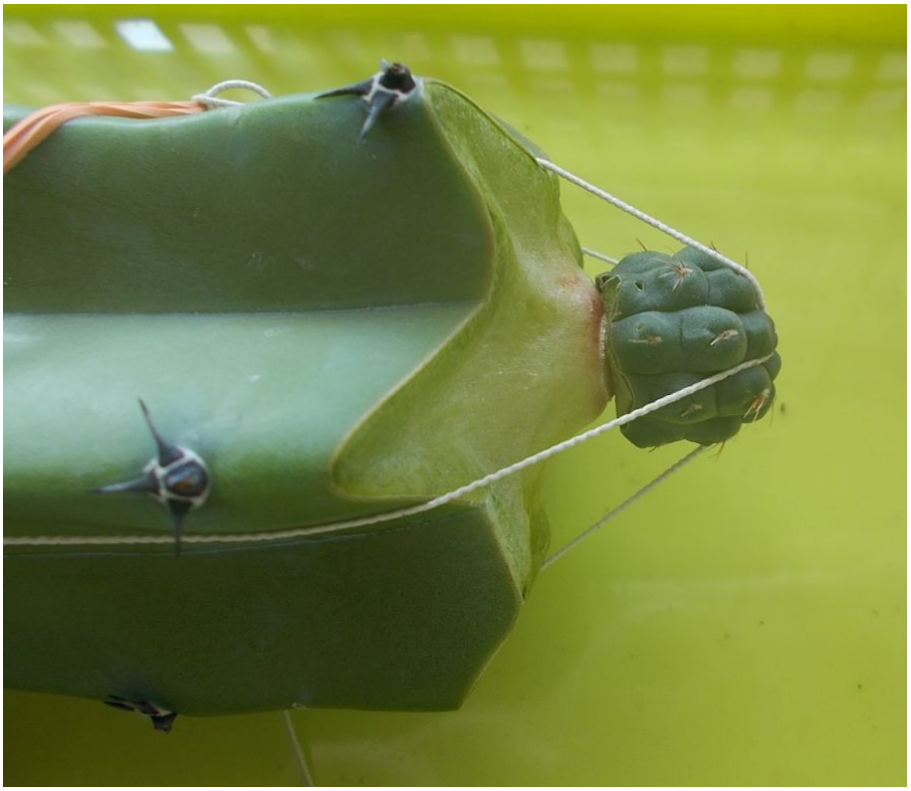
At +1 day. A closeup view of the first specimen. (April 2019)

At +1 day. A closeup view of the second specimen. This is the smallest GBald scion (partly because it was re-cut), on the longest MGeo stock. (April 2019)

At +5 days, I checked the grafts and felt confident enough to remove the shrink wrapping. This lets the cut surfaces dry faster. The grafted joints were not very good, but they held together. I think even poor GBald-on-MGeo grafts will work because GBalds are not very demanding scions. (April 2019)



At +3 days. There was no bruising on the cut surfaces of these two, so I think the brownish bruising was most likely due to a dull box cutter blade. (April 2019)



At +3 days. A closeup view of the first specimen. (April 2019)

At +3 days. A closeup view of the second specimen. (April 2019)

Everything was moved outdoors later on the same day. (April 2019)

Closeup views of some shrink wrapped grafts. The cut surfaces have shrunk a lot, but will bounce back in the next few months as the MGeo stems expand and become fatter. The brownish bruises are also fading. There are small holes and a bit of scarring from the MGeo spines used to hold the scions – these will become almost invisible as the scion grows. Also, note the stumps of spines on some of these MGeo stems – the longest spines have been cut off for safety reasons. (April 2019)

Potting up the specimens four days later. At the lower right is a pail of coco peat. Next to it is a bag of pumice. (April 2019)

The specimens were potted up three apiece in two planter boxes[2]. The potting mix – soil mixed with coco peat – is layered with pumice. The aim was to create a somewhat airy environment for MGeo roots. When grown in normal soil, MGeo roots tend to pile up along the bottom; that is something I wanted to avoid if possible.

These days I try to avoid using a lot of coco peat in smaller pots. Hot weather or heat waves in the tropical urban microclimate tends to bake coco peat into clumps of water-repellent stuff. The baked upper layers will then block water from properly wetting the rest of the potting mix.

