

# Grafting Part 2



Two views of the just-detached GBald scion and MGeo rootstock. (January 2020)

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

## Introduction

This chapter continues following the detached GBald scion of the 2014 graft, now informally called an ex-graft. The objective is to follow the specimen into old age. At some point, some of the attached offsets will be harvested for a new generation of GBald-on-MGeo grafts.

## Nicknames for Scientific Names

PMag = *Parodia magnifica*

PClav = *Parodia claviceps*

GStella = *Gymnocalycium stellatum*

GBald = *Gymnocalycium baldianum*

MGeo = *Myrtillocactus geometrizans*

GSteno = *Gymnocalycium stenopleurum*

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

## Progress of the Ex-graft



No roots, no problem. Two days after detaching, there was one flower open. The stem has no roots, and is using its reserves to continue producing flowers. (January 2020)

From what I can tell, the main risk factors for an old GBald specimen in an urban microclimate in the tropics are *bug intrusion* and *fungi attack* on a part of the weakening stem. Of the two, I am more concerned about bug intrusion. Thus, having a clean stem is important as a GBald ages.



A month later, going strong with 7 flowers open in February 2020.

A GBald-on-MGeo graft is still a wonderfully productive plant even though it may not last a very long time as a grafted specimen. From its first flower in June 2015 to finally detaching from its stock in January 2020, the GBald scion produced at least 116 flowers in about 4½ years<sup>1</sup>. After it detached, the now ex-graft produced 49 flowers for the rest of 2020. That's at least 165 flowers from a single GBald. In addition to that, many large and strong offsets were harvested – a simple thing to do to get more GBald specimens.

Regrafting the GBald scion is not a practical option, as much of the main stem has spongy tissue to various degrees – you'd have to cut off most of the stem to get at younger tissue. This means sacrificing much of the specimen. Old vascular bundles are rather fibrous and tough – they may not be so easily joined in a graft<sup>2</sup>.

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1 From 2015–2016, there were about 32 flowers confirmed via incomplete picture coverage. From 2017, there were 84 flowers until it detached in January 2020.

2 In many East Asian countries, cucurbits like watermelon plants are routinely grafted to another type of cucurbit in commercial plantings, for resistance against root pests and so on. These mass-produced grafts are done when the plants are young seedlings. Grafting may be harder or impossible when soft green stems turn fibrous.

It is better to choose healthy offsets or young stems for grafting or propagation. A GBald-on-MGeo graft in its prime can produce about 50 flowers a year! As such, it is more profitable to renew your collection. Old GBalds will still produce flowers, but expect them to eventually weaken. Any GBald that shrinks will not last forever, so you must propagate replacement plants.



With 7 flowers open again, three days later. One flower is new. (February 2020)

My current plan is to leave this specimen as-is until it goes into terminal decline. This is for data gathering on the behaviour and care of old GBald specimens. There is too little information on the cultivation of short-lived cacti in their old age. We need to understand their lifecycle better.

For the first 6 months after detaching from its MGeo stock, the GBald exhibited strong flower production and growth. It is still shrinking, however, and I have not pulled it up to look at its roots. But it is generally behaving like a normal GBald, only stronger, since it is much larger than GBalds that are not grafted specimens.



In April 2020, an older areole was reactivated and produced a bud. So this flower ended up appearing from the side of the stem.



In May 2020, with 4 flowers open.



There were 6 flowers open the next day. (May 2020)

## The Second Half of 2020



Closeup of two flowers in July 2020. Occasionally the flowers on this ex-graft have an unusually intense red colour that holds up better than usual. The stamens of the flowers, however, do not look healthy.

My GBalds on their own roots display slight seasonal behaviour on an annual basis. You can see this in the Data and Charts chapter, where the number of GBald flowers in 2019 peaks in the first half of the year, then drops in the second half of the year. In Klang Valley, Malaysia, the first half of the year is usually hotter on average, so GBalds probably like to produce flowers in the summer.



Plodding along at about 3 flowers a month. This is in mid-August 2020. Note the shrunken lower stem of the ex-graft.



About the same number of flowers in early September 2020. Stamens are still poor.





