

## Summary of Field Trip to San Tan Regional Park February 5, 2021

Text below is based on observations by Dennis DuBose who participated on the Field Trip, with some additional research. It was written by Dennis DuBose who is responsible for all inaccuracies and photos (unless otherwise credited).

San Tan Mountain Regional Park is a popular hike destination adjacent to Queen Creek, Arizona. It is in Maricopa County near the boundary with Pinal County. It has over 10,000 acres of Sonoran Desert with elevations from 1,400 feet to 2,500 feet.

This Field trip was sponsored by San Tan Chapter and Rim Country Chapter of the Arizona Archaeological Society. Members of both of these chapters and Phoenix Chapter participated.

Two separate groups participated on this Field Trip, one at 10:00 am and another at 1:00 pm. This summary includes photographs from both hiking groups.

Hikers assembled near the Park Visitor Center.



(Photo Sharon DuBose)

Initially the trail was fairly level, but there was gradual elevation gain.



(Photo Lou Jackson)

Hikers arrived at a boulder containing a couple of petroglyphs.



(Photo Sharon DuBose)

The petroglyph was a little unusual. It resembled a whiskey bottle. It is perhaps of fairly recent origin.



(Photo Lou Jackson)



(Photo Sharon DuBose)

Notice the circled dot on the lower right part of the boulder (almost concealed among plant shoots), perhaps a cork (?) for the bottle.

The hike continued across the Sonoran Desert, with many Saguaro Cactus growing.



Finally, we came to what is apparently a prehistoric agave farm. To the north of San Tan Park is the Salt River Valley, which prehistoric Native American Hohokam farmers extensively irrigated with a complex of canals. San Tan Park is at higher elevation away from the river. It appears that these people used rock mulch to grow agaves.



(Photo Sharon DuBose)

In this locale, they raked the surface rocks into a pile from an area about a dozen feet in diameter. They apparently would plant agave pup or bulbil in the pile. The rock mulch would hold rain moisture in the ground reducing evaporation so the agave could thrive. Mature agave plants about to blossom can be harvested and baked to make a high sugar content pulp with lots of calories. The agaves can be thus grown on marginal ground that would not support other crops.

I have seen a different approach at South Mountain Park in Phoenix (at the 24<sup>th</sup> street trailhead parking lot, I think). There the prehistoric Native Americans raked the surface rocks into rows about a dozen feet apart that followed the contours of a gentle slope. Agaves could be planted in these rock mulch rows. I participated in the excavation of a small exploratory trench spanning one of these terraces. There was about six inches of "soil" over bedrock. Yet, this "farm" extended hundreds of yards. I doubt that these people would have put so much effort in this, if it was not productive.



(Photo Sharon DuBose)

Note the several rock piles in the photograph. These have apparently been there for perhaps half a millennium or more.



(Photo Sharon DuBose)

Typical Rock Mulch Pile for Agave Growing

Some of the Agave Rock Mulch Piles are still functioning, being used by wild plants.



(Photo Lou Jackson)

The plants growing in these rock mulch piles are Triangle Leaf Bursage plants.



Actually, a fair percentage of them at this location are assisting Bursage plants. For example ...



(Photo Lou Jackson)



(Photo Lou Jackson)



(Photo Sharon DuBose)



The Triangle Leaf Bursage plant is the most common plant in the Sonoran Desert. It is a small nondescript bush, kind of ragged looking. Its “fruit” is a small bur. In some areas of the Sonoran Desert it is so widespread that the scene is reminiscent of the sagebrush of more northern higher elevation cold deserts. Hence, it gets its name, bur.sage. However, unlike sagebrush, bursage does not have a pungent odor.

The two species are unrelated ...

*Artemisia tridentata* Sage brush, with genus named for the Greek goddess of the hunt, Artemis (Roman Diana)

*Ambrosia deltoidea* Bursage, with genus named for ambrosia, the food of the Greek gods.

However, actually practically nothing eats bursage. Unlike sagebrush which has insect pollinated flowers, bursage is wind pollinated. Most plants in the genus *Ambrosia* are called “ragweed.” It is a cause of much late spring allergies in the Valley of the Sun south to Tucson.

Bursage is often confused with brittlebush, which has yellow daisy-like flowers, and actually in no way resembles bursage, except for being a small bush.



