

Achlorophyllous *Mammillaria grahamii* in Tempe, Arizona

For approximately 40 years, grafted cacti lacking chlorophyll, especially from the genus *Gymnocalycium*, have been extraordinarily popular in the horticultural trade. With their flaming orange and dark red epidermis, these are some of the most striking of plants. Typically, the green of chlorophyll masks the vibrant betalins, but not in these achlorophyllous gems. This is why autumn foliage is so striking in so much of northeast North America, albeit there the chlorophyll decays to let us see anthocyanins rather than betalins. The horticultural industry, especially out of Japan, has introduced many more such brilliantly colored cacti lacking chlorophyll in the past four decades. Large batches of seeds are planted, and those seedlings lacking chlorophyll are quickly grafted before the nutrients stored in their endosperm and other tissues are expended. Offsetting clones allow for mass-production, and such plants can be purchased for about \$2 at Home Depot—totally expendable novelties.

What is striking is that we rarely see reports of such cacti without chlorophyll in the wild. Yet, this should not be that unusual insofar as branching cacti show a fair number of somatic mutations, chimeras, and somoclonal variations. I found one such orange-red stem on a clump of *Mammillaria grahamii* on Hayden Butte (“A Mountain”) in downtown Tempe, Arizona.

It is not obvious from the picture (or in person for that matter) how many different clones this clump was derived from. Of the dozen or more stems (some of which are not

shown), several branches appear to be grouped very closely together, including the orange-red stem. Others appear to be separate, but this could be due to the death of intermediate heads. The orange-red stem may even be its own separate clone, since it does have chlorophyll on the lower portion of the stem. that would allow it to survive on its own. A genetic analysis would probably be needed to determine how many seeds this clump was derived from.

Ferocactus cylindraceus





Note that the orange-red portion of the stem is relatively depauperate of spines. Does the dearth of spines cause the lack of chlorophyll due to intense sunlight killing the chloroplasts? Is the lack of chlorophyll the cause of the lack of spines, due to this stem not producing sufficient nutrients to grow a healthy areole? Are both the lack of chlorophyll and relative lack of spines both due

▲ This magnificent *Mammillaria grahamii* clump has one stem that lacks chlorophyll, revealing the underlying betalains that give the red coloration.

◀ Achlorophyllous stem of *Mammillaria grahamii*. Is this stem attached to the rest in the clump, or does it survive on its own?

to a common developmental abnormality? I have no idea which of these alternatives explains the morphology of this plant.

This orange-red *Mammillaria grahamii* was found, literally, in the middle of downtown Tempe, a densely populated suburban area. Hayden Butte is surrounded on four sides by large scale development: to the east by an enormous football stadium; to the south by the police department, city hall and a hotel; to the west by a recently homogenized downtown strip ("modernized" for a recent Super Bowl game); and to the north by new office complexes, a highway and an artificial lake that was built from a clay liner and two dams in the Rio Salado, but with water pumped in from the Colorado River. Nonetheless, the 125 m tall Hayden Butte has been recently designated a city nature reserve (although probably as an excuse to throw the resident homeless population and beer-drinking teenagers off of the butte). Hopefully having the Tempe Police Department Headquarters



The view looking north from Hayden Butte. The near set of hills are the Papago Buttes, where the Desert Botanical Garden and Phoenix Zoo are located; to the right is Camelback Mountain. All photos were taken by the author on Hayden Butte, 7–8 May 2005.

right underneath the orange-red achlorophyllous *Mammillaria grahamii* will help preserve this magnificent plant in its native setting.

Despite the development and heavy traffic on Hayden Butte, some very nice plants reside on its south-facing side, including several other species of cacti. A healthy population of *Ferocactus cylindraceus* clings to the steeper rocks, including some beautiful looking seedlings. *Mammillaria grahamii* abounds, being found under most Creosote plants (*Larrea tridentata*), except at the bottom of Tempe Butte. There are many clumps of *Echinocereus engelmannii* and *Cylindropuntia*

acanthocarpa, and there also appears to be a single clone of a relatively spineless, and thus very green-skinned, *Cylindropuntia fulgida* descending down from the water tanks. There appear to be several plants of *C. fulgida* here, but they are all localized to a single drainage and are probably all the same clone. Surprisingly, there are no saguaros (*Carnegiea gigantea*) on Hayden Butte, even though there are numerous saguaros a hundred meters to the east on the hill at the opposite side of the football stadium.

Recently the city's park service opted to plant non-native cacti on Hayden Butte, including *Austrocylindropuntia subulata*, *Opuntia ficus-indica* and *Stenocereus pruinosus*. The good news is that these plants seem to be dying. If one can ignore all the human development, including the fact that planes from Sky Harbor Airport fly right over Hayden Butte, this is a magnificent spot—walking distance from downtown Tempe, Arizona State University, the Phoenix Zoo and the Desert Botanical Garden. ♦



▲ *Ferocactus cylindraceus*, *Mammillaria grahamii*, *Cylindropuntia acanthocarpa* and *Larrea tridentata* grow on Hayden Butte right in the middle of downtown Tempe, Arizona.

► *Echinocereus engelmannii* growing under *Larrea tridentata*.

