Central Spine
NEWSLETTER OF THE
CENTRAL ARIZONA CACTUS AND SUCCULENT SOCIETY

PRESIDENT'S MESSAGE

By Chris Ginkel

As I sit here at my computer writing this, I realize that most of my thoughts are focused on all of you. I wonder how each one of you is faring during this crisis. My thoughts and prayers are that all of you and your families are safe and healthy. I long for the time where we can all connect in person at our meetings.

I constantly monitor the situation by checking the websites of the CDC and the Arizona Department of Health Services. I also watch for updates from the Governor's Office of Arizona. Our next general meeting is tentatively scheduled for May 31 with Jason Wiley presenting *The Desert Moonlight Garden*. There will need to be much improvement in the current Covid-19 crisis in order for us to have that meeting, I am hopeful that soon we will see the light at the end of the tunnel.

In the meantime, I pass much of my "social distancing" time tending to my potted plants and those planted in the ground in my garden. I use the time with my plants as a form of meditation. I wander through my garden stopping to gaze in wonder at each and every plant. I study every detail as if each plant was an art masterpiece. To me they all are. I find this time alone with my plants very healing and calming for my soul. I hope that during these troubled times that all of you can find joys in the simple things in life. I look forward to seeing each one of your smiling faces when we can all get together again.

Mammillaria spinosissima by Erik Van Dessel.

MAMMILLARIA (MAMILLOPSIS) SENILIS

By Elton Roberts

Photo by Sue Hakala

Elton has been designated a master grower by the Cactus and Succulent Society of America. The article is reprinted here with his permission.

Mamillopsis senilis or *Mammillaria senilis* (whichever one you want to call it) is one of the most popular and widespread mamms in cultivation. I think that, like most cactus, it comes and goes in fashion. It seems like plants go in popularity in cycles of anywhere from 10 years to as long as 25 years. I think that one thing that helps bring about this

cycle is wholesale growers. They throw on to the market 100,000 of a plant, and if that plant is not too hard to grow, people will have it for years before it dies and needs to be replaced. In the meantime, the plant can seldom be found for sale. About 10 years

ago, *M. senilis* was a hot item. Now you seldom see the plant on sale benches. It is the same with *M. plumosa*.

The plant is one of those that takes hold of you and does not want to let go. I have seen several women who wore sweaters to a cactus nursery walking around with hooked-spined mamms hanging from the sweater. It is easier to dislodge one of these from your fingers than to remove it from a sweater.

The flower color is variable from an orange-red, to a deep red, to yellowish white and is adapted to pollination by hummingbirds. This was one of the original reasons for creating the genus *Mamillopsis*.

M. senilis is widespread in the Sierra Madre Occidental mountains of Mexico at an elevation from 7,000-9,200 feet, so the plants can take quite a bit of cold. Plants are sometimes covered with snow in winter. If dry, the plants can take temperatures to 10F.

For those who live where the winter temperatures dip into the upper 20s only a time or two, you can get by with giving a light drink. Being from high altitudes, the plant is forming buds for early spring blooming and the drink helps. In the heat of summer, use caution watering as the plant goes dormant.

I know a lot of collectors who have killed the plant in the summer and wanted to know why. When plants are dormant, be it in the winter or summer, they do not need to be watered.

If you want to keep your plant happy, make sure that you keep the soil acidic; 1 tablespoon of white vinegar to 5 gallons of water. To keep the dense spination, give as much light as you can. It can form large clumps.

Name of Plant: *Echinocereus bonkerae*

Grown by: Ronald Souder

Purchased: I purchased it at Shady Way Nursery approximately eight years ago.

Pots: This plant is grown in the ground.

Fertilizer: Arizona's Best dry granular palm tree fertilizer, 10-5-10, once a year in March. I sprinkle a small amount manually around the plant.

Potting medium: I typically mix the potting medium the plant came in with native dirt excavated from the hole dug for the plant. I try to remove dirt from the roots before planting. After placing, I pat the dirt down to secure the plant.

Sun exposure: This plant receives all day full sun with a southern exposure.

Watering: I water from a hose 4 or 5 times a year in the drier, hotter months. Otherwise it gets just rain and sunshine.

Frost protection: Everything in my yard is survival of the fittest. I do not provide sunshade or frost protection to any of my plants.