2 I would not recommend these planter boxes to you. They are very cheap and the plastic is weak and thin. If you hold them carelessly, the plastic will crack. The boxes were painted so that they will last longer.

Two views of one planter box being filled up with layers of pumice and a soil plus coco peat mix. This was 9 days after grafting using the shrink wrap method, or 7 days after re-grafting of two failed grafts (the middle and right specimens in the pictures.) (April 2019)

The six specimens in the two planter boxes. (April 2019)

For the purposes of studying GBald-on-MGeo grafts, specimens were then given simple IDs. In the above picture, the three specimens in the upper row (nearer to the wall) are 2019A, 2019B and 2019C. The specimens in the lower row (nearer to the camera) are 2019D, 2019E and 2019F. When multiple specimens are shown, they are labeled like 2019ABC or 2019DEF. Such data management planning is necessary because I have a lot more than 10,000 pictures of cacti with flowers...

Every few weeks I would rotate both planter boxes 180°. I do not believe this procedure mattered a lot, because I have not actually observed the scions growing in a preferred direction. Only the flowers tended to point away from the wall, and that is not a bad thing.

It is generally easy to identify the planter boxes at any time: 2019DEF has the tall 2019E specimen in the middle, whereas 2019ABC has the smallest specimen (2019A) at one end. This is useful when comparing pictures of the specimens many months apart. For example, look at the picture on the first page. The order is 2019CBA and 2019FED because the boxes are always rotated at the same time.

Attempting to Replant Tops of MGeos

The tops of the MGeo stems, potted up on the same day as the grafts. (April 2019)

I wasn't one to waste nice big pieces of cacti, especially pieces of a species that was supposed to be super-easy to cultivate. So I took a pot and planted all six of the tops that were cut off from the MGeo stems during grafting. A no-brainer, or so I thought.

A month later, not one of the six has a single bit of root! (See pictures on the next page.) The cut surfaces have callused, but none of the MGeo tops were interested in putting out roots. Instead, they appeared to be slowly shrinking. Also, the callused surface remained thin and did not thicken.

Eventually this led to many hours of research into botany on the Internet. This behaviour is probably a kind of **apical dominance**. In botany, apical dominance is the dominance of the main stem of a plant over side shoots. The main growing point of the stem suppresses lateral buds lower down, so side shoots never appear very close to the main growing point. In this way, a plant grows in a certain pattern. This behaviour is controlled by the plant hormone auxin, which inhibits the growth of buds and roots at certain concentrations.

In our case, we are dealing with tops of cactus stems. The rest of the cactus is missing. Hence, all parts of a MGeo top piece is near to the growing point or apex from which auxin is produced. Apparently, this is enough to suppress root growth from the callused bottom surface of the MGeo tops – a kind of artificial apical dominance scenario. It was surprising to bump into this kind of behaviour because I don't do enough grafting to remember having experienced it.

The MGeo tops were removed from the pot after a month because not one of them has a single root. (May 2020)

A few days later, the MGeo tops were then placed on a tray of pumice as an experiment. Two of the tops have a bit of sunburn. (May 2020)

The MGeo tops were left in the pumice tray for many months as an extended experiment, but not a single root appeared. I guess we can call it a fatal case of hormonal imbalance. These pieces of cacti will be revisited in the next chapter.

Progress of the Grafts in 2019

A day after potting up, the rubber bands and elastic threads were removed from 2019D and 2019E. This was 8 days after their grafting operations. (April 2019)

The final step is to remove the MGeo spines at the base of each GBald scion. This was done 4 days later. By now, joints should feel secure, well attached. (April 2019)

First sign of new growth in the form of new spines appearing near the growing point, seen on 2019C in May 2019, about 40 days after grafting.

After removing all remnants of the grafting operations, the specimens are simply treated like normal cactus plants. All the usual cultivation tasks applies. Since the rootstocks are MGeo stems, the risk of running into root problems due to watering is practically zero. In the picture above, new spines are appearing – a sign of renewed growth. As for NPK fertilization, feed them sparingly at first because initial growth of the scions is rather slow.

The specimens in June 2019, about 2 months after grafting. The GBald scions are now clearly larger. The MGeo stocks have grown or filled out as well.

