

The Bulletin

EPIPHYLLUM SOCIETY OF AMERICA



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PHOTOGRAPH: Robert Kuettle

'IMMORTAL'

'Evening Delight' x 'Chiba Lovely Dawn'

Hybridizer Darryl Miyamoto Reg. #14230

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ROSTER CHANGES or other membership issues send them to the Membership Secretary.

MEETINGS: Begin at 7:30 p.m., the first Tuesday of each month, (except January, December and US national holidays). Admission and parking are free. Refreshments are served. Members and guests attending their first meeting receive a free potted epi. Regular meetings are held in the Lecture Hall B, Arboretum of Los Angeles County, 301 North Baldwin Avenue, Arcadia, CA, USA. Take the Foothill Freeway (I-210) to the Baldwin Ave. exit, south. Follow the signs to the Arboretum. The December meeting is the Holiday Banquet. Paid dinner reservations are required.

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From Top:
'Danilova' - Fort & O'Barr
'Honey Dew' - George French
'Red Chrome' - Evelyn Shiraki

Winter Culture Calendar

by Keith Ballard

This is an edited reprint from The Bulletin: Vol. 60, No. 2 (Winter 2004-05).

In winter, the epi collector must be very aware of what to expect in the way of weather, and to provide the necessary protection that will safely see his or her epi collection through the season. However, remember cold weather may be a good thing as it allows for a rest period, or dormancy, necessary for encouraging bountiful blooms the next spring.

Temperature: Epies can withstand near freezing temperatures for a fairly long period without visible damage. However, if there is frost, there may be damage, especially to the soft new terminal growth. To safeguard an outdoor collection, a plastic covering or wrapping is usually sufficient for milder areas, especially when the minimum temperatures last a relatively short time. More protection is added with the heaviest clear mil plastic available as a covering over the growing area. The thermodynamics of the situation is that the plants lose heat by both conduction to the surrounding air, and by radiating heat to their surroundings including the sky. Under clear conditions, the heat lost to the sky can be significant. On a clear night, the sky is at the temperature of outer space which is near absolute zero, or minus 460 degrees F. The heat lost is proportional to the fourth power of the temperature difference. Clouds or anything that blocks the view of the sky lowers the temperature difference and cuts the heat lost significantly. Older California residents may remember the old agricultural "Smudge Pots," which were oil burners in the orange groves. Their purpose was not to heat the groves, but to cause clouds in order to decrease the heat lost to radiation. Such clouds we now call "smog" and the burners were outlawed. Any covering or wrapping should be well secured against winter winds. An emergency short-time protection is provided by watering the epies' surrounding area well, NOT the epies themselves. The time that an epi will tolerate exposure to freezing temperatures is reduced if the root ball is saturated with water. Epies resist cold better if on the dryer side.

If prolonged freezing temperatures are to be expected, the safest plan is to take the plants indoors where the temperature can be maintained above freezing. Temperatures between 40 and 45 degrees are ideal for the plants to "rest", and produce optimum flowers next Spring. The typical epi will do fine if nighttime low temperatures do not drop below 45°F, with an occasional dip toward freezing, assuming it doesn't last more than a few hours. But, if the day time temperatures do not rise to at least 50°F on most days, your epics will need more warmth. A timer-controlled string of old fashioned Christmas tree lights, or other heat source,

under the covering is ideal. If the root ball freezes solid it will kill the roots and they will rot. Then you will have to deal with the familiar situation of a plant without roots. Epies with minimum light and water hibernate.

Water: Watering in winter is even more of a balancing act than for the rest of the year. As discussed above, you need to favor the dry side, especially if it is cold. However as usual, the root ball cannot be allowed to completely dry out. If there is sufficient rain, no added water will be necessary, sometimes for many weeks. Epies love rain water, if there is sufficient drainage. Rain has the significant beneficial effect of leaching out salts left by the tap water or other sources. Unfortunately, it also leaches out fertilizer, especially liquid fertilizer. It is unfortunate that the epies in harshest climates that require covering, will miss the benefits of the cleansing seasonal rains. If the rain is not sufficient the epies have to be carefully watched for drying out, especially if the humidity is low. If the humidity is high, they will stay moist longer.

However if there is a lot of rain, and the root balls are soggy for an extended period, there is the usual danger of root rot. This might be an additional reason to cover your epies. This covering, depending on the timing of the excess rain, might be required for only part of the season.

Fertilization: Epies can show signs of buds as early as December. But many growers, to avoid interrupting the dormant period, forego winter fertilization at least until mid-winter, late January or early February. Some then start the seasonal fertilization cycle with an application of 0-10-10 or 2-10-10. Early blooming is especially found in the smaller varieties, which have a tendency to start to bloom as early as March in the milder climates. If trying to maximize growth, such as for plants too young to bloom or for propagation, fertilization could continue all year.

Grooming: Continue to groom and trim your collection, especially if you didn't finish the job in the fall. Mushy (the result of excessive water), blackened branches or branches with mostly dead areoles should come off. The plants generally "tell you" what branches to remove. If you get frost damage, move the plant to a more protected location or otherwise protect it more and see what develops. No matter how bad the foliage mass looks, if the root structure is healthy the plant will probably eventually recover. If you have hail damage remember it is entirely cosmetic. If you are not interested in the seeds, remove any seed pods. If you are interested in the seeds, you can find more culture information in Don Burnett's article on Growing Epiphyllums from Seed (see page 37).

Planting and Repotting: Except for the mildest of climates, the winter months are the least appropriate time for planting cuttings or repotting. Generally, planting cuttings or repotting at this time of year is considered an emergency situation. Examples might be a plant that has fallen and broken its root ball, or a plant that suffers from a waterlogged root system due to poor drainage or excessive rain or watering. With the latter you need to remove the rotted and mushy roots completely, and treat the plant as a new cutting.

