Cactus & Succulent Society of America

To The Point

Spring, 1st Quarter 2021

Hello 2021! It's a new year and the third issue of *To The Point*. A big thank you to everyone who has so generously contributed knowledge, articles and photos. We're hoping more of you will share with us in this new year. This is a member-driven publication - YOU make it special. Let us know if you have ideas or suggestions.

Remember CSSA Zoom Webinars are being scheduled every month with a variety of speakers and topics. Stay informed at:

CSSA Homepage.

← *Discocactus horstii* at Bob Barth's
Photo: Irwin Lightstone
↓ *Disocactus macranthus*
Photo: Ron Crain
See "Similiar Names" page 14

CSSA Calendar of Events 2021

Full details and updates at

CSSA Calendar

Seed Depot Addendum 2020-3

The Seed Depot is a service for CSSA members. Price: $1.25 apiece. Generally 20—25 seeds are included per packet, unless the list specifies otherwise. A number of items on this Addendum are available in small quantities, as indicated by the number in brackets. Please list substitutes, or they will be made at Director Sue Haffner's discretion. Recent Seed Depot donors include Doug Anderson, Russell Wagner, Leo Martin, Brian Kemble, Matt Opel, Dan Gale, Frank Breckenridge, Robert Savage and Liliana Cracraft. Many thanks to them. If you would like to donate seeds, don't hesitate to get in touch with me: sueh@mail.fresnostate.edu

Postage: U.S., $5.00 per order; Canada and other countries, $15.00. Payment must be made in U.S. currency—cash or money order—or check drawn on a U.S. bank (payable to CSSA Seed Depot.) California customers should add 7.25% sales tax on the seeds + postage total. Orders should be sent to: CSSA Seed Depot, 3015 Timmy Ave, Clovis CA 93612. You may also order by credit card from the secure CSSA site: http://cactusandsucculentsociety.org
For questions regarding the Seed Depot, email sueh@mail.fresnostate.edu.

319 *Acanthocalycium ferrari*
320 *Adenium obesum* 'Shada' [5]
321 *Adenium obesum* ssp *somalense* [5]
322 *Agave filifera* 'Compacta'
323 *Agave ovatifolia*
324 *Aloe plicatilis* [10]
325 *Aloe vaombe*
326 *Aylostera heliosa* ssp *condorensis* [10]
327 *Calibanus hookeri* [10]
328 *Carnegia gigantea*
329 *Cereus hildmannianus* fa. *cristata monstrosa*
330 *Cistanthe* sp. Chile (aff. *C. grandiflora*)
331 *Echinofossulocactus multicostatus* [10]
332 *Echinopsis* cv, 'Arizona Sunset'
333 *Echinopsis subdenudata*
334 *Glandulicactus crassihamatus*
335 *Lithops lesliei* 'Storm's Albingold'
336 *Lobivia haematacantha*
337 *Neobuxbaumia polylopha* [10]
338 *Notocactus crassigibbus*
339 *Pachypodium lamerei* fa. *fiherense* [10]
340 *Pelargonium crispidum* [10]
341 *Pelargonium dasycaulon* [5]
342 *Turbinicarpus horripilus* [5]
343 *Uebelmannia pectinifera* (green body) [10]

CSSA Memberships and Renewals Membership Benefits:

- Receive the *Cactus and Succulent Society Journal*, published four times annually, the only printed C&S Journal in the U.S.A.
- Participate in the CSSA Biennial International Convention.
- The 2021 CSSA convention will be held in Colorado Springs, CO
- Participate in CSSA's members-only Field Trips to native habitats of cacti and other succulents.
- Cactus and Succulent seeds available to members from the CSSA Seed Fund
- Support CSSA's mission to support the cactus and succulent community through education, conservation, scientific research, and research grants.

Click here to join TODAY.

San Diego Epiphyllum Society Celebrates Golden Jubilee - 50 Years!

Reprinted from Epi-News November 2020

November 2020 marks SDES's 50th anniversary, a milestone that few garden clubs achieve. We are proud of this! As a community of epi lovers and growers, we have encouraged many others to become interested in epies by creating an interchange of ideas on growing, displaying, and collecting epies and its related species.

We are a local group, but we also have members and friends scattered throughout the nation and the world.

Over the years we have done a lot. SDES has hosted six EpiCons starting with the first one in 1988. SDES has reached out to the community through garden events such as the SD County Fair in Del Mar, Sea World, San Diego Zoo and Safari Park, college garden fairs, Earth Day, and many others. Back in 1976 we (along with the SDZG horticulture director) created a unique display and collection at the San Diego Zoo Safari Park, which we continue to maintain and improve.

Over the years, we have held 50 flower shows, never missing a year. Even during the pandemic this year we adapted; SDES adjusted by holding meetings and programs online via Zoom. We also shifted and held a virtual flower show, sale, and photo contest. SDES is flexible and responsive because we are SDES. And because we are SDES, we have created friendships that have lasted over the decades. We love our epies and we value the relationships even more. Our passion for epies brings us together and the relationships we have built keeps us together.

These photos show a few plants from the hybridizers who have been members of SDES throughout its history. First, Richard Chadwick's *Epiphyllum* 'Fiesta Del Sol' (top) who was very knowledgeable and a big part of the work at the SD Safari Park. *Epiphyllum* 'Elinor Victoria Latimer' (second from top) by Richard G. Latimer, Sr., an early society member. *Epiphyllum* 'Jennifer Ann' (third from top) by George French — he hybridized almost 400 Epies and was influential throughout SDES's history as a founding member and 2nd President. *Epiphyllum* 'Mr. P.' by Don Patterson, who started out as the society's historian when George French was president in 1972.

Dr. Richard Walter (Dick) Kohlschreiber 1933 – 2020

Linda Sinkovic, Santa Cruz, CA

Laurel Woodley (left) and Dick Kohlschreiber (right) at the South Coast Botanic Garden Fall Plant Sale, October 2019.
Photo: Debra Bushweit Galliani

Dick Kohlschreiber was born in Topeka, Kansas and attended local schools. In 1957 he graduated from Kansas State University with a Doctorate in Veterinary Medicine. After a short stint in the Army, he moved to San Pedro, California where he worked as a veterinarian for 35 years.

A member of the Palos Verdes Peninsula Land Conservancy, Dick also belonged to many garden clubs, including the South Coast Cactus and Succulent Society, the Southern California Horticultural Society and the South Coast Dahlia Society. For more than 25 years he was Registration Chairman for the Epiphyllum Society of America. One of the founders of the South Bay Epiphyllum Society, he was also the editor of its newsletter *The Epi Gram.* His articles have been published in the CSSA Journal and in the EPIG Journal (Interessengemeinschaft Epiphytische Kakteen).