The ex-graft with one flower at the start of October 2020. The bud (blue arrow) was aborted, drying up and dropping off.

If you look at the chart for 2019–2020 GBald flowers in the Data and Charts chapter, flower production bottoms out in October 2019. Perhaps coincidentally, the ex-graft experienced its low point in October 2020. In that month, only one flower was produced.

When a GBald is less willing to produce flowers, it tends to abort surplus buds. Usually surplus buds are aborted when too many buds start to grow out at the same time. However, this ex-graft aborted a single bud that has no other competitors save for one flower. The entire plant as a whole is probably not weakening so quickly; perhaps lower temperatures during wet tropical weather that is seasonal around this time makes a GBald think that it's winter and it should stop flower production.

Another characteristic that changed during this period is flower lifetime. Most flowers produced by this ex-graft last six or seven days, but the one flower that opened in October 2020 lasted only three days. Another flower in November 2020 also lasted three days. This might have something to do with the specimen's willingness to flower.



Closeup of the single open flower at the beginning of October 2020. Such poor stamens often do not appear to have any pollen. By contrast, normal flowers have a tidy complement of stamens, and each stamen has lots of pollen on its tip.

Poor stamens on flowers during the second half of the year may also be a manifestation of a GBald's willingness to flower. On this GBald, flowers in the second half of the year were plagued with poor stamens. There were stamens without pollen, stamens with blackened tips, and untidy arrangements of stamens. Yet there was no change to the level of care for the specimen.

Among my GBald specimens, this ex-graft displayed the most extreme seasonal behaviour. Subjectively, I think the other GBalds in my collection displayed seasonal behaviour subtly through small changes in flower production and flower lifetime while flower quality was quite consistent.

As you will see in a later section, the ex-graft's season of low quality flowers ended a few months later in early February 2021. Subtle environmental factors may be driving summer–winter behaviour changes among flowering GBalds in the hot tropical climate of Klang Valley, Malaysia.



In early November 2020, this flower has better stamens.



Closeup of the flower showing the stamens arranged in an untidy manner. Stamen pattern on normal GBald flowers look much better than this mess. The flower look slightly distorted too. (November 2020)



The ex-graft wet either after rain or spraying around the middle of November 2020.  
The flower looks messy, but look what happened a few days later (see below).



Four days later. That big pod looks promising. Non-viable pods do not usually grow this large. (November 2020)



The ex-graft on the last day of December 2020. There are two flowers with awful stamens and surprisingly, the pod is still on the plant.

In November 2020, there were flowers that looked pretty good. The rate of flower production was back to about 3 per month. In 2020, I did manual pollination on occasion among GBald flowers, and got a few seed pods with apparently viable seeds. The ex-graft flower that produced this particular pod was however never pollinated. Normally, such flowers will not set pods, because the current behaviour of my GBalds is that they are rather reluctant to produce seed pods – I don't know why they are so unwilling to produce seed pods.

After about 5 weeks, the pod is still attached to the plant and it has bent over a bit (picture above). This is more abnormal behaviour. A healthy GBald pod ripens in about a month, and the pod should be at maximum size at that time. This ex-graft pod has shrunk and bent over instead, but upon inspection, it is still sturdily attached to the plant. We will revisit this pod later and offer an theory on how this kind of abnormal behaviour is possible.



Closeup of the two flowers. Those are very poor stamens. Again, such flowers appear to keep their intense red colour better than normal GBald flowers. (December 2020)

## Ups and Downs in Early 2021



If a GBald pod is still attached after 2 months, it's an anomaly. Late January 2021.



12 days later, the two buds have turned into normal flowers, with normal stamens that have pollen. Perhaps the ex-graft thinks that summer is beginning. (February 2021)



A nice display of normal-looking flowers two days later. An older areole has also produced a flower. The two larger flowers are open on their fourth day; the smaller flower is open on its first day. (February 2021)

Just a month ago in December 2020, this ex-graft produced two flowers with a sad complement of stamens. By the beginning of February 2021, poor quality flowers appear to be all but forgotten as the specimen resumed producing normal-looking flowers. The condition of the plant would not have changed much in a single month, but the resumption of hotter tropical weather had perhaps switched flower production into “summer mode”.