HOW'D YOU GROW THAT PLANT? By Michelle Schrade

Name of Plant: *Gymnocalycium bruchii*

Grown by: Michelle Schrade

Purchased: I won it at a CACSS auction around five years ago.

Pots: Currently planted in an eight inch deep terra cotta pot.

Fertilizer: I use the club fertilizer during the growing season. I fertilize irregularly, but this year I have a more precise methodology.

Potting medium: I use 50% cactus potting soil mixed with 50% pumice. I always have buckets of the club pumice on hand.

Sun exposure: In winter it gets all day sun, and in late spring/summer I move it to the patio where it gets morning sun and afternoon shade.

Watering: I water this plant only when dry. I use a moisture meter on this one since it is in such a deep pot to prevent rot.

Frost protection: None needed.

A special thank you to Michelle for volunteering to write these two articles. With no show award winners this year to feature in the newsletter, I'll be asking club members throughout the year to tell us how they grow a special plant. To feature yours, contact Editor Sue Hakala at cacsscentralspine@gmail.com.

BREAKING DORMANCY

By Kim Andrews

Dormancy is a natural temporary period of arrested growth, not a complete shutdown of metabolic processes. An organism dies without cellular maintenance. During dormancy, plants prepare their soft tissues for changes in temperature, light and water for the purpose of conserving energy until better conditions exist. Through evolution, dormancy has become an essential part of their life cycle, allowing it to pass through critical environmental difficulties with minimal impact on the organism itself.

Plants react to the environmental signals of temperature changes, daylight to night ratios and water fluctuations to transition physiologically into dormancy. Predictive dormancy occurs when a plant enters a dormant phase before the onset of adverse conditions. Consequential dormancy occurs when a plant enters a dormant phase after adverse conditions exist that may lead to damage or death. Plants growing in the ground usually experience steadily increasing or decreasing temperatures and light over time. A plant tracks the differences in the amount of daylight over time by producing a chemical, only at night, that accumulates and is consumed when the plant senses light. The concentration of this chemical is dependent on the length of darkness. When it reaches a specific threshold, other processes are triggered.

Unlike deciduous plants, there are few visual indicators of dormancy in succulents. However, the external factors that trigger dormancy in most plants are also happening in succulents. During this period of slow growth, the plant slows its metabolic processes, including respiration and photosynthesis. Those surviving lower temperatures alter their cytoplasm to be more resistant to freezing. Meristems, where new growth occurs, do not receive the internal signals to divide their cells to form new tissue. For some succulents, dormancy affects their ability to reproduce. For example, many barrel cactus require exposure to colder temperatures and reduced light to flower.

Gardeners and plant collectors, attracted to non-native plants, create artificial environments for their plants' continual growth, or may force them into dormancy in order to protect them. In order to do this, we manipulate the same environmental signals of temperature changes, daylight to night ratios and water fluctuations to transition the plants physiologically into dormancy. We use our tools of thermometers, calendars, greenhouses, grow lights, heaters, and tips from other successful growers. For plants not permitted to go into dormancy that require it for reproduction, we use vegetative methods.

Dormant plants are not actively growing, just slowly surviving. They need less of everything, but they still need some light and water. Too low of light risks the loss of color and etiolation that is irreversible. Light in the winter is generally less intense, less powerful allowing some plants to enjoy a brighter spot than they would during summer. Water SIGNIFICANTLY LESS and reduce the frequency. If you are new to succulents, using a water meter will show the plant is using much less water than it did when it was actively growing.

Plants experience two phases of dormancy. Triggered by short days and low temperatures, endodormancy occurs first to inhibit plant growth even under good, warm growing conditions. Ecodormancy occurs when the plant is ready to grow, but the environmental conditions are not right, usually too cold. Once plants start to grow, they lose the ability to quickly readjust to colder temperatures. A slow progression of metabolic activity increases when the plant begins to grow as the temperatures slowly rise. Plants are easily affected by an unseasonably warm spell causing them to break dormancy and start actively growing, often being damaged or killed when the weather turns cold again.

With our days getting longer at this time of year, we all get spring fever tempting us to work with our plants and to buy more. We watch the weather forecasts to be ready with our frost cloth or to move our plants to safety. When is it the correct time to bring our plants out of dormancy? Plants in the ground naturally transition between their lowest survival temperature and their lowest optimal growth temperature. Knowing these temperatures for our plants is important. These temperatures are not the same for all species.