Dick was very involved with the South Coast Botanic Garden (SCBG) in Palos Verdes, CA. He was a Trustee member and President of the SCBG Foundation. For many years he supervised the volunteers at the Garden's propagation workshop. At the SCBG Plant Sales, he could be found answering questions at the 'Plant Guru' table.

Dick was generous, sharing his knowedge and time. In 2002 he received both the Volunteer of the Year Award from Los Angeles County and the Volunteer Service Award from the National Recreation and Parks Association for his service at SCBG. In 2005 the Epiphyllum Society of America presented him with the Founder's Award, in recognition of his lifetime work with epiphytic cactus species and hybrids.

Along with his interest in epiphytic cacti (especially *Schlumbergera* and *Rhipsalis*) Dick particularly enjoyed *Echeveria*. He filled his garden with plants from many trips to nurseries and botanic gardens.

He will be greatly missed.

Succulessence

A video by photographer Irwin Lightstone

https://www.dropbox.com/s/07ok4bnmbo5o9p2/My%20Movie%204.mp4?dl=0

Charles (Chuck) Littleton Hanson (1933-2019)

Charles (Chuck) J Staples, CSSA Fellow, Member & Historian of Mid-Iowa Cactus & Succulent Society (MICSS); Member & former historian of Cactus & Succulent Society of America (CSSA), Des Moines, Iowa

Chuck Hanson was a biologist, ecologist, naturalist and nurseryman. In 1960, he earned a Master of Zoology at Ohio State University, Columbus. After relocating to Tucson, AZ he founded and owned Arid Lands Greenhouses in 1978. A second Arid Lands opened in western Iowa and ran from 1995-2006. In Iowa, he specialized in propagation and releasing many rare and unusual succulent plants to the hobby — many first introductions to the world.

Chuck Hanson (left) with friends Neil Bohlman (center) and Mike Massara (right).
Photo: Dave Wolfe

Chuck explored and collected various succulent plants in nine trips to Africa and Madagascar. From 2006 he became interested in xeric epiphytic, lithophytic and terrestrial orchids, and moved to Ecuador in 2008 to study them in habitat. Chuck retired to Arizona in 2013 where he passed away on May 14, 2019.

Chuck served on the CSSA Board of Directors 1991–1998. He was honored with the prestigious CSSA Fellow Award in 2005 for explorer, author, lecturer, outstanding propagator of rare succulent plants and friend of CSSA.

Chuck Hanson was a congenial and interesting individual for all who had the opportunity to meet him. He was a friend to all and graciously shared with all his knowledge and expertise of succulent plants.

Stephania erecta

Kevin Martinson,

I have three *Stephania erectas* that have all flowered and subsequently developed foliage.

I have grown one in an unobstructed south facing window, one several feet from that same window (where it can "see the sky" but not receive direct sunlight), and one under a grow light. They do not need full sun but, in my experience, they cannot get too much of it indoors. The one directly in the south-facing window has grown the quickest over the years.

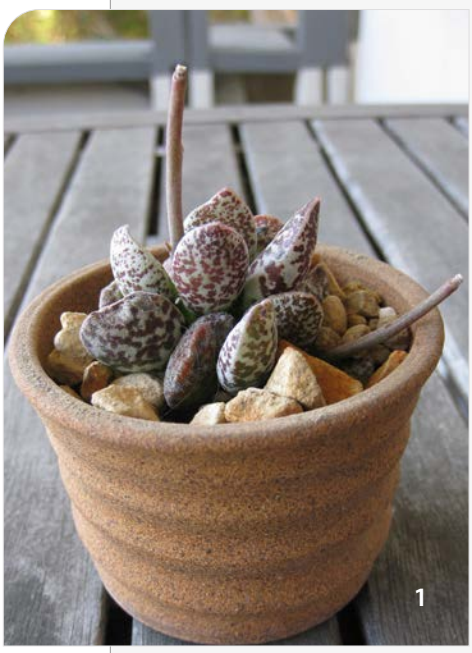
All three have done best when the potting medium was kept moist and not allowed to fully dry out. I do not use soil or compost in my mix at all but rather a very gritty bonsai soil composed of pumice, akedama/turface, and bark (small chunks of bark, not the huge pieces found in most commercial bagged orchid soils) and I water approximately every 5–7 days.

Of the three genus of *Stephania* I own, (*erecta*, *suberosa*, *venosa*), this one is by far the slowest grower. I had one that flowered then produced leaves over the course of 1.5 years while not having developed any root system at all. Very bizarre and fascinating plants.

Adromischus marianiae

Allen Clark, San Diego, CA

Reprinted from Espinas Y Flores, Newsletter of the San Diego Cactus and Succulent Society,November 2020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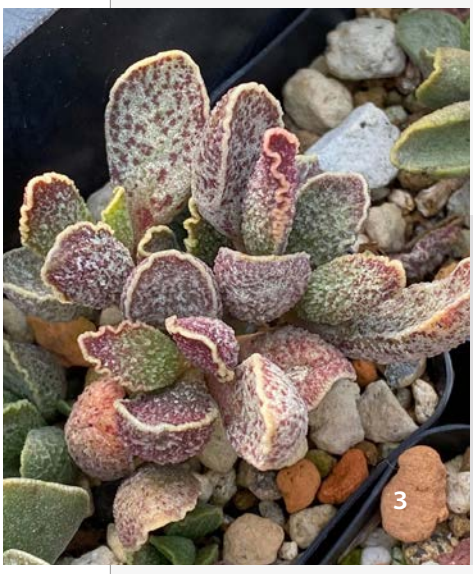
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Adromischus is a genus of succulents indigenous to the Western Cape of South Africa and southern Namibia. The habitat is desert with long periods of dry and fairly heavy seasonal rains. The plants often grow in crevices of rocky outcroppings, especially quartzite.

The genus was separated from the rest of the *Crassulaceae* by Tölken in 1978. He separated the species into five sections. The section which includes the most frequently-seen plants in our collections is Section 5. Perhaps the most popular species is *Adromischus marianiae*. That popularity comes with the price of bewilderment - due to the extreme variety of leaf forms which produce the definitive flowers that place the plant as one of the *A. marianiae*.

Frequently found in contemporary collections is *A. marianiae herrei*, characterized by warts and wrinkles. Color varies from green to brown to bright red to nearly black. Leaves vary in size from a fraction of an inch to several inches in length.

Other forms include *A. marianiae blosianus*, which has smooth leaves, usually rounded. *A. marianiae hallii* is another popular form, despite being one of the slowest-growing. The leaves vary from green to red, plain to densely spotted.