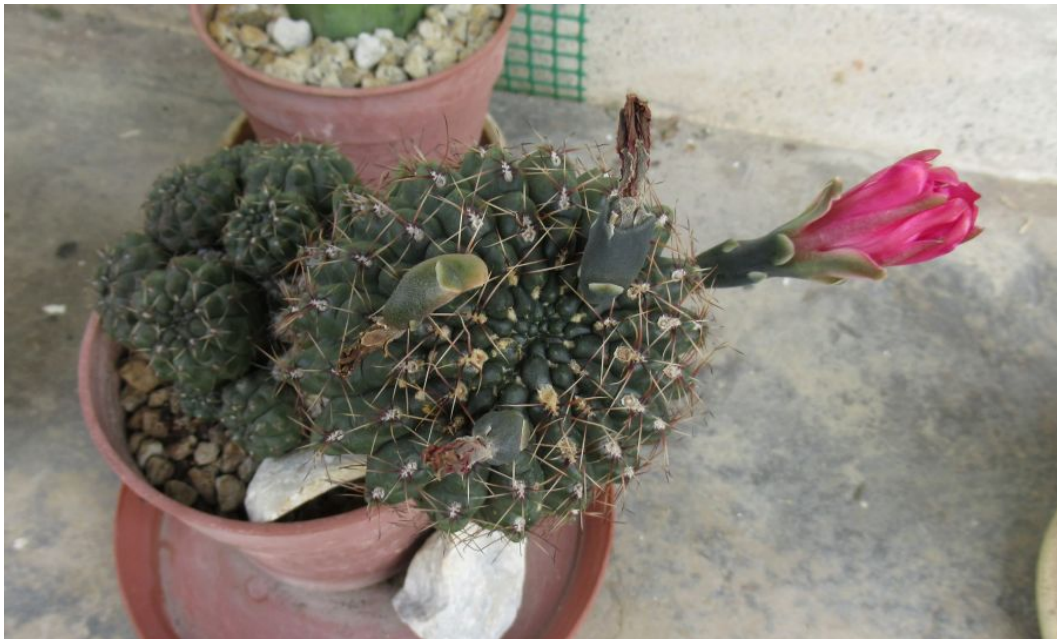
As for the pod, it is clearly an abnormal one, because no healthy GBald pod takes 2 months to ripen. Since the plant appeared to be itching to set seed pods, I manually pollinated the two larger flowers<sup>3</sup>.

The abnormal pod finally started to fail not long after that (see pictures on the next page.) One of the new pods appeared to be viable, while the other quickly started failing. Such behaviour is normal, unlike the antics of the old pod. When the old pod finally detached, there was nothing inside of it except failed ovaries. A GBald seed pod might have been viable and not aborted if there are a few seeds inside, but I could not find any. The pod should have aborted itself a long time ago.

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<sup>3</sup> In the past, I have harvested GBald pollen for later use. On the day these flowers were pollinated, there were 18 GBald flowers, and probably 8 of them had pollen. So I no longer feel a need to harvest and store GBald pollen.





A week later. More potential pods. The old pod is finally failing. (February 2021)



The old pod detached the next day. Splitting the pod open revealed the insides to be empty. The brown bits are failed ovaries. There was not a single seed to be found, yet the pod did not abort early. One of the new pod is promising. (February 2021)

The abnormal pod is probably related to a type of cactus abnormality that involve offsets or buds that grow out of areoles. I have seen such rare anomalies only on old GBald specimens. If old plants of a species do weird things, that means the species is probably not very long-lived – evolution pressure has not ironed out all the kinks that crop up in the old plants of the species.

In the picture from 2017 below, this old GBald has been producing flowers and offsets. Normally offsets tend to appear from areoles on the lower part of the stem, while flower buds grow out from areoles near the growing point at the top. This old GBald had one or two older areoles that grew out flower buds. That is not a very unusual thing, but this specimen also grew an offset near the top of the stem. And below, you can see a weird outgrowth, right in between an offset and a flower bud, all on the same rib! The outgrowth is a cross between an offset and a flower bud. It did not grow any larger, eventually shrinking and drying up a bit, but it did not dry completely and detach.