Pests: Be on guard for pests. When we cover our epies with plastic we may have created a new problem for our collections. We not only insulated our epies, we have just protected any epiloving vermin from their natural predators. Now might be the time for baits or traps that we would normally avoid because of our pets or other considerations in the warmer times of the year. Snails and slugs still find epies an irresistible feast. Insecticidal soaps will still deal with most other insect pests.

Seed Pods: Many of the epi cultivars' seed pods will ripen before winter but those that don't will cling to the plant until the following spring. If you are interested in the seeds, the pods will need to be protected from frost and pests. Protective coverings of paper bags or wire mesh will usually discourage any four legged raider. Again, for harvest and culture information see Don Burnett's article in this Bulletin.

Highlights of Recent Meetings

HIGHLIGHTS OF THE OCTOBER 4th MEETING: This meeting's program included the second in the series of presentations of Members' Gardens. This program was of Keith and Pat Ballard's garden, and was presented by Keith. Although, the Member Garden Series allows anything interesting in the garden, Keith stated up-front that the only thing interesting in this garden was epies, and that's what was going to be seen. But to try to make it interesting, except for a very few select cultivars out of the 100 shown, all had been registered in 2000 or earlier. In addition, an attempt was made to make the colors of a given epi different than the ones before and after it.

The name, size and parents on each slide came directly from the "Registry of Hybrids." If there was no data in the Registry listing, there was no data on the slide.

The earliest registration in the Ballard garden is 1950 for a very interesting flower named 'White Point' which may very well only still exist here.

HIGHLIGHTS OF THE NOVEMBER 1st MEETING: This meeting included a return visit by the L.A. County's "Botanical Information Consultant," Frank McDonough. Frank has a degree in Botany with a minor in Plant Pathology from Cal Poly Pomona. He is also a "California Pest Control Advisor." He has answered botanical questions for 30 years, been on TV, and has taught classes. His talk was about the various pests and diseases that attack cacti and succulents.

The following data is from a presentation that Frank McDonough used as reference entitled: "Pitahaya Diseases" by Gary Bender Ph.D., Farm Advisor Emeritus – Subtropical Horticulture UCCE, San Diego County.



Frank McDonough

California has a huge advantage in growing epiphyllums. Our dry climate allows us to grow epies without needing to use fungicide too much. You would think a prolonged drought in California would be an advantage, however as Frank pointed out, there has been an increase in certain fungal disease. Normally many of the fungal spores are washed off during our rainy season. The lack of rain from the drought has allowed these spores to cling to the plants where they are more likely to cause a fungal infection and spread to other plants.

Generally, with our dry climate the diseases are very few, but epies can be damaged by too much sunlight, and this damaged tissue may be susceptible to stem rot caused by a bacterium. Also, epies can be damaged by too much irrigation water, making them susceptible to root rot caused by several fungi.

Disease Caused by Bacteria: Soft rots of the branches are caused by *Xanthananas rampestris* and *Erwinia caratovaro*. Several countries report these as *Enterobacter cloacae* (2009). Infection starts from injured areas (sunburn, other diseases spots caused by Anthracnose). Control includes pruning out dying branches and spraying with copper sulfate.

Diseases Caused by Fungi: These include: *Dothierella* (*Botryosphaeria*), Anthracnose (*Colietatrichum*), *Bipolaris*, *Fusarium*, *Alternaria* and *Phytophthora*; of which *Botryosphaeria* is the largest problem and the result is most familiar.

Botryosphaeria Disease Management: Prune off dead limbs and dispose away from the plants. Maintain a thick layer of mulch to hasten decomposition of fungi on the ground. Use good sanitation and optimal cultural practices to minimize disease.



Botryosphaeria Leaf Damage

When weather changes from cool to warm, appropriately modify the irrigation program, and pay special attention to irrigation needs during periods of hot weather.

Diseases Caused by Viruses: Viruses are much smaller than bacteria. They enter the cells of a plant and are multiplied by the host. Viruses live and multiply only within living cells. Viral diseases are usually introduced by the use of infected plants or by insects. They can be spread to healthy plants by the feeding activity of sucking insects such as aphids and leafhoppers, or on the hands and tools of maintenance workers, and by branch-to-branch contact between multiple plants. There is no chemical control for a virus once it infects a plant. Although most viruses are specific to only a few types of plants, prompt and complete removal to prevent its potential spread is recommended when a virus is discovered.

Cactus Virus X is the most common virus infecting epiphyllums. For epiphyllums the most noticeable symptom is a color variegation in the flowers. However, there are other virus indicators that a flower may show, such as; lightened colors, curves and stripes of color and stunted, weak flowers.

Control of Cactus Virus X: Remember once the plant is infected, you can't cure the plant. The best control is prevention. Try to buy or accept only disease-free plants. Propagate from seeds when you can (most plant viruses do not pass into the seed). Clean pruning tools in-between plants with a 10% Chlorox plus soap mix or use a propane torch to heat your pruners. If you are not sure your plant prunings are virus free then discard them.

If you have a plant that is worth saving, such as a the last known or a rare cultivar, there are a couple of rather long term experimental procedures that might save it. For either procedure the infected plant must otherwise be healthy, blooming and/or growing. These procedures can be found in the report of a presentation by Frank McDonough entitled "Outgrowing Cactus Virus" reprinted in this Bulletin (See page 39).



'West Coast' flower exhibiting typical color variegation due to viral infection.



Ringspot virus patterning on epiphyllum leaf.

Growing Epiphyllums from Seed (Part 1)

*A basic manual adapted from a presentation
by Don Burnett*

Starting the Hybridization Process

You must first decide if you want to wait at least five and possibly seven years before you will see what type of flowers your cross has produced.

If you decide to undertake such a task you need to consider the following:

Think about what you want to accomplish.