In terms of culture, these plants prefer a mineral-rich mix that drains well to prevent rot and pests that may move in. The addition of some perlite is helpful. Remember that they grow in crevices in habitat, where they get only a small amount of organic material. Their growing season begins in fall and goes through winter. Inflorescences of modest flowers appear in the spring and grow through summer into early fall. In Southern California, it is safe to water lightly the year round.


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Adromischus marianiae 'Bryan Makin' (1); *A. marianiae* alveolatus (2)
Photos: Allen Clark

A. marianiae hybrid (3) Photo: Mitch Hubbard

Adromischus marianae var. *Tanqua* with flower buds. Tanqua Karoo (4)
Photo: https://commons.wikimedia.org/wiki/

Adromischus marianae herrei at the botanical garden of Villa Durazzo-Pallavicini, Genova Pegli (5)
Photo: Hectonichus, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons File:Adromischus_marianae_-_Tanqua.jpg

Three Newly Named Succulent Species in 2020

Dr. Martin Cheek,
Senior Research Leader Kew Gardens
https://www.kew.org/read-and-watch/top-10-species-named-2020
December 17, 2020

New family to science: a strange, heat tolerant and scaly shrub...

A strange shrub was encountered by botanist Wessel Swanepoel in the semi-desert of southern Namibia in 2010. Wessel couldn't place the shrub in any known genus and when asking for further opinions, neither could anyone else. Wessel called on Kew's molecular expert Felix Forest and his team for analysis and results showed that the plant's DNA fitted the cabbage order, but none of the known families in this order. It was not just a new species, but a new genus and a new family named for 2020: *Tiganophyton karasense* (*Tiganophytaceae*). This is unique, as while around 2,000 plants are named new to science each year, new families are only published around once a year. The shrub has bizarre scaly leaves and grows in extremely hot natural salt pans, hence its name *Tiganophyton*, which was derived from the Latin 'Tigani' = frying pan, and 'Phyton' = plant. Fewer than 1,000 plants of the species are known to exist, from just three locations within a small area which experiences the highest temperatures in Namibia, 36°C, with only 4-6 inches of rain per year.

Say Aloe to two new succulents from Madagascar...

Two new species of *Aloe*, the genus famous for *Aloe vera*, have been found and named by Kew scientists based in Kew's overseas office in Madagascar this year. *Aloe* species from Madagascar are

Tiganophyton karasense © Wessel Swanepoel (top)

Madagascan *Aloe rakotonasolo*i flower © Solofo Rakotoarisoa/RBG Kew (bottom)

Photos: Courtesy Kew Gardens

usually found in open and sunny areas, but these two new *Aloes*, *Aloe vatovavensis* (not pictured) and *A. rakotonasoloi*, were found in a forest. The Kew team, led by Solofo Rakotoarisoa, found the plants out of flower, so took them back to the capital Antananarivo to cultivate them. Once the flowers had come out, the species could be confirmed as new to science, and named and published. It is not yet known if the succulent leaves of both *Aloes* have the medicinal benefits found in *Aloe vera*.

Swanepoel, W., Chase, M.W., Christenhusz, M.J.M., Maurin, O., Forest, F. & van Wyk, A.E. (2020). From the frying pan: an unusual dwarf shrub from Namibia turns out to be a new brassicalean family. Phytotaxa 439: 171–185.

Rakotoarisoa, S.E., Rakotonasolo, F., Rabarijaona, R.N. & Grace, O.M. (2020). Two new species of Aloe (Asphodelaceae) from the Eastern Humid Forest of Madagascar. Phytotaxa 455.

Aloe rakotonasoloi © Solofo Rakotoarisoa/RBG Kew (right)

Photo: Courtesy Kew Gardens

The Plants of Jerry Barad

Bob Stewart, reprinted from The Eastern Spine, Newsletter of the National Capital Cactus & Succulent Society, Dec 2020

Dr. Jerry Barad was a long time collector and grower of cacti and other succulents. He was active in the New York Cactus and Succulent Society as well as the Cactus and Succulent Society of America, including being a past president of CSSA. He maintained a large greenhouse in New Jersey filled with plants he had collected from around the world.

Jerry's main greenhouse was 90 feet long, 30 feet wide, and in the center 18 ft. tall. The center of the greenhouse was devoted to large columnar and barrel type cacti. Over the years it had grown into a impenetrable cactus jungle, only to be viewed from the exterior path that bordered it. Nevertheless, it was very impressive for the wide variety and sizes of plants it held.

Dr. Jerry Barad passed away several years ago but the Pennsylvania Horticultural Society (https://phsonline.org/) has produced a video on him and his passion for plants. You can view it here:

https://www.youtube.com/watch?v=u_MluP69muA

Updating a Succulent Garden

Matthew V Maggio, Sherman Gardens and Library Succulent Specialist
(Excerpts reprinted from Matthew Maggio's article* in *Pacific Horticulture* October 2010);
Photos: Gary Hunt, Santa Barbara, CA

The existing Sherman Library and Gardens Cactus Garden (Corona del Mar, CA) was a roughly 1,200-square-foot collection with specimens dating back to the Garden's founding. The garden had grown old and tired. It needed serious help, perhaps some fresh ideas. Thoughts of renovation were already dancing in my head. By October 2005, I began the renovation. The following six months would usher in an epic transformation, beginning with the design process.

The unofficial plan was guided by a few fundamental goals: (1) shatter conventional views about succulent plants, (2) engender lasting excitement over succulents, (3) inspire design creativity, and (4) leave the old wagon wheels and cow skulls on the Hollywood movie set where they belong.