Nature brings its plants out of dormancy by gradually changing the temperatures and daylight length. Our role as a gardener or plant collector is to provide a controlled environment for non-native plants where we gradually change the environment to avoid shocking our plants. Abrupt changes can create a stressful environment for plants that may rot by overwatering or sunburn by too much sunlight. When moving a plant, initially place it where it will be protected from full sun, wind and rain.

TIPS FOR CHANGING A PLANT'S ENVIRONMENT

LIGHT Gradually increase the light intensity the plant receives to avoid sunburn. Increasing the sun exposure over a few weeks gives it time to adjust. If it is not warm enough to move the plants outside, increasing the sunlight inside is their first cue to start waking up. Plant growth made during the winter months may be weak causing those portions to decline when in its appropriate sun location. This reaction is normal and pruning may be necessary.

WATER When plants are dormant and the weather is rainy, protect outdoor plants from too much moisture. If water was withheld during dormancy to prevent rot, give the plant time to awaken some before watering. Gradually increase the amount of water provided. When the plant starts to put on new growth, water as you normally would. A light dose of fertilizer may be provided at this time. Make sure the soil is draining well.

TEMPERATURE When an actively growing plant is moved outside too early, the temperature difference may be too great, especially at night, because it has not gradually prepared for the lower temperatures. Monitoring the night temperature is required. Be prepared to move the plant back inside to protect it from getting too cold.

Plants may be lost when an unseasonably warm spell causes the plants to break dormancy and then returns to cold temperatures.

REPOTTING If it is the beginning of the growing season for a plant, then it is a good time to repot it and to inspect its roots. After an initial watering to settle the soil around the roots, no further water should be applied until the plant is actively growing.

Depending on the plant, it can take weeks for plants to come out of dormancy. Do not feel bad if a dormant plant never wakes up. It is frustrating, but it happens to the best of us, even though we took all the precautions. It requires planning and work to overwinter dormant plants and wake them up in the spring, but it is worth it.

ALOE DICHOTOMA

By Bob Torrest

A member asks: What's the best way to root an *Aloe dichotoma* that has had an arm break off?

The best way to root an *Aloe dichotoma* is to make a clean cut on the broken end with a sharp, sterile knife. Give it several days to callus over. Plant in a good enriched but well drained soil. Then be patient.

SHE'S YOUR BABY NOW

Photos and Text by Eric Lundberg

When I retired in 2016 from my career as a wholesale nurseryman in Pennsylvania and moved to Arizona, I was certain I was done with growing plants. The plan was to spend time doing other things; playing my French horn and woodworking, hobbies which I had longed to do but never had the time. We built a new home in the north part of Phoenix metro. My intention was to put in a handful of cacti and succulents, a couple of boulders and be done with it. Ha! My first summer here, I visited a neighbor nearby who has covered over an acre with containerized cacti and succulents (so many that you have to walk on narrow paths between thousands of plants). The place reminds me of the homes you see on the reality TV hoarder shows. It was fabulous, The owner was informative and knowledgeable, and most of all, I fell in love with these amazing plants. I filled the trailer and headed home.

As I unloaded the trailer, I realized that even though I had spent my life growing nursery stock, I was virtually clueless about these plants. I did not know many of their names, where to place them, how large they would become, how to plant them, or how to care for them. In the ensuing months, I accumulated more plants from many different nurseries and box stores, maiming and killing more of them than I ever expected. I soon learned that one of the most daunting challenges of cactus and succulent growing is taking ownership of a new plant. I will share here some things I have learned about how to acquire and become the caregiver of cacti and succulents.

Left, front walk in August 2017, and right, front walk in February 2020.

Before one purchases any plant, it is mandatory to know if the species can thrive, or at least survive, in your locality. The main cause for failure, in my experience, has been from buying plants that no matter what I did, the plants could not take our heat and were ones that I never should have purchased. Never assume that because a plant is offered for sale locally it will survive here. It could have been grown elsewhere in a totally different climate. I have learned to not always trust the tag information, especially

for winter hardiness and tolerance to full sun. Full sun means different things in different places. If you do not know for sure, do a little research before buying. I use Google mostly, but have been helped immensely by asking on various Facebook groups, especially the CentralArizonaCactus group. I often use the search engine on the group's page to read up on past conversations. If you are contemplating purchasing a plant you have never seen growing in the area you live, be especially careful before putting money on the counter. There is probably a very good reason other people have not been successful in growing that species. What follows is based on the premise that the plants being discussed are suited to grow well in the Phoenix, Arizona metropolitan area.

