The History of the Joseph Wood Krutch Garden

by Tamara McClung, for Independent Study PLS399 Fall 2011

When the University of Arizona was established as a Land Grant Institute in 1891, Dr. James Toumey, a botanist for the Agricultural Experiment Station on campus, recognized the value of the aesthetically unique vegetation that thrives here in the Sonoran Desert and started a cactus display garden that we now know as the Joseph Wood Krutch Garden. In the 120 years since the genesis of the University and its cactus garden, the University’s practices have advanced to reflect current and evolving understandings of and attitudes toward landscaping and the natural environment.

By 1929 when the garden was moved from the west side to the east side of what is now Old Main, it boasted over 600 species. In its new location the cactus garden stretched from Old Main to Highland Avenue, and was embellished with walkways and benches enjoyed by both students and visitors to the campus. It was shortly after this move that one of the most celebrated species was added to the garden, when eight boojum trees were acquired on a Carnegie Desert Laboratory expedition to Baja California. The distinct-looking tapered trees are now rare and protected by the Mexican government. Construction started on the new Student Union in the 1950s, and part of the mall was grassed over. Some specimens were dispersed to other areas on campus, and some of the more important
specimens were consolidated in a central oval. By the 1970s, the rest of the mall was filled in with turf, but the cactus garden in the central oval remained, and can still be enjoyed in the same location between the Administrative and Koffler buildings. In 1980, the garden was dedicated to Joseph Wood Krutch, an influential naturalist author who loved the southwest, and who left his papers with the U of A.

More recently, the Krutch garden has withstood other proposals for its relocation. In 2001 plans were being made for a new Alumni Plaza, which would include a move back to the West side of Old Main. This inspired friends of the Krutch garden in the Arizona Alumni Association and the Campus Arboretum Committee to form the Krutch Garden Working Group, whose efforts resulted in the development of a general care plan and statement of goals for the garden in 2004, which included its expansion and improvement. More species were added to the garden in 2007 including ocotillo, hedgehog cactus, creeping devil cactus, senitas, and mammolarias during another “facelift,” and a previously undiscovered boojum seedling was found. The Joseph Wood Krutch cactus garden still stands as a symbol of the University’s responsibility as a Land Grant Institute to encourage land stewardship through research, education, and outreach, and of our continuing connection with our history, heritage, and responsibility as co-habitants of the Sonoran Desert.

**Krutch Garden Ethnobotany**

In the dry heat of June, before the monsoons, the Sonoran desert can certainly seem like a harsh environment. However, the native species that occur here today have adapted over millions of years to be able to thrive in the intense sunlight and heat, and through long periods of drought. For example, the creosote bush can survive for up to two years with no rain! Over time, interactions between the organisms here and the surrounding conditions have shaped this into one of the most green and diverse deserts in the world.

Human inhabitants have been a part of this process for a long time. Early hunter-gatherers and agriculturalists paid close attention to the relationships between the plants, animals, climate, and natural rhythms of the Sonoran desert. Native plants were the main sources of food and medicine for people, and people selected seeds from the best crops to plant for the next season. As propagators, pollinators, cultivators, and indirectly, humans have played their part in the formation of the striking settings we find ourselves in today.

In these modern times, we may forget that much of our medicine is derived from compounds found in plants that our clothes are made from their fibers, that their fruits, stalks, leaves, and roots sustain us, as well as the animals we use for food, and innumerable species of wildlife. We may find ourselves searching for a fading connection to our environment. It’s only natural. The connection is still there, and we have the tools to cultivate it, as we continue the ancient dance of life.

The Krutch garden, born at The University of Arizona almost as soon as the doors opened, has grown and developed with the University for 120 years. It stands as an insight into the past and a living laboratory testing sustainability into the future.
Krutch Garden Tour

1. Ocotillo - *Fouquieria splendens*

Ecology
- Rapid leaf production and senescence suggests CAM metabolism, although the leaves and stem both use C₃, photosynthesizing during the day (6)
- Hummingbirds are important pollinators, also what appear to be nectar-stealing carpenter bees and verdins have been found to effectively pollinate (6)
- Antelope ground squirrels feed on flowers and seeds (6)