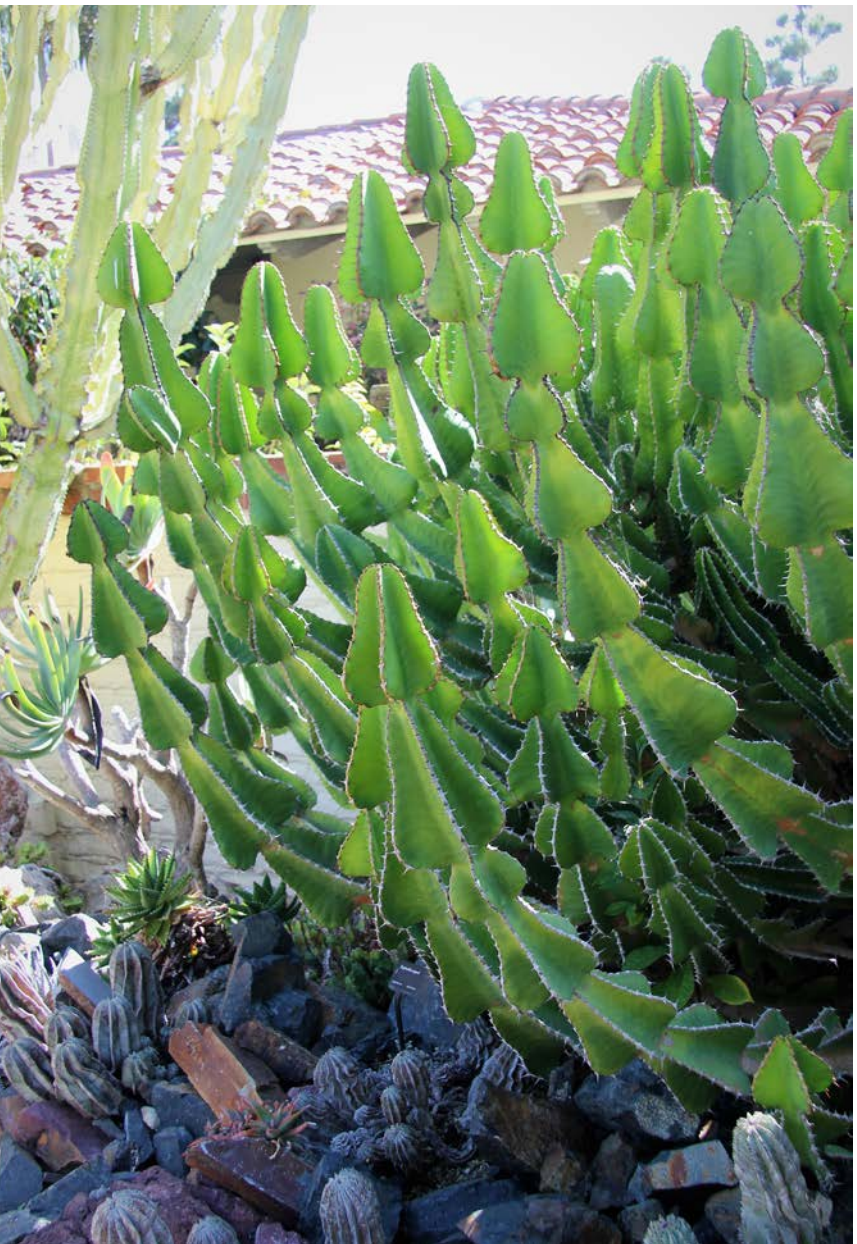
First came a meaningful name change, from Cactus Garden to Succulent Garden. The term succulent extends much further, covering numerous plant families wherein certain genera have succulent features. So our emphasis in the Garden shifted in both name and practice.

To build excitement for succulents, the new plantings had to be bold and dramatic—altogether jaw-dropping. Harmony was required among plantings and inanimate features. A great garden is like a well-orchestrated symphony, with each element lending rhythm, melody, and tone to a pleasing composition. To these ends, we employed mass plantings of contrasting colors and textures. We also organized the plants, by type, into sweeping patterns, with the objective of emphasizing particular visual qualities. This also helped maintain an orderly appearance instead of a busy, incoherent stew. Everything needed to flow.

Although aesthetic enhancements were vital, the longevity of the new garden depended upon a strong horticultural foundation, beginning with a fundamental understanding of the local environment. On the macro level is the region's mediterranean climate, with its warm dry summers and cool wet winters. Sherman Library and Gardens sits within walking distance of the cool Pacific Ocean, which moderates temperatures year-round, maintaining average summer high temperatures in the low 70s F – a mere ten degrees above the average

Specimen plants in the cactus collection (above) are gaining more character with each passing year.

* A Succulent Oasis at Sherman Library and Gardens By: Matthew V Maggio; *Pacific Horticulture* October 2010 https://www.pacifichorticulture.org/articles/a-succulent-oasis-at-sherman-library-gardens/



Everything in the garden design needed to flow, and the most illustrative example is the "river" of blue *Senecio* and carefully laid stones (top).

Large *Euphorbias* provide shade for smaller plants creating one of the many microclimates in the garden (left)

A multiheaded *Mammillaria* growing nestled among carefully chosen rocks (right).

Subtle, yet strategic placement intentionally highlights the concept of convergent evolution, wherein unrelated plants in different regions evolve similar designs in response to similar environmental stresses; *Agaves* represent the New World, while unrelated, but similar-looking *Aloes* represent their Old World counterparts.

winter highs. Annual precipitation here averages only twelve inches and occurs primarily in the cool season.

Some of the original succulents were inappropriate for the local climate. As an experienced succulent grower, my job was to pinpoint the most climatically suitable candidates. I eliminated numerous miniature cacti, some euphorbias and subtropical caudiciforms, not because of their requirement for spring/summer moisture, but because of their intolerance of damp Mediterranean winters. Some plants had grown weak and diseased, in part because of inadequate heat and dryness. We ousted these misfits during the demolition phase. True desert denizens, like the giant saguaro (*Carnegiea gigantea*), yielded to more winter-growers, opportunists, and succulents that favored a maritime atmosphere. Winter-growers included members of several succulent families: *Crassulaceae* (*Crassula*, *Cotyledon*, *Dudleya*, *Aeonium*); *Azioaceae* (mesembs and ice plants); and *Asphodelaceae* (*Gasteria* and many species of *Aloe*). Other featured groups included *Agave* (*Agavaceae*) and *Echeveria* (*Crassulaceae*), a host of terrestrial bromeliads (*Bromeliaceae*), many more *Aloes*, some cacti, and some *Euphorbias* (*Euphorbiaceae*).

Poor soil was the next major issue, and the problem was two-fold. Drainage was horrendous because of a layer of almost pure coarse sand—to which plants clung precariously—that overlaid a compacted silty clay loam. This abrupt soil interface left the sand excessively damp atop the underlying hardpan. The sand also held little nutrient value, which resulted in widespread health defects among the incumbent plants.

Determined to radically alter the soil environment, we removed almost everything, plant-by-plant and rock-by-rock. We brought in twenty-five cubic yards of new soil media: ten yards of pumice, ten yards of loam with some compost, and the balance from decomposed granite and soil taken from my own backyard.

No story about the Succulent Garden would be complete without mention of its rocks. They are everywhere in this garden! Just as the plants were grouped by type, so were the mineral elements. A specific type of stone mirrored each plant pattern—*Agaves* with granite, for instance. The Garden's geologic diversity includes basalt, schist, slate, sandstone, mudstone, rose quartz, granite, weathered marble, and more.