When a person visits a medical provider for the first time, they are required to fill out many pages of medical history and information. To prescribe proper personalized care, it is critical for the doctor to be fully informed about your unique medical conditions. In like fashion, you will be a better care provider for a plant if you have some idea of its history. Sometimes, albeit rarely, the person giving or selling you a plant can share pertinent information about the specimen. More often, you need to be able to figure out the prior care of your new "baby" plant on your own.

There is much similarity between a plant nursery and a nursery for babies. Both provide what is needed for the sustenance, health and growth of their wards. Plant nurseries and baby nurseries serve essentially the same function; to prepare them to be somewhere else. Just as a good parent taking a baby home from the hospital nursery will do all they can to make the transition as smooth as possible, best results will be achieved when the same is done for a plant.

There are many kinds of nurseries, each having a unique system for growing plants. One could purchase the exact same species from five different places, and even though genetically identical, each might need to be treated differently to achieve optimum results. Abrupt changes in the care it receives can kill a plant or result in an irreparably peculiar looking one. A common sight here are transplanted saguaros which have extremely narrow tops, a tiny fraction of the diameter below. This clearly indicates the point when it was transplanted. Such damage is understandable with these difficult to transplant giants.

A tiny plant can show similar misshapenness if it is suddenly given poorer care than before. The new growth may become narrow and off-color if moved from high light to low light. Similar morphology may result from a drastic reduction in fertility. Conversely, drastically improving the conditions of a cactus can result in correct morphology perched atop permanently damaged tissue.

Left, a Saguaro with severely narrow tops. This damage is permanent. Columnar cactus that has improved since planting. The scarred part below the healthy top will never look proper.

It is necessary to sidetrack a moment to point out an often misunderstood fact about plants. Unlike animals, plants possess absolutely no capability to replace damaged tissue. While a finger cut may completely disappear, plants cannot do likewise. Some plants can seal off a wound by “compartmentalization” where special tough tissue forms at the edges of wounds to prevent spread of opportunistic diseases from the wound area to healthy tissue. This process is used to advantage when rooting cuttings. Thus, the well-known practice of allowing cuttings to “callous” for a week or more before planting. This includes not only tissue damaged by mechanical injury, but also damage caused by extremely poor growing conditions. Knowing that malformed tissue will never be brought back to normal may dissuade one from purchasing a “fixer-upper” from the discount rack.

Nurseries are in the business of growing plants to the point where they can be presented for sale. To stay profitable, or at least to stay in business, many successful nurseries, particularly the large wholesalers, strive to grow their plants quickly and economically. They push their plants using environments and practices most conducive to rapid growth. On the other end are nurseries that offer “hard-grown” plants. These are plants that have not been babied (the dual meaning of nursery again) by the grower as much as the aforementioned nurseries do. Naturally, there are growers in between these two extremes, resulting in a spectrum of possibilities.

When you know the environment and culture a plant received up to the time you take over, you can duplicate those conditions, putting the odds more in your favor to be rewarded for many years with a beautiful specimen. Generally, locally-grown plants are easier to transition to your care, as they are already used to our harsh conditions. It should be easy to figure out if a plant has been grown locally. Start by simply asking an employee where the plant was grown. If the answer does not suffice, it is time to play Sherlock Holmes. If every plant there is up for sale, it is very probable their stock was grown elsewhere. A nursery that grows its own plants will have a production area with smaller ones that are not yet ready to be sold. While it is entirely possible that a retail nursery is supplied strictly by locally-grown plants, there is a good chance they are offering plants from distant places. Most likely, it is a combination of the two.

Plants grown outside of Phoenix metro are usually more delicate and not accustomed to the bright sun and heat of central Arizona. Such plants need extra attention in order to successfully transition to their new homes. Often, it is possible to tell by reading the label to find the name and location of the grower. Pampered plants tend to have a darker color than you might expect. They almost look too healthy! Uniformity in appearance among the individuals offered usually means they were produced by a large grower.