Indigenous/Medicinal Use
- Used for fencing (sometimes as a living fence), house walls, ramada roofs (6)
- Flowers added to water for pleasant flavor (6)
- Flowers and/or nectar eaten by Seri, Cahuilla, Yavapai, Pima, Tohono and Hiá ced O’ohdam (2)
- Cahuilla used protein-rich seeds to make flour for mush or cakes (2)
2. Night-Blooming Cereus - *Peniocereus greggii*

Ecology
- few, thin, barely succulent stems, nocturnal white flowers are heavily scented and have long floral tubes (6)
- plants in each population bloom at the same time, almost all in the same night, flowers die at sunrise (6)
- pollinated by hawk moth (*Sphingidae*) which fly long distances for the nectar (6)
- red fruit eaten by birds (1)
- heavy agricultural pesticide use devastating to hawk moth: chemical habitat fragmentation (6, 2)

Indigenous/Medicinal Use
- tuberous root used to treat diabetes (6)
- Tohono O’odham boiled roots and drank as medicine for respiratory ailments, headaches, and to aid in digestion (2)
- flowers, roots, shoots and fruits eaten (2)
- in some Gila River Pima communities, these plants are protected (2)
- one of the first plants featured in the Krutch garden!

3. Cat Claw Acacia - *Acacia greggii* (wait-a-minute bush)

Ecology
- blossoms source of nectar for honeybees, insect pollinators (bees, flies, and butterflies) (6)
- has curved prickles, called “wait-a-minute” bush (6)
- legumes harbor nitrogen-fixing bacteria in the soil and produce high-protein seeds which are a food source for many wildlife species, especially insects (6)

Indigenous/Medicinal Use
- O’odham drink tea from roots for stomach and kidney problems (6)
- Seri and Yaqui use wood in bows (6)
- most often ground into coarse meal and made into cakes by indigenous (2)
- seeds can be stored, roasted, ground, made into bread (2)
- Indigenous women carried dried buds or blossoms in sachets as perfume
- wood for fuel and construction of baskets, hunting and fishing tools, fences and furniture
- legume called vaina, can be eaten fresh or ground for porridge, baked, used as coffee substitute
4. **Parry’s Agave - Agave Parryi**

Ecology
- pollinated by insects and hummingbirds
- seeds dispersed by wind (6)

Indigenous/Medicinal Use
- staple of Native American diet (2)
- leaves and hearts and stalks roasted, sunbaked and eaten (6)
- long central stalks can be boiled, dried, or eaten raw (2)
- heads often roasted/baked in large pits (2)
- heads and/or stalks are steamed, mashed and allowed to ferment, then distilled into *mescal* (6)
- juice drunk fresh as *aguamiel* (honey-water), or fermented into *pulque* (6)
- used for food, alcoholic and nonalcoholic beverages, syrup, fiber, cordage, clothing, sandals, nets, blankets, lances, fire hearths, musical instruments, hedgerows, soap, medicine, and ceremonial purposes (2)
- colorful juice used as multipurpose paint
- some native women used as rouge

5. **Boojum - Foquieria columnaris**

Ecology
- distinct, tapered succulent stem with light gray bark, with horizontal, spiny branches which produce leaves only when sufficient moisture is available (6)
- clusters of white, fragrant flowers are produced on the tops of primary stems in mid to late summer (6)
- endemic to Baja California but there is a very small population on the Gulf coast of Sonora (6)
- some bend and form loops (6)
- name comes from Lewis Carroll book, *The Hunting of the Snark*, the “boojum” being a mythical creature, named by Godfrey Sykes (6)
- different populations of species of insects pollinate in different years in response to environmental cues not yet known (6)
6. **Organ Pipe Cactus - *Stenocereus thurberi***

**Ecology**
- Pollinated by insects and bats especially long-nosed bats (6, 5)
- “pitahaya dulce” - red fruit, ripens in summer (June to August) (5), tastes like watermelon (1), fruits as large as oranges (2)
- White or purplish flowers (2)

**Indigenous/medicinal use**
- Favorite fruit to many native peoples (2)
- Is eaten fresh, as jam, fruit leather, syrups, wine, mashed seeds produce oily paste used as butter (5)
- Early missionaries tried to prevent natives from going to the pitahaya harvest due to its ceremonial significance (a time of great and lengthy celebration) but soon most realized the importance of the fruit as a food source (2)
- Seeds made into flour, used only in times of food scarcity (also "second harvest" from excrement) (5, 2)
- Woody ribs used in construction of fences, ceiling beams (5)
- Heated flesh used as compress for aches (6)
- Seri made boat sealant from flesh and animal fat (6, 5)- Tarahumara native people associate the organpipe cactus with the calendrical cycle and mythology associated with the macaw (5)
- Native Americans use to soothe snakebites