Beyond their obvious cosmetic role, the rocks serve many vital functions. They act as mulch by suppressing weeds, regulating soil moisture and temperature, and preventing erosion of the mounds. The largest boulders keep some plants from crowding each other and afford maintenance personnel a sure footing without compacting the soil. Darkly colored rocks help create warmer microclimates for plants favoring more heat than the coastal climate provides. We planted the mesembs among light-colored quartz to protect these delicate species from the occasional heat wave—an idea borrowed from quartzite habitats observed in South Africa.

A grouping unique to Sherman Gardens is the mesemb collection of ice plants and their relatives in the *Aizoaceae*. It is easily the most diverse outdoor assembly of these succulent gems on public display anywhere in North America. This was made possible by the delicate combination of careful soil preparation, the creation of a quartz outcropping, and the temperate coastal, winter-rainfall climate. A similar collection could not have been attempted twenty miles inland because of the heat. This is the only outdoor botanical garden in the Western hemisphere where one can photograph members of the genus *Conophytum* as if they were growing in their natural habitat. Other genera from the family on display are *Cheiridopsis, Cephalophyllum, Faucaria,* and *Glottiphyllum*. From autumn through early spring, this collection erupts into pulses of fiery orange, yellow, and magenta flowers.

Although we planted the new garden densely for maximum impact, we exercised great care to allow adequate space for specimens to mature, like these 30 ft *Euphorbias* (top).

The garden is densely planted with every space occupied, even under the steps (bottom).

Although this garden was renovated in 2006, the novelty endures, and the evolution continues. Specimen plants are gaining more character with each passing year, while some foreground plantings are reconfigured yearly. New succulent hybrids hit the market constantly, and Sherman Library and Gardens promises to be on the receiving end.

Sherman Library and Gardens is a vibrant cultural center that provides the public an oasis of inspiration, education and appreciation of regional history, horticulture and the arts. The 2.2-acre property boasts a nationally renowned botanical garden and research library with collections related to the history of the Pacific Southwest. The Library and Gardens is a nonprofit organization sustained by the generosity of members, friends, and a dedicated Volunteer Association that help to support the Gardens, Library, and a year-round calendar of educational programs and seasonal exhibits for the community. Located at 2647 E. Coast Hwy., Corona del Mar, California 92625. For more information, telephone 949.673.2261 or visit www.thesherman.org

Agave Stalk Becomes Nursery

Sue Hakala, Central Arizona Cactus and Succulent Society

My most treasured *Agave* sent up its life-ending flower stalk, blooming with superb beauty. I don't despair, I may be losing an *Agave* - as most species only bloom once and die - but I kept the stalk as it can become a nursery and a reminder of my special plant.

I cut the stalk to an appealing size and wedged it between heavy rocks to keep it vertical in a protected and semi-shaded area. As the stalk dries, it can become the perfect nursery for carpenter bees in the Sonoran Desert where I live. These handsome bees are hairy, bluish black like patent leather, about one inch long, and as wide as your thumb. They won't sting unless trapped or threatened and do not form a hive as they live alone. They are excellent pollinators and important to have in this landscape. Depending on where you live, you may have solitary bees that can make use of the stalk. This happens naturally in the desert.

Single female carpenter bees nest in wood. They will compete heavily for a chance to nest in an *Agave* stalk. I sit patiently in the spring and observe the females posturing with each other for days at a time to see who will get the prize. The winner architect will then proceed to chew into the stalk and begin to tunnel out a section 8-9 inches long. There are telltale signs of sawdust collecting at the base of the stalk. If I listen closely, I can hear the chewing and digging going on inside as she makes a tunnel ¾ of an inch in diameter. Somewhere during this time, she mates. When finished with her tunnel, she will fertilize your plants, collecting the pollen and nectar, returning it to the nest.

The pollen and nectar are then rolled into a ball and placed in the bottom of the tunnel. She lays an egg on top of it. The pollen and nectar become food for the developing bee. Chewing up the cellulose of the stalk, she forms a roof over this cell. She continues this process until the tunnel is pretty full. I've observed females returning to their tunnel at sunset for their night's sleep. In the early morning, she may be sleeping in the tunnel doorway guarding her brood. When the adult bees are ready, they emerge, each in turn, chewing out their roof.

Carpenter bees normally use dead tree limbs or other unfinished wood, like firewood, as nurseries. If they are tunneling into wood of value, cover it, varnish or paint it. They overwinter in their tunnels, or in this case, an *Agave* stalk. I've had bees nesting in a cherished stalk for several years, providing great entertainment and valuable pollination. This is a grand natural history lesson to observe.

Agave desmetiana sending up a flower stalk in Sue's backyard (top).
Photo: Sue Hakala

Wood split exposing the carpenter bee nest with the eggs (bottom). Notice the partitions which are constructed of sawdust. The female seals the cells with egg and food and doesn't return.
Photo: A.Thom-Wolf - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=79919694

SIMILAR NAMES

Sue Haffner
Reprinted from Cactus Corner News, Fresno Cactus & Succulent Society November 2020

As if botanical names are not confusing enough, some succulent genera have very similar names. *Discocactus/Disocactus*. The former is a tropical cactus, usually of flattened spherical shape, that forms a cephalium and produces fragrant flowers. It's native to southern Brazil and adjacent areas.

Disocactus is a flat-stemmed epiphytic cactus with large colorful flowers, native to Central America and northern South America.

Echinopsis/Echidnopsis. The former is a genus of South American cacti, globose to columnar, famous for their large flowers with long tubes ("Easter Lily Cactus.") *Echidnopsis* is a stapeliad native to east Africa and the Arabian Peninsula. It has narrow, snaky stems (the name means "viper-like") and produces small five-pointed flowers.

Sometimes it makes you wonder if the taxonomists aren't just messing with us.

Echidnopsis cereiformis (top right)
Echinopsis ancistrophora (center right)
Discocactus albispinus flowering (bottom right)
Photos: Irwin Lightstone

Disocactus (*Nopalxochia*) *phyllanthoides* (bottom left)
Photo: Joyce Carr

Are Cacti intelligent?

Chaden Yafi, Houston, TX
Reprinted from Kaktos Komments, Houston Cactus & Succulent Society, May/June 2020

Intelligent? You would ask! They do not have a brain or a nervous system, how can they be intelligent?

We know that plants don't have a stomach, but they eat; they don't have lungs, but they breathe. Why can't we accept that they can think and process information even without having a brain or a nervous system?

Recent studies have shown that while plants do not have a brain, they do possess a highly elaborate signaling system as well as many of the chemicals and hormones that exist in the brains of mammals.