- Will the flower last
- Color
- Size
- Shape
- Will they bloom early or late season
- Will they be sparse or prolific bloomers
- What will the growth be like

1. Saving pollen

Sometimes you may have an idea of a cross you might want to make but the two flowers are not blooming at the same time. You can save the pollen from an earlier blooming flower and pollinate a flower which is in bloom a week, or even a month later.



Collecting pollen

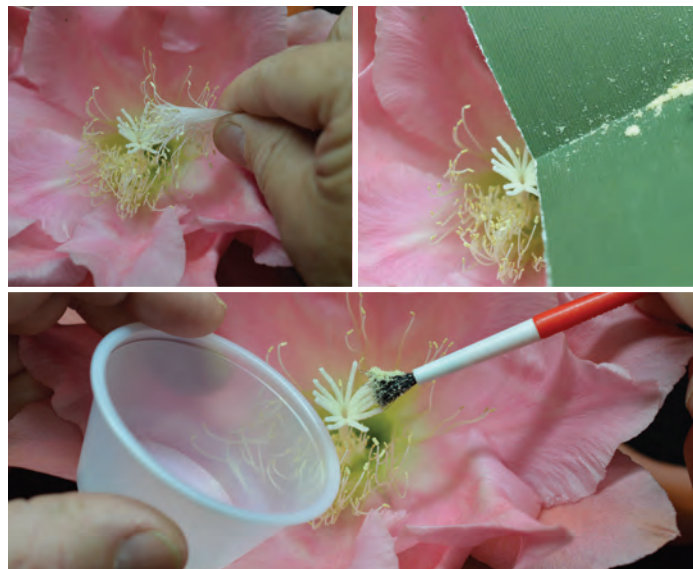
To save the pollen, take a clean piece of paper and fold it in thirds both directions. Hold it under the flower you wish to save the pollen from and gently brush the pollen off onto the paper. Fold the paper to contain the pollen and try not to crush it. Write the flower name and date on the paper and place the paper in a small airtight jar. Any jar will work as long as it is sterile. I find the ones which bouillon cubes come in work well. I then place the jar in the refrigerator door where it is not so cold. When you are ready to use this pollen let it come up to room temperature.

2. Pollination

Select the two flowers you wish to pollinate and determine which will be the seed plant. Both flowers "must" be perfect with no irregularity in any part of the flower.

You may pick the pollen flower and bring it to the seed plant. All that is required is to touch the anthers, which is part of the stamen that produces and releases pollen, to the stigma lobes.

Editor's note: Or you may use the pollen you saved previously (per the directions in the previous section).



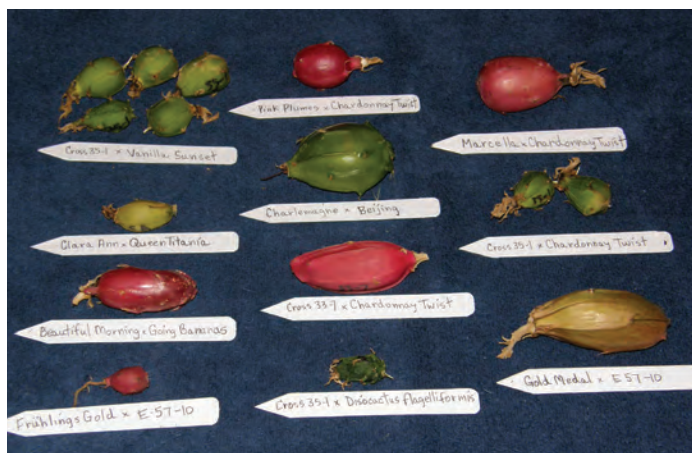
Three ways to pollinate a flower. (top left) Using the anthers from another flower; (top right) Dumping pollen into the stigma; (bottom) Using a brush to transfer pollen

It would be wise to cover the pollinated flower with something to keep any other pollination from occurring. An easy way of accomplishing this is to cover the flower with anything that resembles cheesecloth and tape the ends for approximately one week until the flower petals dry up and there is no further chance of pollination. Then you may remove the cheesecloth.

Make sure you make a plant label with the cross name and tie it around the branch with the pollinated seed pod. On the label, the seed parent's name always appears first followed by the pollen parent.

You need to leave the seed pod on the plant as long as possible and let nature take its course. Do not touch the seed pod to see if it is soft. The bacteria on your fingers may cause the unripe fruit to rot before it is mature. Usually you will know when it is ready to harvest by looking at the pod. In addition, the mature seed pod will give off a fragrance which signals it's ready to be harvested.

Seed pods will vary in size, shape and color. They are all unique and original.



A variety of seed pods

3. Harvesting the seed pod

Remove the seed pod and use a black marker to write the cross on it if you do not plan on collecting the seed from it immediately. Remove the tag you had on the branch of the parent plant and keep it with the seed pod.

4. Harvesting seed from seed pod

You will need:

- a large bowl light in color (seeds are black)
- large tea strainer (small one will work)
- paper towels
- newspaper
- wax paper
- masking tape
- table knife for spreading seeds

You are ready to pan for gold.

Take the seedpod and peel it, exposing the pulp and seeds. Place the pulp in the bowl along with plenty of water and begin the process of removing the pulp from the seeds. Mash the pulp with your fingers and pick out as many large pieces of pulp as you can, and leave all the seeds in the bowl.

Use plenty of water



Peeling the seed pod

Use your hand to swirl the water in the bowl in a circular motion and tilt the bowl to let the separated pulp fall out and over the rim of the bowl. Continue mashing the pulp and seed with your



(top) Mashing the pulp to release the seeds; (bottom) pulp removed then seeds poured into strainer

fingers and separating the pulp from the seeds, adding water and swirling the pulp and seeds. Let all the seeds that float go over the rim of the bowl as they are not fertile. Continue adding water, swirling, removing pulp until you will have only the seeds left in the bowl.