7. **Soaptree Yucca - *Yucca elata***

**Ecology**
- Creamy white flowers on stalk in May or June (6)
- Pollinated almost exclusively by yucca moth (either *Tegeticula yuccasaela* or *T. maculata*) who lays eggs on the ovaries, larvae depend on seed for food; production of fruit and moth population closely linked (6, 2)
- Dry, cork-like fruits (2)

**Indigenous/medicinal use**
- Roots when mashed make soapy substance that can be used for washing (6)
- Fruits, flowers, seeds and stalks edible (2)
- Textiles made from leaves - mats, baskets, ropes, nets, sandals, clothing, mattresses, hairbrushes (6, 2, 1)
- Flowers of Yucca known to be bitter but that of *Yucca elata* are regarded as having the best flavor and are primarily used by Tohono O’odham and Apache (2)
- Cattle eat and used as last resort livestock feed
8. Creosote - *Larrea tridentate* (greasewood)

**Ecology**
- evergreen with small yellow flowers, fruit is small, wooly ball (6)
- pollinated by insects, bees, 22 species of bees feed only on creosote flowers, creosote grasshopper, creosote katydid (6)
- extremely drought tolerant, can live for two years without rain (6)
- commonly a nurse plant for *Echinocereus*, *Mammallaria*, *Peniocereus* (6)
- diploid, tetraploid, and hexaploid in different areas, evolutionary adaptation to different environmental conditions (6)
- rain brings out wonderful scent, “the smell of rain” (6)
- clones itself by sending up satellite shoots, and as peripheral shoots are sent up, inner shoots die to form “doughnut” (6, 5)
- a creosote from a single seed in California has been found that is sixteen meters in radius, and estimated to be about 10,000 years old (6, 5)

**Indigenous/Medicinal Use**
- widely used by many native peoples for many medicinal purposes (6)
- called “greasewood” by Papago (6)
- Papago and Pima elders tell a creation story in which the creosote is the first living thing created from the soil of the Earth Maker’s breast, lac insect first animal from creosote (6)
- resin used as glue and for waterproofing (6)
- Seri smoked galls formed by creosote gall midge like tobacco (6)
- O’ohdam say it was first plant created, call it “greasewood” (6)
- noted for usefulness in treating nausea, menstrual cramps, intestinal discomfort, dandruff (5)
- currently marketed as “chaparral tea” (5)
- waxy coating used to prevent oils and fats from going rancid

9. Engelmann Prickly Pear - *Opuntia engelmannii*

**Ecology**
- pollinated by bees and other insects (6)
- also host for cochineal (6)
- produces copious amounts of fruit which may persist into the fall (6)
- eaten by and seeds dispersed by mammals, birds, rodents, desert tortoise, cactus beetle (6)
- habitat for desert animals including rodents and birds (6)
- naturally reproduce mostly vegetatively (6)

**Indigenous/medicinal use**
- may help control blood sugar and reduce cholesterol (6, 2)
-pads have sweet red pulp used for jams, candies, juices, nopalitos (6)
-boiled pads used in adobe plaster, used in restoration of San Xavier Mission (6)
-used for face cream
-useful for purifying drinking water
-glochids used for itching powder (to make you itch?)

10. **Jojoba - *Simmondsia chinensis* (pronounced hoe-HOE-buh)**

![Jojoba plant](image)

**Ecology**
- pollinated by wind (6) and insects
- forage for desert wildlife (javelina, deer, livestock, bighorn sheep), and nuts eaten by rodents, squirrels, birds, rabbits (6)
- evergreen (sometimes drought deciduous), dioecious, flowers in winter and produces nut-like fruit in summer (6)
- needs chilling hours for buds to mature and open after late winter rain (6)

**Indigenous/medicinal use**
- O’odham use paste of the nut as antioxidant salve on burns (6)
- fruits contain rare and valuable oil (actually a wax) - cosmetic use including shampoo, perfume, lotions, for skin problems and sores as salve (6, 1)
- industrial uses due to high resistance to going rancid (6)
- wax remains viscous at extreme temperatures (1)
- fruits edible by many animals but humans don’t enjoy - seed meal is toxic in large amounts, Seri do not consider it food (6)
- use as coffee substitute (1)
- chew raw seeds for sore throat, also used to ease child delivery (1)
- O’odham of Sonoran Desert used oil for hide preservation
- native uses include oil for styling hair and tea for stomach problems and rheumatism
- cultivated in AZ