Let's start by defining intelligence. Etymologically speaking, the word intelligence comes from the Latin verb "intelligere" (inter: between, legere: choose" meaning to compare or choose between things or situations.) (1) Perhaps the most common definition of intelligence is: the ability of problem solving. This ability manifests itself in being flexible and capable of adapting to new situations by making correct choices.

This article will examine some of the problems and issues that cacti encounter and examine the ways they behave to solve them. In the end, I will give a few glimpses of new studies on plants' intelligences in general.

Copiapoa humilis subspecies *tenuissima* blending with their surroundings

Photo credit: Stefan Burger www.cactusexplorer.com

Drought

Living in an arid environment is a harsh reality shared by most cacti. However, they learned to adapt and thrive in it. Throughout their evolution they had invented a way to alter the photosynthesis process and carry it out at night instead of the day and thus minimize water loss. Nevertheless, water is still an important element for the life of all living creatures, even cacti. How can a cactus live for weeks, months, or years without water?

Examining the *Copiapoa* cactus might give some answers.

Most *Copiapoa* cacti live in the Atacama Desert, which is one of the most arid areas in the world. In the 1980s, this desert experienced 14 straight years of extreme dry climate (even for a desert) with not a drop of rain. All the plants died except the *Copiapoa* family! (2)

At a certain point of its evolution the *Copiapoa* developed the ability to produce a wool-like material over its spines. This wool-like material serves as a way to trap a single drop of water in the atmosphere from dew, mist or fog. The *Copiapoa* cactus also learned to store water not only in its stem (like other cacti) but also in its root, which is very large in size (sometimes larger than the cactus itself.) This ability made the *Copiapoa* survive the years of extreme drought.

Other cacti use different strategies to conserve water. They produce more roots when it rains to absorb as much water as they can. When the climate gets dry, their roots will shrivel and even break off to conserve the water they have in their stems. If the cactus contains more water than the soil where it is growing, it risks losing water to the soil. Thus, the cactus will cut itself from that dry soil. (3) That made some cacti growers advise against restricting watering completely during winter for the fear that a cactus might lose all its roots.

Attracting Pollinators, Mastering the Art of Seduction

The case of the *Espostoa frutescens* cactus

Espostoa frutescens is a columnar cactus native of the Andes Mountains. The flower of this cactus blooms at night, thus attracting bats to pollinate. We know that bats use echolocation to target their meals. Many plants attract bats to pollinate their flowers by reflecting their sonar, thus making their flowers more appealing. But the *E. frutescens* takes the whole game a step further. The main type of bats that pollinate its flower is Geoffroy's tailless bat. The flower of the *E. frutescens* is surrounded by a hairy type of material called the cephalium. In a recent study, scientists examined the possibility that the cephalium plays a role in the pollination of the flower of this cactus. They found that the hairy cephalium absorbs ultrasound around 90 kHz. This number is not random! It turns out that Geoffroy's tailless bat happens to echolocate at frequencies right around that 90 kHz! This is a totally different method of attracting the bat. By absorbing (not reflecting) the ultrasound and dampening the background of the flower, they make the flower itself more conspicuous and appealing. It is as if the plant found a specific "language" to address the bats and invite them over! (4)

Espostoa frutescens. herbarrium specimen
http://specimens.kew.org/herbarium/K000101775

Predators

Among the various functions the spines of a cactus have is keeping predators away. Some cacti that don't have strong sharp spines (ex. *Copiapoa* and *Lophophora*) protect themselves by using their amazing camouflage ability. They blend with their surroundings and make themselves invisible to herbivores. The *Copiapoa* family also can pull itself almost completely underground to avoid the heat and predators at the same time.

Heatstroke

When a cactus gets too much sun exposure that results in sunburn, it opts to enter dormancy. It does so by halting the developing of new tissues that will get burned too. It temporarily reduces its growth rate and will sit inactive until the optimal conditions are back. Then the cactus will continue to grow. Thus, cacti growers are advised to be careful with watering if they notice the "summer" dormancy or sunburn on their plants. This can happen even in the summer months which is the growing season for cacti.

Trauma

When a cactus is damaged or feels something threatening its growth, it produces many pups. This way it can guarantee its continuation and survival of its species.

Some commercial growers deliberately damage the center of the cactus to produce pups so that they can sell more plants. However, this is not a good way to deal with cacti and the forced damage might not always result in pups.

Research on plants intelligence

One might consider all that is mentioned so far to be merely a physiological reaction by cacti. And some would not agree to use the word "intelligence" when describing any plant behavior.

Plants' intelligence is not a new discovery. Perhaps Darwin was the first to mention the possibility of plants having a "brain." For Darwin, the

brain would be the roots as he wrote in the last paragraph of his book, *The Power of Movement in Plants.* His son, Francis, was famous for declaring that plants are as intelligent as animals.

Nonetheless, speaking about plants' intelligence has become more valid and acceptable in the last two decades. There is a lot of scientific research examining: plants behavior, memory, ability to store and use information, adaptations capability, plasticity, etc. The new microscopes and time lapse filming helped scientists to gather new facts about plants that they didn't know before. All of this puts plants again in the center stage and debunks the old inherited ideas that plants don't think or deliberately make decisions.

Mimosa pudica
Photo: H. Zell - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=10694351

Studies have shown that the ability of plants to transport signals from one part of it to another is very similar to that of neurons in mammals. Cacti have chemical substances that share the same structure of that in the nervous system of animals.

The two leading figures in this realm of study are the British scientist, Anthony Trewavas, and the Italian scientist, Stephano Mancuso, who is also one of the pioneers of so-called "Plants Neurobiology."

It is also important to mention an experiment by the Italian-Australian scientist Monica Gagliano (associate professor of biology at the University of Western Australia) which repeated the Pavlov dog conditioning experiment while using a plant!

In Ivan Pavlov's famous experiment, a dog was offered food every time a bell rang. The bell didn't mean much to the dog before the experiment. The dog would salivate when he gets the food, but in the end, when they rang the bell without offering the dog any food, the dog still salivated! The dog was able to link the bell sound with the concept of food. Therefore, the dog was able to "imagine" or "conceptualize" the food upon hearing the bell alone!

Dr. Gagliano used the same principle but with a plant. She chose the climbing pea plant and instead of the bell, she used a fan. Instead of food, she used blue light that plants love as an essential element for their growth. The pea plant grew toward the blue light wherever it was placed with the fan. Eventually, the pea plant was growing toward the fan, even with the absence of the blue light! (5)

Another notable experiment Gagliano carried was testing plants "memory." She used the *Mimosa pudica* to achieve this. (This experiment echoed a previous experiment that the French botanist René-Louiche Desfontaines carried out back in the 18th century on the same plant species.)