Extreme example of decomposed potting media.

A sign that the plant was pampered and grown quickly is if the potting mix is still near the top of the pot. This indicates that it has not been in the pot very long, since organic medias tend to settle noticeably as they decompose over time. See the pictures of a pot of three *Beaucarnia recurvata* for an extreme example of plants that have been in a pot for a very long time, as evidenced by decomposed potting soil. (I also deduced by this particular experience that this species can use more water than I previously thought.) Most cacti and succulents would have died in such conditions. If the watering practices and media seem much more wet than you would consider desirable, it is very possible chemical disease-preventing drenches were used to reduce the chance of infection. These drenches are used to compensate for the excessive watering and low media porosity. Unless you want to practice

Same plant six months after re-potting.

chemical drenching, you need to make some changes. Moving the plant to better drainage and weaning it slowly to less frequent waterings can eliminate the need for the chemical drenches it may have received prior to your ownership. By providing the best possible drainage, either by using a potting mix that drains rapidly or by ensuring a plant placed in the ground has superb drainage, it can handle more frequent watering during the transition, with the goal of being a true desert plant, one that requires less watering.

Whether the plant was pampered or hard-grown, the pot and media you receive with the plant has probably fulfilled its purpose, which was to get it to market. It may last a while longer in the original media, but I almost always repot or plant my new purchases promptly. I remove the old media when planting because, if left on the root system, it will continue to decompose, eventually becoming extremely low in porosity at the worst place, around the crown of the plant. Low soil porosity is the ideal environment for rotting a plant. My potting mix contains 50% coarse pumice, 25% coconut coir, 25% bagged potting soil, resulting in a very fast-draining media. When planting in the yard, I dig a very large hole and add copious amounts of ¼" stone to the backfill.

Aloe x 'Hercules' showing burn from improper transitioning to full Phoenix sun.

Locally produced plants are generally easier to acclimate. I will never forget that first summer here, how my neighbors would drive slowly past my home, shaking their heads at the sight of a fool planting doomed plants in 100 plus degree weather. I was fortunate that even though I bought that first trailer load of plants on July 1, they all established and grew well. I planted nearly every one in July in my front yard, which is a full sun location. I am certain my success was largely because they were already acclimated to our harsh climate. They were "hard grown" plants. Had they been "pampered" plants, many would have died or been permanently disfigured.

If you are considering a plant you know grows well in full Phoenix sun, but suspect the plant was produced in lower light, possibly a shade house, it may need to be covered with shade cloth for the first summer or if potted, placed in a shaded location. The picture below is included to show what can happen by planting too late in the spring, then failing to shade on time. By the time I figured out it was not handling the sun, the damage was done. I did shade it, and I am sure it will be fine. But it will be years before it grows past the damage. Planting in the fall allows a plant time to acclimate on its own for the following summer. Knowing this, I

am more inclined to purchase pampered plants in autumn and winter, knowing they will gradually adapt to the harsh conditions over the months leading to summer.

Nearly every nursery has a fertility program, so the plant you bought has almost certainly received supplemental fertilizer. There is a good chance it has been receiving more fertilizer than it ever would in nature. To keep its appearance, the addition of fertilizer after purchase may be warranted. See my article *Feed Me* in the October 2019 *Central Spine* for ideas about home fertility programs for cacti and succulents (found on the website).

One last thing to consider in transitioning a plant from nursery care to your care is watering practices. Pampered nursery grown plants have been watered more frequently than they would be if hard grown. They also have received more water than one would consider to be appropriate for an established landscape plant. It is a risky decision to use a "sink or swim" approach in teaching the plant to behave like a proper desert plant. Do your best to first duplicate the watering care your plant received at the nursery, weaning it slowly over months to make it satisfied with its new conditions.