11. **Bear Grass and Sotol - *Nolina microcarpa, Dasylirion wheeleri***

![Bear Grass and Sotol](image)

**Ecology**
- pollinated by insects
- yellowish- to bluish-green non-succulent rosette, inflorescence has thousands of tiny white flowers (6)

**Indigenous/Medicinal Use**
- stalks and seed eaten roasted and buds of flowers can be eaten (2)
- flowering stalks roasted in pits and eaten by Coahuila native people (6)
- sometimes used to make alcoholic drink (2)
- primary use for weaving textiles (2)
- Indigenous people used leaves to make baskets, brooms, sandals, mats (2)
- sometimes used for thatched roofs or huts (2)
12. **Saguaro - *Carnegiea gigantea***

**Ecology**
- Symbol of Sonoran desert (4)
- Seeds often dispersed by birds, especially doves, often in trees which serve as nurse plants which the saguaro may ultimately overtake by roots intercepting rainfall (4, 6)
- Birds, bees, and bats pollinate (6)
- Begin to flower between 40 and 75 years of age, begin to grow arms between 50 and 100 (6)
- Nesting place for birds, especially woodpeckers, Elf Owls and other birds occupy abandoned nests (6)

**Indigenous/medicinal use**
- Seri use “saguaro boots” (abandoned, fallen remains of callused woodpecker nests) to carry and store food (6)
- Fruits ripen in summer during period of food scarcity before monsoons, are used as food by native peoples including Pima, O’odham, Yavapai (6, 2)
- Special Tohono O’odham significance; calendar begins and ends based on fruiting time (“Saguaro Harvest Moon”, right after the “Painful Moon”), ceremonial use, make mild wine used in celebration of upcoming monsoon (6)
- Native people discarded outer fruit wall on the ground facing up, to encourage rain (2)
- Ribs used for harvesting fruit and building materials (6)

13. **Cardon - *Pachycereus pringlei* (elephant cactus, sahués, xaasj)**

**Ecology**
- May exceed 60 feet tall (6)
- White to red fruit (6)
- Pollinated by birds such as woodpeckers and doves, insects such as bees, butterflies, and bats (2)
- Pollinated primarily by bats (6, 5)
- Eaten by birds, coyotes, javelinas, foxes (5)
- Home for birds including hawk

**Indigenous/Medicinal Use**
- Used by SW Native Americans as food staple fresh, as pulp, or juice, Seri eat pulp and seeds (6)
- Fruits a food source to Baja Ca groups, Seri, Pima Bajo, Eudeve, Yaqui, Mayo, and Guarijio (2)
- Seri dried the pulp to be chewed dry, soaked, or boiled later (5)
- Seri and other store large amounts of seeds (also a “second harvest” plant in times of dire food scarcity) (5)
- Ribs used as firewood, fishing spears, hooking poles for harvest (5)
- Used to construct fences, corrals, walls, rafters, beds, walking sticks (6, 5)
- Ancient Seri custom to bury infant’s placenta at the base of this or saguaro cactus, child knows significance of “his” or “her” cactus (5)
- Seri would place children’s coffins in branches to protect from coyotes (5)
- stems half-roasted and used to treat toothache, however, may cause teeth to fall out (2)
- wood rot resistant
- flesh as wound bandage, painkiller, disinfectant, healing

**14. Indian Fig - Opuntia ficus-indica**

**Ecology**
- flowers and fruits vary in color yellow to orange flowers, red/purple or white/yellow fruits (2)
- region of origin is disputed; may be from central Mexico (2)
- shelter and forage for wildlife (6)
- naturally reproduce mostly vegetatively (6)
- pollinated primarily by bees that specialize in cacti (6)