The abnormal pod is slightly abnormal compared to the totally abnormal outgrowth, in the sense that it may have some characteristics of an offset near its base. So the weird pod never detaches, even though it's mostly a pod, because the base of the pod thinks that it's a stem. It may have finally aborted itself when hormonal balance changed.



An old GBald with three different things growing out of areoles. At lower left is a normal offset. At upper right is a flower bud. In the middle (blue arrow) is a weird 'something' that is a cross between an offset and a flower bud. (March 2017)



From not being able to sustain a single bud back in October 2020 to producing six flower buds and keeping up a large pod in February 2021. All systems are Go now.



A view of the the different degrees of shrinking of the lower stem. (Feb 2021)



With three normal-looking flowers open a week later. (March 2021)



The pod (arrow) was harvested the next day; it contained 72 seeds. (March 2021)



There were five flowers open the next day. (March 2021)



Six flowers opened the day after that. (March 2021)



The ex-graft GBald with six *healthy* flowers open in early March 2021.

And just like that, the ex-graft is behaving like a strong flower producer again. From zero to hero in a few months – it supported six flower buds and a large seed pod with no problem. The behaviour of the ex-graft GBald strongly suggests seasonal behaviour in a tropical climate. The effect may be subtle, because it can only be seen by studying flowering behaviour over one year – the tropical climate may be too evenly hot for GBalds to display proper seasonal behaviour. Without those flowers to observe, the specimen won't appear to be doing much except the upper stem grew a bit and the lower stem shrunk a bit.

Pictures of GBalds in South China nurseries have few flowers. Those specimens are plump, neat and tidy. By contrast, most of my older GBald specimens look positively ragged like this ex-graft GBald. They are failing to stop flowering behaviour completely; they are not getting proper rest periods either. So my GBalds are kind of *messed up* in the hot tropical climate of Klang Valley, Malaysia.

These cacti have evolved to operate with seasonal behaviour. But in the tropics, non-stop flower production without prolonged rest periods may lead to health problems among GBalds. There may not be simple solutions, because it is always hot in the tropical lowlands. At a minimum, we can try to mitigate this kind of stress on GBalds by providing them with proper nutrition.



Two days later, there were still six flowers open. (March 2021)

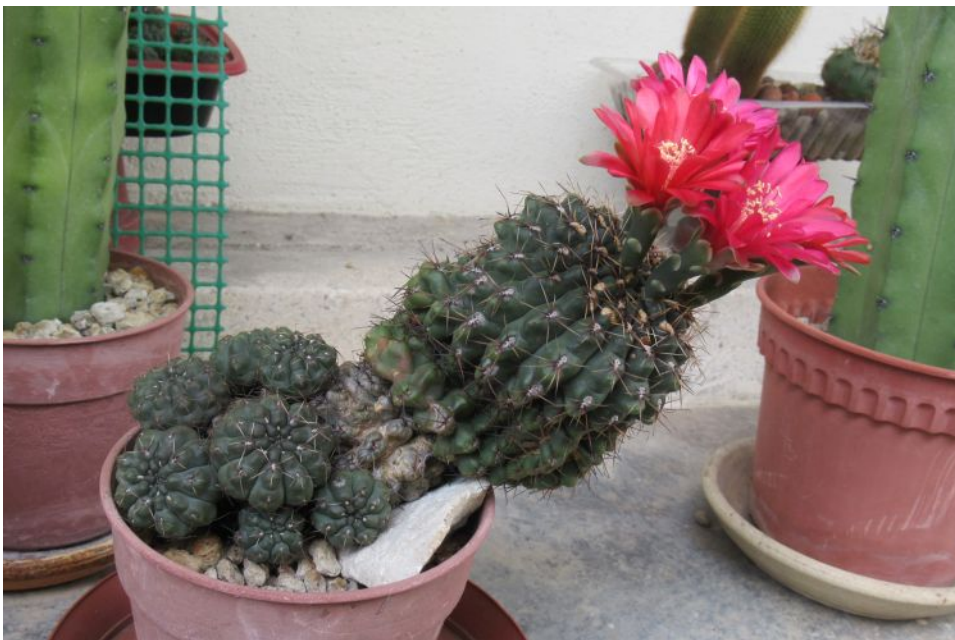
The flower buds that made up the six flowers were pushed out almost at the same time, thus leading to flowers opening at nearly the same time, such as those in the picture above. Sometimes, flower buds on this and other specimens would be spread out. When there are many buds of different sizes, you may end up with flowers on a specimen for two weeks or more, but since they are spread out, the display would not be as impressive as having many open flowers of the same size.