It will take about 2 months before new growth becomes really obvious. This can be seen in the picture above – compare this to the picture of the six specimens in April 2019 and the changes are obvious. The GBald scions are rounder and a bit larger. MGeo stocks are also growing, and the cut surfaces have ‘bounced back’ in the process.

There is one unusual thing in the picture: 2019E (the tallest specimen) has an MGeo stem that is *bulging* near the GBald scion. 2019E also has the fastest-growing scion, perhaps because graft joint is a good one and the stock is large. The scion was more or less the smallest of the six, yet it appears to be racing past the other specimens in terms of growth. As for the bulge, I think it is due to hormonal signalling by the GBald scion – in the next chapter, we will see other changes to the MGeo stock that bolsters this theory.

At this stage, the GBald scions were not really threatened by scale insects or spider mites because bugs had far jucier and bigger cactus stems to attack. For these specimens, it took more than a year before bugs ever became an issue. Of course, scale insect attacks for example happen only once or twice a year for the cacti in my collection, so it’s not something that is a huge burden.

A closeup of 2019E in mid-July 2019, about 3 months after grafting. The MGeo stem’s bulge is rather obvious now. The scion did not look like much just after its second grafting operation, but after 3 months it has turned into a small and nicely globular GBald. The ribs of the GBald scion are fully stretched out and the growing point looks like it is growing at maximum speed.

The grafted specimens at the end of August 2019, about 4½ months after grafting. All the GBald scions are starting to turn into globular stems.

The cut surfaces of the MGeo stocks have skinned over with a corky layer (suberized). This protective layer will become thicker and tougher over time, turning into a hard, almost woody surface. If the MGeo stocks on your grafts have shrunken cut surfaces or bruising, do not worry, for these features will completely disappear in time.

2019C (left) and 2019E (right) at the end of August 2019.

At the end of October 2019, about 6½ months after grafting.

Two of the specimens, 2019A and 2019B, had an offset or two on their MGeo stocks. One small offset can be seen on 2019A in the picture on the previous page. These MGeo offsets were always removed before they could become very large. It is possible that the scions were growing too slowly (versus normal MGeo growth rates) and the MGeo stocks had excess resources.

The other four specimens did not have this issue because I believe they are slightly more vigorous – these specimens produced flowers without pollen on their stamens, possibly because the scions originated from a hybrid GBald. The hybrid specimens in my collection are generally more vigorous and they produce more flowers. However, they may be slightly more susceptible to bugs and fungi. This will be discussed in more detail in later chapters. In general I think variability is fun. When you are growing a lot of a single species of cactus – GBald – for their flowers, variety is welcome.

2019C (left) and 2019E (right) at the end of October 2019.

The six specimens in late November 2019. The MGeo stocks have all grown and filled up nicely. The bulge on the MGeo stock of 2019E is less prominent because the lower stem has grown in diameter. Next to 2019E, the MGeo stock of 2019D (left of 2019E) looks like it is also bulging a bit, or turning slightly globular.

By late 2019, the six GBald-on-MGeo grafts were well on their way to success. The GBald scions were beginning to take the shape and characteristics of mature GBald specimens, albeit very fat ones. There are hints of wooly and elongated areoles – signs that a GBald scion is turning into a mature cactus capable of flowering. Still, it would be 3–4 months before the first bud finally appeared.

2019C (left) and 2019E (right) in late November 2019. Both scions are beginning to turn into mature GBalds. The spines are not great – the 2014 graft had better spines at this stage. One may need to sacrifice some growth speed in order to get better spines and stems that are less fat.

The MGeo stock of 2019E is starting to display another anomaly in the picture above. Some of the areoles of the MGeo stock on the bulging upper stem have a bit of *wool*. The MGeo stock of 2019C by contrast, has areoles that look more normal, without any visible wool. That's very interesting plant signalling – perhaps it can be exploited for useful purposes.

In the next chapter we will look at the continued progress of these GBald-on-MGeo grafts in 2020. In the months before buds finally appeared, growth was remarkably strong. 2019E and 2019C would begin to flower in March 2020. But they are also rather fat stems, and fat-stemmed cacti are not the toughest or healthiest kind of cacti in the tropics. In the long run, some of these GBald scions may succumb to opportunistic fungi infections, but no matter, the ride was a glorious one. ♦

Version Information

This is the June 2021 Edition of this document.

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Colophon

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