At this point, place a paper towel in a large tea strainer and pour the seeds and water from the bowl into the strainer. Set the strainer back on top of the bowl and let the water drain from the seeds. Tape down a piece of wax paper onto a piece of cardboard or newspaper. Use a table knife to remove the seeds from the paper towel inside the strainer.



Removing the strained seeds from the paper towel

Spread the seed over the wax paper the best you can, they will want to stick together because of the gelatinous coating on each seed.

Place the seeds in an undisturbed and warm place inside your house and wait for about a week before you remove them from the wax paper. Don't forget to bring along the original label.

Now it's time to remove the seeds from the wax paper.

Remove the masking tape and fold the wax paper in half on a white surface. A tablecloth will work just fine. Then take a sharp



(top left) spreading the seeds on wax paper;
(top right) removing the seeds from the wax paper;
(bottom) storing the seeds in a solo cup

knife and insert it inside the folded wax paper and scrape off the seeds. Place the seeds in an envelope with the cross and date. Store in a dry place until you are ready to sow the seeds.

Did you remember to include the original label along with the envelope?

(Continued in the next issue of the Bulletin.)

Outgrowing Cactus Virus

by Raymond Eden

From August 1, 2000 Meeting Highlights

This article is a reprint from The Bulletin: Vol. 36, No. 1 (September 2000). However, a warning is necessary for the corrective procedure proposed that uses the chemical Dimethyl Sulfoxide (DMSO). DMSO has been extensively studied but still is not well understood. It was banned by the FDA in 1981 but now is available at Amazon, called a miracle drug and a fake cancer cure, and at best is controversial. If you are considering using DMSO, read some of the articles on the internet about it. And yes, this is the same Frank McDonough (but 16 years ago), as our speaker in November 2016. KCB

There is good news on the cactus virus front, and Frank McDonough shared it with us at the August ESA meeting. Mr. McDonough is a plant virus authority and has been a Botanical Information Consultant for the County of Los Angeles County for the past three years. ESA Director Ed Beardsley chanced to meet Mr. McDonough at the Arboretum Library and soon thereafter approached the rest of

the Board with the idea of inviting him to speak at an ESA meeting. The Board unanimously approved, believing the epi community would appreciate this unique opportunity to learn something about the cactus virus epidemic. Based on the number of people who attended, it appears The Board was right. It is a credit to ESA members that they have taken the virus warnings seriously, whether published in the Bulletin or incorporated into ESA culture demonstrations. Being well informed is half the battle.

At the onset, Mr. McDonough was careful to point out that the techniques he shared with us are "theoretical" — meaning they have not been proven by scientific experiments with viral infections in epiphyllums. However, these techniques are used successfully with crop plants such as strawberries and sweet potatoes.

HERE'S WHAT WE LEARNED

Transmission: When Mr. McDonough was asked if cactus virus is spread from a parent to its seeds, (a serious concern for epi hybridizers,) he repeated what was reported in March 1996 Bulletin, that cactus virus is not transmitted from parent to seeds. During sexual reproduction, plants exhibit amazing 'Intelligence' by removing virus infected genetic material and undesirably mutated genes from their DNA. In those instances where it appears a seed bearing parent transmitted a virus to its seeds another explanation must be found.

It is possible for cactus virus to be spread by sucking insects such as scale, but in reality this is a minor threat as most of us control such pests.

Mr. McDonough did not cover the following topic, however it was in the copy of his lecture notes he provided your editor and it is being reported here as it is relevant and alarming. According to a University of Idaho website, it is being reported for the first time that saguaro cactus virus can spread by contact between plants. Unfortunately the website does not elaborate. What does "contact" mean? Is it mere touching, or must one or both of the plants have internal cell tissue exposed and making contact for transmission to take place. Must "contact" be prolonged and if so for how long? We hope to find the answers to these questions, but until we do, it might be a good idea to separate plants you know have viral infection from the rest of your collection.

The worst news is old news. We humans are the virus' best friend because we are too lazy to sterilize our contaminated tools and we graft to infected stock. Both Cactus Virus X, and Saguaro cactus virus are easily spread by these types of mechanical inoculation.

Prevention: Because there is no cure for cactus virus. Prevention should be our highest priority. There are three types of prevention:

- 1.) Control sucking and chewing pests such as scale, aphids, slugs and snails.
- 2.) Test plants, cuttings and grafting stock for viral infection. Do not use infected grafting stock.
- 3.) Faithfully practice the proper tool sterilization techniques given below.

Proper tool sterilization is not achieved by wiping the blades of your snips with cloth or paper towel. This is true even if you routinely apply alcohol or chlorine bleach to the blades first. To be effective tools must soak for at least 20 minutes (one source says 90 minutes,) in isopropyl alcohol or a solution of 1:10 parts chlorine bleach to water. (Remember, bleach causes steel to rust). After soaking, tools must be rinsed thoroughly and wiped dry, as alcohol or bleach residue can harm plants.

According to McDonough, the best preventative measure is heat, (as was reported in the March 1996 Bulletin (Vol. 51 No. 3, p.19, 27). People laugh during ESA culture demonstrations when Keith Ballard fires up his trusty propane torch and blasts the blades of his snips. It looks like overkill. But as Keith says, "Overkill is just right."

Mr. McDonough recommends applying alcohol to the blades then burning it off with an open flame until just before they are red-hot. Depending on the intensity of the flame, this could take several minutes, but it still takes less time than soaking. The point is, passing the blades of your snips through the flame of a candle will not do the trick. Let blades cool and wipe off smoke residue before reuse. You might want two or three tools to save time.

Diagnosis: We all learned something new when McDonough brought up diagnostically susceptible indicator plants. Susceptible host plants are species which are so sensitive to cactus virus they react quickly and unmistakably when infected. They are a valuable aid in testing epies for viral infection. They are readily available and cheap, plus the method of testing is so simple anyone can do it.