Also, in March 2021 there were 71 GBald flowers in total from maybe 17 GBalds – practically every specimen that has flowered in the recent past did so in that month. Perhaps the GBalds felt a change in the tropical weather and thought that summer has arrived and it's time to go all-out with flower production.

In the next month, the specimen managed to produce a display of four healthy flowers (see picture on the next page). However, given the condition of the shrinking main stem, this level of flower production was clearly unsustainable. One areole can only produce one flower bud, so you'd need the plant to grow new areoles. Only areoles from the main stem are willing to produce flower buds, and there is only one main stem and one growing point at the apex of the stem. In other words, a high level of flower production can only be sustained by strong and vigorous stem growth. And sure enough, in the following months, things started to go downhill again – which is not a bad thing, if the plant can rest and recuperate properly.



About a month later, the ex-graft GBald produced a display of four flowers.  
(April 2021)



Side profile of the GBald on the same day. There is a lot of shrinking going on and I hesitate to call this a healthy plant.

But it managed to produce 10 flowers in two months – a pace that is unsustainable.  
(April 2021)



## Slowing Down and the Return of Poor Stamens



Stem growth has probably slowed down, leading to two flowers in early May 2021.



In late May 2021, there was a single flower open, with rather poor-looking stamens making an appearance again. The petals were also quite sloppy for a GBald flower open on its *second* day. This flower lasted only 4 days – a poor show.



With two flowers in early June 2021. Flowers are now “spaced out”, or further apart in age – there is an old flower, a new flower, and a flower bud.



A month later, early July 2021. Not too shabby. The stamens are not great.



There was a slight uptick in activity in August 2021, when the ex-graft GBald managed to push out 3 flowers at nearly the same time. Some of the stamens are a little thin. The growing point of the stem (orange arrow) looks a little constricted and lack new spines – the apex is not growing particularly well.

The ex-graft GBald mostly plodded along throughout the second half of 2021. Flower production was steady, but at a slow pace with flower buds that are far apart in age. There is no part of the specimen that looks like a new stem; most of the stem look well-worn with scars here and there. Apex growth is particularly weak.

It's almost like the GBald wants to go dormant but could not do so because of the weather. Instead, it is plodding along with fewer resources. GBalds do not appear to have strong dormancy behaviour. What about conducting experiments such as the resting experiments done with *Parodia* specimens? Well, I am rather leery about trying dormancy experiments with GBalds – weakening old stems further look like a very risky thing to do. Weak GBald stems will not survive if bugs get inside the stem. And so I would rather keep these GBalds plodding along in the urban tropics.



The ex-graft GBald with one flower open near the end of September 2021. There is now a prominent sunken section on the main stem (orange arrow). There are more scars too, probably due to bug damage.

Now, you may look at the picture and think that the flower looks reasonably healthy and the presence of two more buds indicates that the specimen is doing well. Nope: This flower was not very large because it was open on its third day, but the next day it dried up. The two buds later led to flowers that lasted five days each.

In September and October 2021, no flower lasted more than five days. Two flowers lasted only three days. For most of this period, this old GBald managed to sustain only one flower at a time. In addition, it has been doing some shrinking here and there (see the picture above.)

Subjectively, the ex-graft GBald is doing better at “plodding along” than last year; this may be due to more frequent sprays of fortified water, hence the specimen got better nutrition. From November 2021, I have added a silicon fertilizer in the usual fortified water sprays as an experiment to help old GBald stems (such as this one) improve disease resistance.

I don't think the old main stem is going to rejuvenate itself, so it's time to do some propagation work. It's a great specimen after all – it has probably produced more than 200 flowers by now. ♦

## Version Information

This is the December 2021 Edition of this document.

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