I adhere to the practice of not watering for a week after transplanting to allow damaged roots time to heal, thus preventing disease entry. Thereafter, especially with pampered plants in the summer, I am not afraid to water again when the soil had dried. I use a moisture meter to determine if the soil is dry, with one caveat. The probes of the meter should never be inserted in a manner that would damage roots. Never use a moisture meter on fleshy-rooted plants such as *Adenium.*

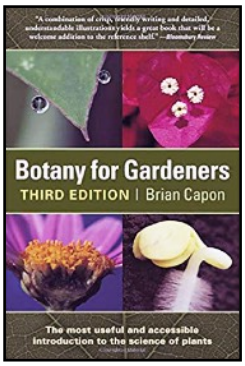
Growing plants can be infinitely rewarding, yet infinitely confounding as well. Perhaps no other experience frustrates plant lovers more than acquiring a gorgeous plant, then watching it slowly degrade into an unsightly mess. I hope some of the ideas shared in this article can help reduce the problems with taking over ownership of plants.

To summarize: Make certain the plant has the possibility to thrive at your location. Determine what kind of care it has received prior to your ownership. Determine what kind of care it should and can receive in your care. Make the changes slowly, allowing the plant plenty of time to adjust to its new home, your beautiful garden.

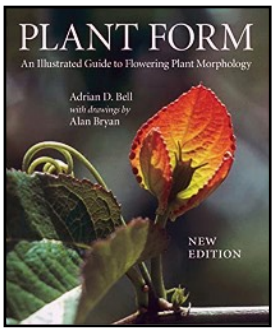
Be sure to visit CACSS on the web at:
centralarizonacactus.org the Society's website
Facebook centralarizonacactus
CACSS Swap and Shop, and Instagram.

Many of us have books on how to grow and care for cactus or old-world succulents. If you haven't yet, please take advantage of the extensive and diverse CACSS library (the librarians are smart, helpful and patient to boot!). Most sources agree that horticulture focuses on the knowledge needed to grow plants, while botany focuses on how plants work from a scientific perspective. There is a large overlap between the two topics, which is why it may be fun to read at least one book targeted toward botany. I have read four of them recently and provide a review below in the hope that you find one of interest.

Key for ratings (1-5 stars):
- Accessibility: writing style, clarity, ease of comprehension
- Reference-able: breadth of index, topic organization, ability to find information quickly
- Science Depth: orientation to a lay person (1 star) versus depth of scientific detail (5 stars)
- Illustrations: visualization quality, annotations, relation to text



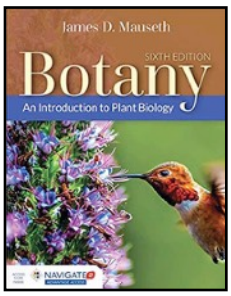
Botany for Gardeners by Brian Capon (2005) Timber Press
The title describes the contents very well. The writing style is clear, simple and geared toward someone who knows a bit of horticulture and wants a taste for "how" plants grow. The section on Adaptations for Protection states, "Spines are modified leaves or parts of leaves, such as projections from the margins of blades. For example, some cactus spines are evolutionary remnants of rigid petioles and midribs, well sharpened for protective purposes." Unfortunately, petiole is defined forty pages prior.
Accessibility: 4 stars. You can almost read it for pleasure and not strain the brain.
Reference Source: 3 stars. A search in the index for "petiole" provides the page number but you must scan through the text to find the definition.
Science Depth: 3 stars. The science is solid, but the author weighs heavily in favor of readability over technical depth.
Illustrations: 3 stars. Most are simple and clear but could use direct annotation (arrows or circles for "look right here").



Plant Form: An Illustrated Guide to Flowering Plant Morphology by Adrian D. Bell (2008) Timber Press
There are many branches of botany including cytology, paleobotany, epigenetics, etc. This book focuses on morphology which is the study of the external features of plants. In reference to certain cacti with flat leaves (e.g., *Epiphyllum crenatum*, the orchid cactus) the author states, "Phylloclades can be recognized by the presence of scale leaves or scars where temporary leaves have fallen off. In the case of phylloclade-bearing cacti, the leaf

and bud site is marked by an areole." This very scientifically-oriented book is detailed and requires both stamina and commitment to complete all 431 pages.
Accessibility: 2 stars. Clearly geared to those who wish to use botanical terms with precision.
Reference Source: 5 stars. It is painstakingly referenced and it's easy to get lost in it by tracing terms found on one page to another, and then another.
Science Depth: 4 stars. The book is very detailed but covers only one branch of botany.
Illustrations: 5 stars. Most topics have both pictures of plants and line drawn illustrations making the topic of the text quite clear.