For Saguaro Cactus Virus and Cactus X Virus (CVX) indicator plants are *Amaranthus caudatus* (Amaranthaceae, Amaranth, 'Love Lies Bleeding' or 'Tassel Flower'), *Chenopodium amaranticolor* (Chenopodiaceae, Common name unknown), *Chenopodium quinoa* (Quinoa); *Gomphrena globosa* (Amaranthaceae 'Globe Amaranth').

Viral infection testing using super sensitive plants is quick, easy and inexpensive. First obtain one of the susceptible host species. Using sterile tools (like a new razor blade wiped with alcohol) remove a small chunk from the plant to be tested. Mash the soft inner tissue using a clean mortar and pestle (or ceramic bowl and spoon) with silica grit abrasive and smear the paste onto a leaf of the indicator plant making sure the paste make contact with the indicator plants inner cell tissue. If it reacts with lesions within a day or so, the stem of the tested plant is infected, which does not mean every stem on the plant is infected. If the indicator plant does not react, the tested stem is virus free, but this does not necessarily mean the rest of the plant is virus free.

Winning the Race: More good news. There are two methods for outgrowing virus—"tissue culture" and "forced-growth vegetative propagation". Both involve new growth (meristem) which is relatively uninfected. They succeed because of the way a virus replicates in the host plant. In simplified terms, a virus cannot replicate without appending itself to cells inside a plant and commandeering the plants DNA and RNA to do its replicating for it. This means the virus load is mostly concentrated

at the point of initial infection, and spreads throughout the plant from there, gradually, over time. There are numerous ramifications to this fact, but the good news is, the youngest growth will be the least infected.

Tissue culture involves growing new plants, which are genetically identical to the original, from tiny clumps of meristem cells. It is simpler than it sounds and not particularly expensive. Rather than go into lengthy detail, Mr. McDonough referred us to Kitchen Culture Kits, Inc. at kitchenculturekit.com on the Internet. This company offers complete tissue culture kits including some specifically for cactus culture at reasonable prices.

Notes:

1. I found this article when looking for more publications by Mr. McDonough. The "KitchenCulture Kits" mentioned above are still offered on the internet, but in the "Learn more for yourself" addresses, just above, may be long gone or may be incorrect.
2. Some time ago Jerry Freeman, a longtime and now deceased member, tried at least one of the techniques above and said it worked!

ESA Volunteer Appreciation Day

October 1, 2016, Eaton Canyon
Pasadena, California

By Geneva Coats

Our annual Volunteer Appreciation Day activities were arranged for us by Volunteer Coordinator and Board member Marrie Caldiero.

The first item on the agenda was a tour of Eaton Canyon in Pasadena, conducted by Diane Raging Hawk, a native American from the Yavapai Chiracahua Apache tribe. She is a "Park Baby" having lived and worked in the park system all her life. She is not a botanist or scientist, but instead learned plants, animals and tracking from her parents and grandparents.



Diane Raging Hawk

Plants were used in the Native American culture for many purposes; spiritual, construction, food and medicine. The natives make an offering before they pick, and don't pick what they don't plan to use.

Fire had burned the canyon completely in 1993. We are in the fifth year of a drought in California, and many trees are being lost due to drought and bark beetles. We saw many native trees like buckthorn, oak and sycamore. Most of the sycamore trees are diseased and many are dying. They are hoping for some good rainfall this year to help revive the plants.

There are about seven different sages that grow on the grounds. White Sage (*Salvia apiana*) is sacred to natives. It is burned and used ceremonially for purification and to promote meditation. It is used to bless the ground and create sacred ground. Scientists have proved that sage purifies the air. According to Diane, it can be used in cooking; you can add a sprig to your water bottle, and it's good with fish.

Wild buckwheat (*Eriogonum fasciculatum*) seeds can be eaten in a form like oatmeal, or ground into a flour, and wild birds enjoy them too. Buckwheat blooms provide nectar and pollen for butterflies and bees. Wild grapes were growing along the path of the tour area.



Wild Buckwheat

While we were examining the buckwheat, a coyote crossed the path ahead of us! We also learned the sound of squirrels chirping to signal danger, as they know there is a snake, coyote or hawk nearby! We saw the piles of leaves that mark the dens of pack rats, otherwise known as wood rats. There were many pack rat dens along the tour route.

Poison oak (*Toxicodendron diversilobum*) seeds are enjoyed by birds, and we learned that deer like to eat poison oak leaves! Diane explained that she teaches schoolchildren the rhyme: "Leaves of three, let it be; it's no joke, it's poison oak!"

We learned about "Mulefat," (*Baccharis salicifolia*), a shrub that grows near rivers. During a drought mules would eat the leaves which would make them gassy and "fat," which is how it got its name. The natives used Mulefat branches for arrows, looking for branches that are sturdy and straight.

Another interesting plant is *Phacelia*, which is also commonly known as a "fiddle plant" as the blooms curl up like a violin, and is known to the natives as a caterpillar plant. It has purple blooms in the spring that attract bees.



A Pack Rat Den

Elderberry (*Sambucus nigra*) is known to the native Americans as "music tree" because the branches are used to make flutes, whistles and pipes. The Tongva people make clapper sticks out of them. The inner part of the branch is soft and easy to hollow out. It has edible yellow flowers which turn into berries. The blue or purple berries are edible and you can make tea or wine out of them. Red berries are toxic. Twigs and fruits are used to make a blue dye for basketry. Elderberry extract in pills is given to air force pilots to keep them alert. You can grind the leaves to make a green paste that treats poison ivy. Apaches are somewhat nomadic, and made cookies with elderberry for energy, and they would also chew chia seeds to keep their mouths from drying out during times of travel.