Brittlebush Left and Bursage Right in February

The difference is obvious when both species are leafed out fully. Bursage leaves are small and green while Brittlebush leaves are large and whitish green. However the

difference is dramatic when Brittlebush is in bloom with its prominent yellow flowers. Even after blooming the long dead flower stems distinguish Brittlebush from Bursage.



Brittlebush in Bloom, in Spring



Brittlebush, long after Blooming

People notice brittlebush because of the flowers but generally ignore the much more common bursage, which has very small, obscure green “flowers.”

Bursage is sometimes described as a nurse plant for the saguaro cactus. Seedling saguaros are sensitive to the hot sun and drying. They often germinate in the shade of another plant. And the most common plant in the Sonoran Desert (home of the saguaro) is Triangle Leaf Bursage. If you look for them, sometimes you can find infant saguaros under a bursage plant.

The prehistoric rock mulch piles at San Tan Park are spread out approximately in rows or almost a grid. Presumably, teams of Prehistoric Native Americans worked through suitable “fields” raking all the surface rocks in a dozen foot diameter circle or block into a pile, then moved on to the next adjacent block.

It is hard to show these rows or grids in a photograph taken from about five feet above the surface. Here are some photos that try to capture a bit of it ...



Field of Rock Piles



Rock Piles Marked

See the end of this document for some other information about agave culture.



More Arrays of Rock Piles





Each Saguaro Cactus has its own Personality

(Photos by Lou Jackson)





(Photos by Lou Jackson)

Phone Texting while Riding a Horse through the Sonoran Desert Among the Saguaros



(Photo Lou Jackson)

And then there is this, a Crested Saguaro ...



(Photo Sharon DuBose)

Crests grow in many species of cactus, but they are more noticeable on saguaros.

Speculations on what is the cause of saguaro creting include genetic mutation, lightning strike, freeze damage, micro-organisms, fungus, virus, mite or insect attack, exposure to chemicals, and a hormone that causes the pleats to grow out of control.

Nobody knows for sure.

The Crested Saguaro Society has found over 2000 Crested Saguaros in Arizona.



(Photo Lou Jackson)

## End of the Hike, End of the Day

So what does Andrew Carnegie have to do with Saguaros?

Andrew Carnegie came to the U.S. in 1848 aged 12 and got a job as a telegram delivery boy. While waiting for telegrams to arrive for him to deliver, he observed the office bookkeeper at work and became fascinated. He went to night school to learn accounting. Using his new skills he moved up in the telgraph business. Telegraph lines used the same right-of-ways as did railroads and the two industries were closely connected. He got involved in selling investments in these industries. He saw that steel rails were replacing iron rails and got into steel production. He applied cost accounting, chemistry, and scientific industrial methods to produce high quality steel at lower prices. He became one of the richest men in the U.S. He sold his company, which merged with other companies to form US Steel. In retirement he became a philanthropist funding local libraries, world peace, education, and scientific research. Carnegie free libraries sprang up across America.

In 1903, the Desert Botanical Laboratory in Tucson, Arizona, was founded on the authority of the Carnegie Institution of Washington. It was set up on Tumamoc Hill, an

archaeological site. The staff there subsequently virtually invented the science of ecology and cofounded the journal Ecology.

In appreciation of their benefactor, Andrew Carnegie, they gave the scientific designation name *Carnegiea gigantea* to the saguaro cactus.

### **Some Information about Prehistoric Agave Cultivars**

On February 9, 2021, just a few days after our San Tan Regional Park Field Trip, the Phoenix Chapter of the Arizona Archaeological Society hosted Zoom presenter Ron Parker who spoke on “*Agave Cultivation and Ancient Cultures*” about the skills of Prehistoric Native Americans in Arizona growing human-developed agave cultivars during the period 200 AD to 1450 AD. He is the author of a book *Chasing Cultures: The Search for Ancient Agave Cultivars Across the Desert Southwest*.

He identified 3 species of Agaves growing in Arizona that involved domestic cultivars: *Agave chrysantha*, *Agave palmeri*, and *Agave parryi*. Mr Parker described the variety of uses for the agave as food, beverage (fermented drink), fiber, soap & medicine, and building materials.