Flora: Inside the Secret World of Plants by the Smithsonian (2018) Penguin Random House
A stunningly beautiful book that can grace any coffee table. The text is simple and direct, but the gem of this work is in the illustrations, photographs and reprints of art. An inset on a page about waxy leaves states: "Waxy cuticles are made of water-resistant chemical compounds. These help to prevent water from evaporating from the leaf while also providing some protection against fungi and bacteria." Notice that the chemical compounds are not identified.
Accessibility: 4 stars. With the focus on illustrations the text is brief, direct and very clear.
Reference Source: 3 stars. There is a lot of information but much of it is horticulturally related.
Science Depth: 2 stars. A high-level explanation for the CAM cycle of photosynthesis is provided, but a reference to the role of potassium states only that "potassium encourages flowering."
Illustrations: 5 stars. Hands down one of the loveliest books I own.



Botany: An Introduction to Plant Biology by James D. Mauseth (2017) Jones and Bartlett Learning
This is a highly rated college textbook. I must say that reading other texts first have made this more accessible. Here's a caption from an image in the section on the CAM cycle of photosynthesis, "Photosynthetic cells of CAM plants have large vacuoles, which permits the accumulation of C4 acids. These are cortex cells, arranged in palisades, similar to leaf palisade mesophyll." After reading this, you'll never look at plants the same way again.
Accessibility: 4 stars. It's written to teach so although it's dense, the writing style is purposely clear and precise.
Reference Source: 5 stars. As expected for a textbook.
Science Depth: 5 stars. You can geek out to your heart's content.
Illustrations: 4 stars. You will have to flip between pages to read the text in context of the image.

CACSS FACEBOOK PAGE

By Michelle Schrade

The month of March was a challenging one for our club. As a result of the COVID-19 pandemic, the annual CACSS Show and Sale at the Desert Botanical Garden was cancelled. This event is the highlight of our calendar year and a huge fundraiser for our club. Much hard work and time went into its planning. Members were disappointed at the lost opportunity to show plants, purchase plants and talk plants with their friends and fellow club members.

Social media became an outlet for us to use as a venue for highlighting plants we planned on entering in the show. Photos and videos filled our Facebook page of members' spectacular cactus and gardens. Most of us are gardeners at heart and quickly saw the situation as an opportunity to spend extra time in our "happy place."

Each month a photo of a cactus and succulent posted by FB members is selected for recognition.

Left, Succulent of the Month: *Echeveria* posted March 12 by Barbara O'Connor.

Cactus of the Month: *Trichocereus* hybrid 'Firecracker' posted March 26 by Sue Hakala.

Post with Most Likes: *Salvaged Golden Barrel Cactus Cluster* posted March 6 by Hobie Laurent with a record 620 likes.

COOPERATIVE EXTENSION FOR MARICOPA COUNTY
FREE PUBLICATIONS Website: cals.arizona.edu

This is a great source for all kinds of information related to gardening. Find science-based information from the University of Arizona on topics such as:

- how to transplant a cactus
- frost protection
- citrus fertilization
- care of desert adapted plants
- problems and pests of *Agave*, *Aloe*, cactus and *Yucca*
- damping off
- interior plants; selection and care
- aphids
- Arizona landscape plants
- vegetable gardening
- rainwater harvesting
- invasive wildlife
- and so much more

CACTUS & SUCCULENT REVIEW

Be sure to check out the March 2020 issue of this free, excellent online newsletter, produced by Editor Sheila Cude in London, England. This issue is filled with great articles on the plants listed below and more. Just remember, these plants are grown in EXTREMELY different conditions than we have here in the low desert.

- *Lachenalia* sp. South Africa bulbs
- *Bulbine* sp. South Africa bulbs
- *Oreocereus*
- *Pseudolithos horwoodii*
- *Conophytums*
- *Opuntias* grown in the U.S.