According to Diane's naturalist beliefs, "Everything has a beginning and a purpose and a time for being here, and when it passes there is a new beginning. A perfect example is the oak tree, which grew from an acorn and eventually made a home and provided food for birds and animals. When leaves and branches fall, and the tree itself dies, there would be no place for us to walk with all the debris! So, we depend on the FBI to go to work! Fungus, Bacteria and Insects! They break everything down into nice rich topsoil. So even in death, the tree is still home to many animals and doing its part in nature!"

Yerba santa (*Eriodictyon californicum*) is also known as "bear weed." It's a bit of a leathery leaf. The branches and leaves are covered with a sticky resin and are often dusted with a black fungus. The leaves are dried and smoked and used to treat asthma and respiratory infection. You need to collect only certain parts of the plant during certain seasons, so don't collect it and use it if you don't know what you are doing.

Mugwort has a lighter underside to the leaves...when it requires more light it turns its leaves upside down. "We use it for tea, spiritual and medicine. My mom put it in my shoes when I was overactive to keep me grounded."

Coastal sage scrub is a grouping of various natural sages, including true sage and California sagebrush (*Artemisia californica*). Coastal sage is known as "cowboy cologne" because instead of deodorant, after a long ride on the trail cowboys would rub themselves down with coastal sage when they

wanted to go into town. Natives used light coastal sage in their clothes to help mask their scent during hunting. The deer cannot easily pick up your scent when it's masked with coastal sage.



Yucca leaf

Most people dislike a yucca plant just by looking at it, but! There are so many uses for yucca! It's soap, it's shampoo, it's food, it's medicine; it can be used for construction and for rope making. The sharp spines are used for needles and threads. You can sew rabbit and deer fur with it. Diane says:

"We take the pieces down to the river and wash them, and the long fibers are used to make rope, cordage, brooms, brushes, flip-flops, etc. You can eat the yellow flower, the fruit, the seeds can be ground into an edible flour, and in my tribe we make a fiddle out of the stalk. Once it gives a stalk and flowers, it dies."

Golden current (*Ribes aureum*) produces nice edible berries. Lemonadeberry (*Rhus integrifolia*) or Sugar Bush (*Rhus ovata*) can be used to make a tea that tastes like lemonade. It's another California native plant! Matilija poppy (*Romneya coulteri*) requires a fire to go through in order to sprout. Our tour guide likes to call it her "Fried Egg Plant" because of the huge white flowers with yellow centers. Showy Penstemon (*Penstemon spectabilis*) bursts into bloom in the spring with purple flowers that look like they are "singing." Pearly everlasting (*Anaphalis margaritacea*) is dried and used to treat wounds or asthma.

Opuntia cactus are also known as prickly pear. The fruit or "red tuna" can be used to make jam. Opuntia pads are good for diabetes and you can slice and cook it in with your eggs.



Crushed Cochineal

Cochineal is a scale insect that lives on opuntia cacti...the scale is ground and used for red dye, and found in many of our foods to this day! It is called cochineal or carmine and is used for red color in fabrics, shampoos, jello,

and cosmetics. Starbucks took some flack from vegans when they disclosed that they used cochineal as a colorant in their Strawberries and Crème Frappuccino. They have since replaced the cochineal dye with lycopene from tomatoes.



Indoor Display of the Many Uses of Yucca

We also saw an area where rescued land turtles are cared for. One of them had recently had gallbladder surgery! Next we moved to the indoor museum where our guide showed us her display about the many uses for yucca. The park also boasts an outdoor classroom area with a stage where schoolchildren can attend different educational presentations.

Lunch was provided by the Society after the tour at the beautiful home of Brian and Christina Provost. It was a warm and sunny day with gentle breezes blowing. A great time was had by all!



Lunch at Brian and Christina Provost's House

Hybrid History

by Keith Ballard

This article is based upon a book published in 2009: "Hybrid: The History and Science of Plant Breeding," by Noel Kingsbury. KCB

"If you want to feed someone, give them some rice. If you want to give them a reason for living, give them a flower."

— Chinese proverb

This article is intended to give some insight into the origin of our hybrid epies. As one would suspect, the process actually started a very long time ago, as an effort to make edible agricultural products better, such as tasting better, bigger, higher yields, earlier blooming and/or longer production. The process started all over the world, at vastly different locations, rates and times. In many cases, the modern plant is much changed from its original version.

For the most part the history is not documented well, but some data and approximate dates can be surmised from world history.

The Early Beginnings

The real start of hybridization was the selection the "best" tubers, such as bananas and seed, by farmers for next year's production from this year's harvest. This started somewhere between 8300-5500 BC. Grafting started between 2000-1000 BC by the Chinese, followed by the Greeks and Romans. Progress was generally slow, but occasional leaps did occur. In just one example of what appears to be a particularly well-documented quantum leap, around 1300 AD-1600 AD, there was an agricultural intensification in the upper Midwest of what is now the United States. A new corn strain, dubbed Northern Flint corn, had appeared. It was better suited to local climates and had a more appropriate photoperiodic response to the latitude than previous strains; it was hardier, with greater insect resistance, and it ripened earlier.

Deliberate hybridization, that is the crossing of different varieties or species, in order to produce new ones—had to wait until there was an understanding of gender, i.e. sex, in plants, which did not happen in general until the European early modern period. Cultivation had long been observed to alter wild plants, and before the modern period it was a widespread belief that under certain conditions one species would turn into another. To modern ears, this sounds strange, but think for a moment about how easily crops become mixed—a few oats in a field one year, their grains mixed with a following wheat crop, resulted in changed plants gradually increasing year by year.

The knowledge that date palms (*Phoenix dactylifera*) needed to reproduce sexually had been understood since ancient times; some trees clearly produce fruit, while others only pollen. They are dioecious (i.e. having the male & female sex organs borne by different plants). Stone carvings dating from ancient Assyria (2400 BC-612 BC now present-day Iraq) clearly show artificial

pollination going on which would have been necessary in plantations where a maximum number of productive females were found rather than unproductive males. Medieval Arab writers clearly understood that date palms had different sexes but this understanding was not extended to plants in general at the time.