The *Mimosa pudica* (https://upload.wikimedia.org/wikipedia/commons/f/fe/Mimosa_Pudica.gif) closes its leaves when feeling any danger or strange situation. Gagliano invented a plant dropping device and attached many potted *Mimosa pudica* plants to them. The machine would drop the plant several times. Each time the plant was dropped, the plant would close its leaves. Eventually, when the plant "learned" that there is no danger in this, it ceased to close its leaves. Several weeks after the initial experiment, the plant did not close its leaves when it was subjugated to the drop. It remembered. The plant was able to remember information for more than 15 days! (6)

All of the recent research confirmed that plants are more intelligent than previously thought. Their behavior and adaptive capability are not found to be merely an automated physiological reaction. A plant's response to different occurrences varies,

and can be, at times, individualistic. A cacti grower does not need to be cognizant of scientific discoveries and experiments. Any cacti grower can notice that two cacti seldom behave in the exact same way or grow identically! Each one has its own "personality" and peculiarities.

Perhaps all of these findings will inspire us to treat plants with more care and respect; to view them not from a utilitarian or medicinal way, but as living creatures that have so much to teach us about existing in this world and wisely using its resources. Maybe also this will make us relinquish our tendency of putting plants on the bottom of the hierarchy, below humans and animals.

The plants that seem abundant today might be endangered tomorrow.

The new findings about plants intelligence and behavior will make us step out of our deepened anthropocentrism and open new "green" horizons in our hearts and souls.

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Two Cacti in Their Natural Habitat

Bob Stewart, Washington, D.C.

I have been fortunate to visit the American Southwest numerous times during the 1980's and 1990's. I thoroughly enjoyed seeing and photographing cacti and other succulents in their natural habitats. Here are two of my photos.

Neollyodia conoidea, a cactus with bright magenta flowers (top right), growing at the base of *Agave lechuguilla* in Big Bend National Park in southern Texas. Both of these plants are common in the Chihuahuan Desert. Unfortunately, neither of these plants make easily grown container plants and you rarely see either grown in collections.

Echinocactus texensis, the horse crippler cactus (bottom right), gets its common name from its occurrence in grasslands and pastures of Texas where it is a danger to cattle and horses that step on it and break their legs. *E. texensis* Is found throughout much of western Texas, southwestern Oklahoma, and southeastern New Mexico. It can be grown as a container plant, but does get large.

Caralluma socotrana

(Sanguilluma socotrana; Monolluma socotrana)

Brian Kemble, SFSCS Newsletter October 2020

The genus *Caralluma* was first set up by the English botanist Robert Brown in 1811, and by the time of the 1933 publication of the first edition of The Stapeliae, by White and Sloane, it had grown to include 86 species. The expanded second edition from 1937 brought the total up to 105 species, divided into nine designated Groups. In 1995, Darrel Plowes published a major revision of the genus in which he broke it up into smaller and more coherent genera, resurrecting some old genus names and creating some new ones. As is so often the case in taxonomy, there were some who adopted Plowes' revision, some who wanted to stick with the old bloated concept of the genus, and still others who wanted to split it up, but had different ideas on how this shoud be done. The result of all this is a host of species with more than one name, including *Caralluma socotrana*. In Plowes' revision, it was given a genus of its own, and named *Sanguilluma socotrana*. Subsequently it was combined with several other species in the genus *Monolluma*, giving it a third name. Perhaps it is reasonable to stick with *Caralluma socotrana* until the dust settles. Under any name, *Caralluma socotrana* is a striking species found in northeastern Africa, Yemen, and the island of Socotra, after which it is named. Plants form clumps up to 15 inches (38 cm) in diameter and as much as a foot tall (30 cm), composed of many slender pale-green erect stems. Plants branch mainly from the

Fig. 1 *Caralluma socotrana* east of Awash in central Ethiopia, with tan-colored buds opening to dark red flowers. The white flowers are a neighboring plant.

Fig. 2 A plant in full flower.

Fig. 3 A close-up of the flowers; note the irregular concentric rings of ridges around the centers.

base, but occasionally higher up as well. The stems are four-sided, but their corners are rounded to the point that they appear almost cylindrical, with lumpy projections bearing small teeth adjacent to the nodes where the flowers emerge. Often there are darkened patches, appearing like daubs of soot, adjacent to or surrounding the nodes.

Caralluma socotrana in flower is nothing short of spectacular. The flowers are about 1.2 inches across (3 cm), with a color that ranges from dark red to vermilion,

depending on the population. As is seen in many other stapeliads, the petal bases are united to form a “satellitedish”, separating at the outer rim into five triangular lobes. The lobes are covered with smooth wart-like tubercles, while the dish within has rows of transverse ridges which are a little darker than the background between them. At the center of the flower is the corona, like a dish within the dish, containing the stamens and the pistil. The corona may be dark purple or pale yellow with purple stippling, with a small yellow center. While the sight of a plant in flower might be described as “breath-taking”, don’t breathe too deeply unless you are up-wind! After all, this is a stapeliad, and like so many of its relatives it smells more

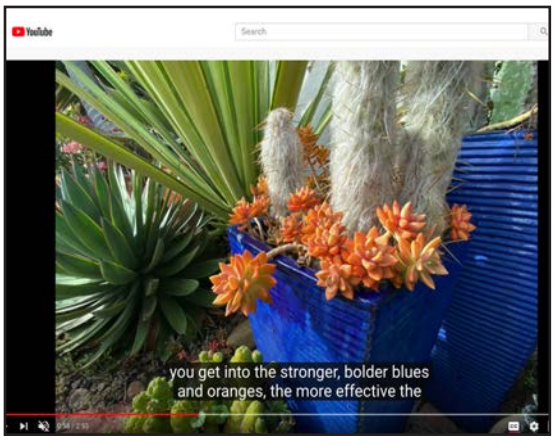
Fig. 4 A plant with seed capsules. The twin follicles resembling a pair of horns are commonly seen in milkweed relatives.
Fig. 5 A young plant in cultivation.
Fig. 6 A young plant in habitat with extra-prominent black splotches on its stems.

Fig. 7 Another plant in flower; the beige straps visible in the photo are the remains of last season's follicles.

like a carcass than a rose. The purpose of the foul smell is to attract flies, which are fooled into thinking there is an actual carcass, and then pollinate the flowers when they stop to visit.