He speculated that Prehistoric Native Americans had perhaps derived cultivars with improved advantages to them from these species using plant breeding. He identified 5 agave cultivars:

*Agave murpheyi* sometimes called Hohokam Agave due to association with that cultural area, including Phoenix and San Tan area, available today at some nurseries

*Agave delamateri* associated with the Salado Culture of the Tonto Basin, more common than the other 4 combined

*Agave phillipsiana* possibly imported from non-Arizona cultures

*Agave verdensis* associated with the Sinagua Culture in the Verde Valley

*Agave yavapaiensis* associated with the Sinagua Culture in the Verde Valley

The characteristics that defined these as cultivars rather than natural wild species are as follows:

Nearly always found near archaeological features

Reproductively compromised (produce few if any seeds)

Reproduce vegetatively, are clones

Homologous morphology, each plant has the same shape, arrangement, structure

Mid-sized agave species, not very small nor huge

Produce large, healthy cores (for harvesting and roasting)

Sweeter than naturally occurring wild agaves

Have soft, pliable leaves, easier to cut (cut off for harvesting)

These species produce few if any seeds, and seeds that are produced by a couple of these species are not viable in the wild conditions where they grow. All of these species reproduce by “pups” that grow up around the mother plant from underground stems (rhizomes). So, they cannot spread far on their own. Murphey’s agave, *Agave murpheyi*, produces bulbils on the flower stalk. These are small plantlets that can be easily collected, transported, and planted. They do not disperse very well naturally. If the flower stalk is knocked over and some of the bulbils can come in contact with the ground, they can survive.

Mr Parker described the many and sometimes extensive “agave farms” using rock mulch that are found in Arizona, made by Prehistoric Native Americans. He said that the rock mulch was a brilliant concept for such desert agriculture. The rain flows right through the rock mulch into the soil, but then the rocks shield the soil from the hot sun and reduce drying evaporation.

He pointed out that although these rock mulch agricultural structures are widely presumed to be for agave culture, it is somewhat speculative. He said that essentially never are these agave cultivars found today growing in such rock mulch farms. They are usually found elsewhere, where growing conditions are better, with more moisture and often at cooler higher altitudes. This sounds counterintuitive if the rock mulch was actually for agaves. But, the reason for constructing the rock mulch piles in areas where the agaves could not grow unassisted was to make growing them possible. So, without human assistance for some 500 years, agaves died out in areas tended with rock mulch. However, some plantings survived in places where the rock mulch technique was not required.

San Tan Treasurer Jim Britton attended the Phoenix Chapter Zoom presentation by Mr Parker, and Jim asked him if he was aware of the San Tan Park rock mulch gardens. He was not.

Lou Jackson of Rim Country Chapter participated in the afternoon San Tan Park field trip and contributed some of the photos in this document. He also drew my attention to this paper on the rock mulch agave gardens and cultivars of Prehistoric Native Arizonians...

*Hohokam Lost Crop Found: A New Agave (Agavaceae) Species Only Known from Large-scale pre-Columbian Agricultural Fields in Southern Arizona*

Wendy C. Hodgson, Andrew M. Salywon, William H. Doelle

Systematic Botany 43(3), 734-740, (10 August 2018)

Which can be found here online ...

<https://bioone.org/journals/systematic-botany/volume-43/issue-3/036364418X697445/Hohokam-Lost-Crop-Found--A-New-iAgave-i-Agavaceae/10.1600/036364418X697445.full>

or

<https://www.ingentaconnect.com/content/aspt/sb/2018/00000043/00000003/art00009;jsessionid=2hijv7pit7n.x-ic-live-03>

The authors had been alerted to some agaves growing in some prehistoric dry-farmed fields now on private land near the San Pedro River in Southern Arizona. Apparently, the field contained circular rock piles, similar to those at San Tan Park. This is also apparently the first known case of modern agaves actually growing in rock pile fields. These agaves were similar to *Agave phillipsiana* and *Agave palmeri*, a cultivar and a wild species referred to by Mr Parker above. Furthermore, these agave specimens had the characteristics of a domesticated cultivar, much the same as Mr. Parker listed. The authors described them as representatives of a new species, *Agave sanpedroensis*.

In Mr Parker's February 9<sup>th</sup> presentation at the Phoenix Chapter, one of the attendees asked if he was aware of this paper. He said he was, but he was skeptical that it was a new species and not one of the other known cultivars. He pointed out that the authors had only two flower stalks of these agaves to examine, and he felt that was too few.

At any rate, the paper here has a lot of information about prehistoric agave cultivation in Arizona.

Looking at Four Peaks, Flat Iron and the Superstitions, and City of San Tan