Agreement on sex in plants was slowly arrived at in Europe during the 1600s. Before this, it was possible even for someone as perceptive as Francis Bacon to state that "copulation extendeth not to plants." Despite this, in his utopian essay of 1624, "The New Atlantis," Bacon suggests that animals and plants might change through domestication to produce totally new forms of great advantage to humanity.

It is generally accepted that the first clear indication of gender (i.e., sex) in plants came in 1694, when Rudolph Jakob Camerarius (Camerarius 1534-1598) professor of natural philosophy at the University of Tübingen in Germany, published a memoir concerning some experiments he had made with a variety of plants. He concluded that pollen was necessary for the production of seed, and that plants, or plant parts, could be described as male or female. An interpretation of flowers as sex organs soon followed, and was made into the centerpiece of a whole system of plant classification by Linnaeus during the following century.

The fact that corn has male and female parts that are so clearly physically separate made it an obvious early subject for investigations into plant sex and hybridization—one pursued by several early American farmers and botanists. A major leap forward was made by Cotton Mather (1663-1728), a puritan minister in the American colony of Massachusetts, who also was a forward looking and incisive observer of nature. He was one of the first to accurately record the effects of the pollen of one kind of corn settling on another.

Around the same time as Cotton Mather was making his observations, Paul Dudley (1675-1751), a naturalist and scholar also from Massachusetts, noticed that strains of corn tend to mix if planted near to each other, and recognized that "a wonderful copulation" takes place. Some decades later James Logan, Governor of Pennsylvania, conducted a series of experiments; Logan seems to have been the first to perform what we would regard as a formal experiment to prove that pollen was necessary to effect fertilization.

Outrage! The Cautious Beginnings of Deliberate Hybridization

Linnaeus observed and recorded a number of naturally occurring hybrids and made several deliberate crosses, the first of which was made in 1757, between two species of *Tragopogon* (a dandelion relative). He recognized the potential of hybridization and made the conceptual leap that a wide variety of kitchen garden plants, such as brassicas, are the results of generations of hybridization. In the system of classification he published in 1735, Linnaeus held that the number of species which existed to be the same as it was at the Creation. His subsequent

experience with the crossing of plants led him to believe that hybridization created new combinations of the traits shown by the parents. His way out of what could have been a conundrum was to suggest that the genus was the basic unit of creation. The latter was a response to the negative reaction to new plant varieties by some church leaders, that mankind was messing with the world as created.

Linnaeus's main interest was plant classification; despite his obvious enthusiasm for hybridization, this was not an area he pursued. No one else in the academic world made a systematic attempt at doing so until Josef Gottlieb Kölreuter in the latter half of the eighteenth century. Meanwhile, outside of academia, experimentation was taking place.

If a key person, plant species, and event stands out, it was the introduction of Thomas Fairchild's 'hybrid pink' (a cross between a sweet william *Dianthus barbatus* and a carnation *Dianthus caryophyllus*) at a meeting of London's Royal Society in February 1720. The Royal Society is spoken of as the world's first scientific society; it was a meeting point for all the great and the good who were curious about the natural world. The gentlemen of the Royal Society were interested in anything and everything; the world they lived in was beginning to change, new lands were being opened up, old certainties questioned. For those prepared to open their eyes and their minds, the world was full of wonderful things and happenings, all of which needed an explanation, or at the very least to be noted and discussed in convivial intelligent company after a jolly good dinner. Thomas Fairchild (1667-1729) was a nurseryman—not quite of the social caliber to be welcomed into the Royal Society and almost certainly too busy to be able to participate. His 'hybrid pink' was introduced to the society through a friend, Patrick Blair, a doctor and amateur botanist. Blair's paper to the Royal Society was primarily concerned with plant reproduction, establishing that plants do have male and female parts and that deliberate breeding of them was possible.

Fairchild's 'hybrid pink' was found on his nursery at Hoxton, then a village on the outskirts of London. Whether it was an accidental seedling or the result of a deliberate cross, history does not relate, although he is reported to have carried out the hand-pollination of pinks. Fairchild was one of many nurserymen catering to a growing demand for interesting and unusual plants and flowers for those inhabitants of London able to afford gardens. The growing wealth of London meant that more and more people had the time and money for gardening, an interest

which fed on the beginning of what was to become a tidal wave of plant introductions from abroad. The late 1600s saw a flurry of books on gardening, and in 1688, with the publication of the first nursery catalog, consumer gardening had officially begun.

The 'hybrid pink,' which became known as 'Fairchild's mule,' was yet another novelty with which to tempt customers. He was clearly an innovative and adventurous nurseryman, interested in pushing the boundaries of the possible, engaging in experimental grafting, such as oranges and lemons (*Citrus x limon*) on the same tree and black and green grapes on a single vine, and making a collection of variegated plants. Until this period, farmers and gardeners had two sources of new plants: new introductions from foreign lands, and chance discoveries of new forms, either found in the wild or from sowings of seed of cultivated plants. The idea of being proactive and deliberately trying to make new plants was a new one—Fairchild appears to have been one of those who had made this conceptual breakthrough. His "mule" and the concept of hybridization was not however widely followed up; the increasing numbers of new plants arriving from foreign lands became the main focus for gardeners for another hundred years at least. One of the most interesting themes of the whole early modern period is the mental wrestling that was clearly taking place in many learned minds between religious beliefs and the empirical evidence being gathered about how the physical world operated and, in particular, how it might be manipulated.

But, with the principles of hybridization well understood, the 1600s saw a veritable explosion of new flower varieties when hybridizers discovered they could make money selling their results. A couple of examples are the Dutch with their tulips and the English with roses.