CSSA OFFICERS AND BOARD OF DIRECTORS 2020

Officers: President: **Chris Ginkel** 602-908-2664 chrisginkel@gail.com | Vice President: **Eric Holst** 480-786-2010 forex@cox.net | Secretary: **Heather Holst** 480.786.2010 heats@cox.net | Treasurer: **Judy Tolbert** 602-421-5290 tolbertjl10@gmail.com

Directors-at Large serving through December 2020: **Cindy Capek** 623-570-2069 cindycapek48@gmail.com | **Nick Diomede** 602-772-8282 nich.diomede@gmail.com | **Emily Glenn** 920.217.6681 glenneg13@gmail.com | **Barbara Macnider** 602-448-2954 zeneda@yahoo.com | **Cricket Peterson** 602-326-2604 | cricket7arizona@gmail.com

Directors-at Large serving through December 2021: **Tom Briggs** 480-510-2430 tcbriggsphx@gmail.com | **Pam Edsall** 623-810-2550 cygnetti@yahoo.com | **Russ Faust** 480-588-6613 faust224@hotmail.com | **Celeste Gornick** 602-548-8106 hheaven77@aol.com | **Jim Oravetz** 602.284.9854 | oravetz@cox.net | **Lois Schneberger** 480-948-8373 lschneberger40@gmail.com

CACSS PROGRAM AND COMMITTEE CHAIRS 2020

2020 Annual Sale Chair: Nick Diomede
2020 Annual Show Chair: Thom Young
Archivist/Historian: Lois Schneberger
Audit Committee: Mike Gallagher
CSSA Representative: Mike Gallagher
Donations: Jim Oravetz
Facebook Coordinators: Dan Smith, Thom Young, Chris Ginkel, Celeste Gornick, and Ken Luiten
Fertilizer Sales: Eric Holst
Holiday Party 2019: Sue Glenn
Librarians: Wendy Barrett, Nancy Mumpton
Mailed Newsletters: Sue Tyrrel
Keeping in Touch with Members: Jo Davis
Membership: Beth Kirkpatrick
Newsletter: Sue Hakala
2020 October Auction Chair: open
Plant Rescue: Lee Brownson
Private Plant Sales: Sue Tyrrel
Programs and Room Setup: Nick Diomede
Propagation Education Group (PEG): Tristan Davis
Pumice Sales: Gard Roper
Refreshments: Maggie and Amanda Hines
Website: Beth Kirkpatrick
Website Technical Assistance: Anna Rosa Lampis

SPECIALISTS TO CONTACT WITH QUESTIONS

Wendy Barrett wbarrett@cox.net
Nancy Mumpton
nancy.mumpton@gmail.com
Co-librarians for CACSS collection.

Nicky Davis
nicky.davis4@gmail.com
Manages the Seed Depot.

Tristan Davis 480-540-9540
minime8484@hotmail.com
Specializations include plant propagation, and heading PEG (Propagation Education Group).

Doug Dawson 480-893-1207
dawsonlithops@hotmail.com
Specializations include growing from seed, flora of Namibia, *Lithops*, other *Mesembs*, *Melocactus*, and miniature cacti and succulents of Arizona.

Mike Gallagher 602-942-8580
mgallagher26@cox.net
Specializations include *Aloes*, *Haworthias*, columnar cacti, and *Turbinicarpus*.

Chris Ginkel 602-908-2664
chrisginkel@gmail.com
Co-manages the Facebook page and CACSS Swap and Shop page.

Eric Holst 480-786-2010
heats@cox.net
Manages the fertilizer program.

Ken Luiten 520-780-2925
luit6987@gmail.com
Manages the Instagram page.

Dean Patrick 602-909-8530
desertpatrick@cox.net
Specializations in softwood stem-cuttings, plant division and seed starting, rooting cacti, *Agave* and *Aloe*.

Gard Roper 602-996-9745
Manages the pumice pile.

Dan Smith 480-981-9648
smithdans@outlet.com
Specializes in Adenium, raising *Adeniums* from seed, grafting and *Adenium* culture in general, and co-manages the Facebook page.

Bob Torrest 480-994-3868
roberts9114@msn.com
Specializations include desert landscaping, unusual (including rare fruit) trees and shrubs, *Aloes*, *Agaves*, and columnar cacti.

Sue Tyrrel 480-797-8952 or
styrrel@cox.net
Manages selling at meetings.

Thom Young 480-460-0782
te77@q.com
Co-manages the CACSS Facebook page, 2020 Annual Show Chair.

Beth Kirkpatrick 480-275-4833
bethalia@gmail.com website contact.
Anna Rosa Lampis provides technical support.

Send comments, suggestions and submissions to Editor Sue Hakala at cacsscentralspine@gmail.com