The stapeliads have long been placed in the Asclepiadaceae, or Milkweed Family, but this family has now been merged into the Apocynaceae. The type of seed capsule produced by *Caralluma socotrana* is similar to that seen in many other members of the family, such as *Pachypodium* or *Asclepias* (milkweed), with twin horn-like follicles, or seed chambers. At maturity, the follicles split open to release the windborne seeds.

Contrast Colorful Succulents with Colorful Pots
- with Debra Lee Baldwin
https://youtu.be/_dMO5hAjq_I



"Like glazed pots, succulents come in all colors, including blue. For effective succulent-pot pairings, contrast colorful succulents with contrasting, colorful pots. I show numerous pairings with an emphasis on complimentary colors. Find the names of succulents in the video and the designers who did the pairings on my site."

Debra Lee Baldwin is a garden photojournalist formerly with Sunset magazine. She authored three bestselling books about using succulents in gardens, landscapes and containers. Debra's YouTube channel videos have had over 6,000,000 views, and her "Celebrating the Joy of Succulents" newsletter has nearly 8,000 subscribers. She is a member of the San Diego C&SS and has a half-acre succulent garden.

A Focus on Diversity

Alan Kamil, George Holmes University Professor of Biological Science and Psychology Emeritus at the University of Nebraska - Lincoln


1A


1B

One of the attractions of succulents is that many of them live in extreme habitats, which has resulted in a remarkable diversity of specialized adaptations, and these provide opportunities for unique images, nicely integrating my biological interests with my photography. The two species below are mesembs that provide excellent examples.

1. *Pleiospilos nelii*, split rock. I purchased this *P. nelii* from a local store specializing in house plants. The appearance of the unusual leaves struck me as having potential to make interesting images although, as is often the case for me, I couldn't have said exactly what would develop until I had time to look at it under different lighting conditions, etc. Eventually possibilities emerged from the combination of the rough surfaces that could be emphasized with side lighting. In addition, the overall structure suggests a monster mouth that was either being swallowed or regurgitated! I took pictures from two perspectives that looked good to me, which I have included, and I intend to take more of this plant as it changes over the next 6-8 months.

I took this photo (1A) with an Olympus OMD EM-1 mk 2 camera mounted on a tripod in my studio with an Olympus 60mm f/2.8 macro lens at f/16, with 0.8 second shutter and ISO 200, and used the in-camera focus bracketing feature of the EM1.

I took this photo (1B) with an Olympus OMD EM-1 mk 2 camera mounted on a tripod in my studio with an Olympus 60mm f/2.8 macro lens at f/16, with 0.5 second shutter and ISO 200, and used the in-camera focus bracketing focus bracketing feature of the EM1.


2A

2. *Titanopsis calcarea*, concrete leaf. Another Mesemb from a local nursery. In this case I was interested in the patterns created by the wart-like tubercles on the ends of the leaves. After trying a few different angles, the view from above was very effective, giving an abstract look to the image and that white and black backgrounds yielded dramatic images as can be seen below.

I took this photo (2A) with an Olympus OMD EM-1 mk 2 camera mounted on a tripod in my studio with an Olympus 60mm f/2.8 macro lens at f/16, with 0.5 second shutter and ISO 200, and used the in-camera focus bracketing focus bracketing feature of the EM1.

I took this photo (2B) with an Olympus OMD EM-1 mk 2 camera mounted on a tripod in my studio with an Olympus 60mm f/2.8 macro lens at f/22, with 0.8 second shutter and ISO 200, and used the in-camera focus bracketing feature of the EM1.


2B

Leuchtenbergia principis

Ann Hopkinson, Conejo Cactus & Succulent Society, Succulent Scoop December 2020

Leuchtenbergia principis, common name Agave Cactus, is one of my favorites. It doesn't look like a regular cactus and is monotypic (meaning the only species in the genus *Leuchtenbergia*). I like the papery spines the best! Endemic to Mexico where it grows alongside *Agaves*.

Leuchtenbergia has triangular growths called tubercles. Flowers arise from the tips of these tubercles. I have had this specimen for about 20 years, maybe a bit more. It has been grown in a bright spot in my greenhouse with shade cloth providing some over head shade. The roots are thick and long so it should be grown in a deep pot. Otherwise it requires regular cactus growing conditions with a well drained soil and left slightly dry in the winter. Susceptible to scale and mealy bugs which I treat with insecticidal soap.

Mission Statement

CSSA is a community of individuals who are passionate about promoting the appreciation, knowledge, and conservation of cacti and succulents in cultivation and in wild populations.

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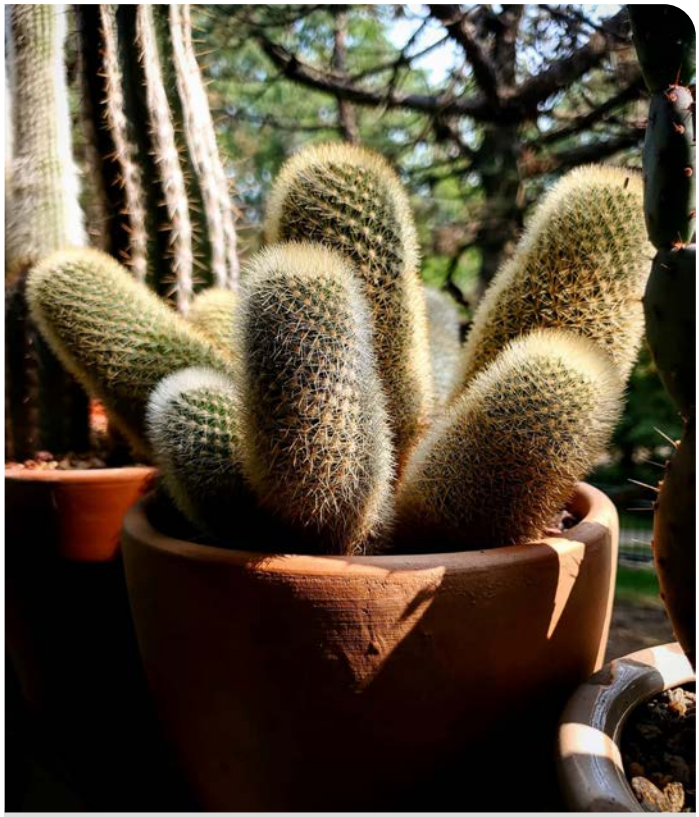
  - Articles and photos for 2021
    - Spring - December 15
    - Summer - March 15
    - Fall - June 15
    - Winter - October 15



↟A happy Bristle Brush Cactus (*Mammillaria spinosissima* subsp. *pilcayensis*) on a windowsill in Kansas City, MO.
Photo by Courtney Martinez

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