Now, what about the origins of our epiphyllum hybrids? We really do not know by whom and when the first epi was crossed. In the mid 1950's the creators of "The Registry of Hybrids and Species" tried to get as much information as they could about epi crosses made before the ESA was founded. The committee searched all the records they could find, and set aside the first 5000 registration numbers to cover these discoveries. The first registration date in the Registry is: 'Speciosus Lateritius' with a date of 1828 and the first by registration number is: 'Züchterstolz' with Number 5001 (and no date).

The total of found registrations by the end of 1939, the year before the founding of the ESA, was 546. The total at the end of 2015 was about 10,000.

Refreshments Schedule

To find when it is your turn to bring refreshments for an ESA meeting, look for your last name initial in the column to the left. The meeting date to the right is when you have the privilege of providing food, serving and cleaning up.

LAST INITIAL MEETING DATE

V-Ba Tue, Feb 7, 2017

Be-Cr Tue, Mar 7 2017

D-Ha Tue, Apr 4, 2017

He-Ku Tue, May 2, 2017

L-Mi Tue, June 6, 2017

A Selection of Photos from the 2016 Season



'Campfire'



'Blushing Girl'



'Carolina von Stiedl'



'Bos'N Hartford'



'Casino Royale'



'Chiyo Matsumiya'



'Denis Kucera'



'Cool Patty'



'Desert Sunrise'



'David'



'First Crush'



'Flamboyant Jeff'



'Gold Derby'



'Full Reward'



'Golden Glow'



'Gabriel's Horn'



'Grand Moghul'



'Hard To Believe'



'Jean Marie Seile'



'Hopelessly Devoted'



'Jester'



'Ivan The Terrible'



'Kiwi Contradiction'



'Leona A'



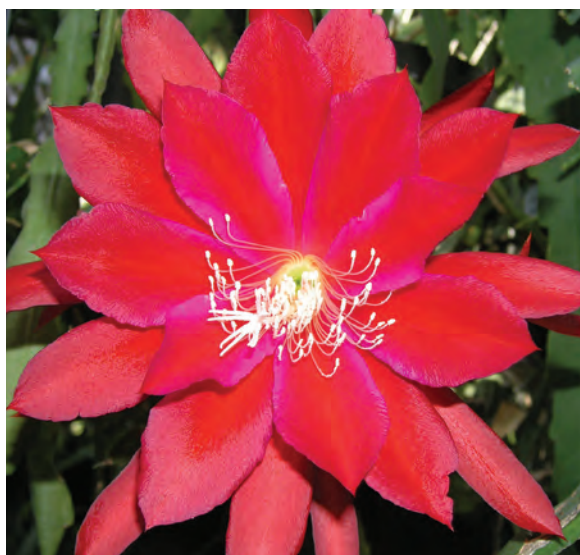
'Lilas Solferino'



'Lola Leah'



'Little Lady'



'Light My Fire'



'Mary E. Mattijetz'



'Memorial'



'Natascha Flechsig'



'Mozart's Ballet'



'Pink Nymph'



'Mysterian'



'Red Monarch'



'Rhonda'



'Santee'



'Roxie Dell'



'Shining Armour'



'Ruby Cup'



'Valhalla'

Calendar of Events

February 2017

ESA BOARD MEETING

Tue, Feb 28, 7:00 pm

March 2017

ESA GENERAL MEETING

Tue, Mar 7, 7:30 pm

Program: European Hybridizers: Arnhelm Lux, Thieri le Gallo, Heiner Düsterhaus, Etienne Haugede, Hans Günther Noller and Ralf Mangelsdorff

Refreshments: Members with last name starting with Be thru Cr the March meeting is your turn to bring snacks, help serve and clean up.

Location: Arboretum of LA County, Bamboo Room.

ESA BOARD MEETING

Tue, Mar 28, 7:00 pm

April 2017

ESA GENERAL MEETING

Tue, Apr 4, 7:30 pm

Program: Rudolf Hessing: Latest hybrids

Refreshments: Members with last name starting with D thru Ha the April meeting is your turn to bring snacks, help serve and clean up.

Location: Arboretum of LA County, Bamboo Room.

GREEN SCENE PLANT & GARDEN EXPO

Sat & Sun, April 22-23, 10 am to 4 pm

ESA will be selling plants and cuttings at this event.

Location: Fullerton Arboretum, 1900 Associated Rd., Fullerton, CA 92831

ESA BOARD MEETING

Tue, Apr 25, 7:00 pm

SPRING GARDEN SHOW

Thur-Sun, Apr 27-30

ESA will be selling plants and cuttings at this event.

Location: South Coast Plaza, 3333 Bear Street, Costa Mesa, Ca 92626 — Crate and Barrel/Macy's Home Store Wing

May 2017

ESA GENERAL MEETING

Tue, May 2, 7:30 pm

Program: TBD

Refreshments: Members with last name starting with He thru Ku the May meeting is your turn to bring snacks, help serve and clean up.

Location: Arboretum of LA County, Bamboo Room.

SBES ANNUAL SHOW & SALE

Sun, May 7

Location: South Coast Botanic Garden, Frances Young Hall

SDES ANNUAL SHOW & SALE

Sat-Sun, May 14, Sat SALE ONLY

Location: Casa Del Prado, Balboa Park

ESA ANNUAL SHOW & SALE

Sat-Sun, May 20-21, Sat SALE ONLY

Location: Arboretum of LA County, Ayres Hall

ESA BOARD MEETING

Tue, May 30, 7:00 pm

June 2017

ESA GENERAL MEETING

Tue, June 2, 7:30 pm

Program: TBD

Refreshments: Members with last name starting with L thru Mi the June meeting is your turn to bring snacks, help serve and clean up.

Location: Arboretum of LA County, Bamboo Room.

LAIFA ANNUAL FERN SHOW & SALE

Sun, June 10-11

ESA will be selling plants and cuttings at this event.

Location: Arboretum of LA County, Ayres Hall