**Indigenous/Medicinal Use**
- natives cultivated, is widely cultivated to this day all over the world (2)
- brought by missionaries from “New Spain” (2)
- fruits called “tunas,” eaten fresh or mashed into jam (3)
- young pads eaten as “nopalitos” (spines removed) (3)
- including pads in diet lowers levels of cholesterol and glycemia (2)
- most prized of the prickly pear fruits for flavor (3)
- pads cooked and eaten with chiles, onions, tomatoes, garlic (2)
- adobe construction: adhesive and water resistant properties (6)
- host for parasite cochineal - cochineal used for red and purple dye which were prized by many native peoples in the Americas, and Europeans, and is still used today (6)
- animals, livestock eat and used to remove parasites
- used as hedge
- pulp from pads used as moisturizer, sun protectant
- anti-inflammatory; healing and soothing agent for tarantula bites and soreness
- remedy for warts, kidney problems, measles

**15. Velvet Mesquite - Prosopis velutina**

**Ecology**
- seeds originally scarified/dispersed by megafauna, now riparian weathering and cattle (6)
- abundance in SW (6)
- bees pollinate (6)
- foliage eaten by animals (6)
- “bosques,” dense mesquite stands - habitat destruction (6)
- flowers edible, sweet (2)

**Indigenous/medicinal use**
- Tohono O’odham still make mesquite flour today, becoming commercially viable (6)
- beans known as pechitas, source of starch for indigenous people, honey valued (2)
- charcoal valued for flavor in grilled foods (6)
- wood lumber for building material (6)
used for basketry, fabric (6)
gum from stem used for candy, pottery glue, black dye (6)
piñon nuts and acorns were traded between native peoples for mesquite (2)
extensively used from pre-Colombian times to present (2)
River Pima had two calendar months that referenced velvet mesquite, “mesquite leaves moon” and “mesquite flowers moon” (2)
River Pima stored large quantities of mesquite flour (2)
sap used for cold and flu remedy
roots, bark, leaves used for conjunctivitis, intestinal parasites, acne, dandruff

Other species in the Krutch Garden:
Cochal - *Myrtillocactus cochal*

**Ecology**
-occurs in Baja California (6)
-up to 13 feet tall and wide (6)
can be found in bloom year round (2)
-small greenish-white flowers (7)
-fruits have no spines or glochids, look like large grapes or currants, myrtillo means “berry” in latin (7)
-insects, birds, especially hummingbirds, pollinators

**Indigenous/medicinal uses**
-“candelabra cactus” (7)
-prized for marble sized red fruit, acidic, similar to currant used for drinks, empanadas, candies, desserts (7)

Strawberry Hedgehog - *Echinocereus engelmannii* (could be *E. fasciculatis*, are both referred to as Strawberry Cactus and difficult to distinguish from one another, some even say they may be the same species (6, 2))

**Ecology**
-clusters of up to 60 stems (6)
-deep purple, red, lavender flowers, fruit has edible red pulp (6)
hummingbird and moth pollinators (6)
-fruit quickly consumed by wildlife (2)

**Indigenous/Medicinal Use**
-fruit pulp and juice can be eaten raw or preserved (6)
-fruit usually eaten as snack as there were usually few (2)
eaten by Hohokam, Hiá ced O’ohdam, Tohono O’ohdam, Seri indigenous people (2)
Wolfberry - *Lycium fremontii*.

**Ecology**
- drought deciduous (6)
- bee, butterfly, and hummingbird pollinators (6)
- habitat for desert creatures especially birds, birds eat fruit (6)
- red berries edible fruits - careful, they may blacken your teeth! (6, 2)

**Indigenous/medicinal use**
- SW indigenous people eat fruits fresh, mashed, dried, or juiced (6,2)
- used to make sauce with flour and water (2)
- eaten by Hiá ced O'ohdam and Tohono O'odham, Pima, Maricopa, Mohave, Quechan, and Cocopa peoples (2)
- ceremonial significance, use as painkiller

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Crucifixion Thorn - *Koeberlinia spinosa*

**Ecology**
- thicket habitat to small desert animals
- birds are main pollinators, birds enjoy fruit

**Indigenous/Medicinal Use**
- part of Native American diet (2)
- wood used for construction, furniture
- Native American use for sanitizing homes against measles, disease, with oily black smoke produced when burned
Senita - *Lophocereus schottii*

**Ecology**
- mature, flower-producing stems are densely covered in long, bristly, gray spines (6)
- pink nocturnal flowers emerge through the bristles, followed by small red fruit (6)
- mutual pollination-related relationship with a moth which pollinates the flowers and uses developing fruit for food for larvae (6)

**Indigenous/Medicinal Use**
- Mexican name borrowed from Indian name, *sina* (6)
- Senita roughly translates in Spanish to “little old woman” (6)
- Tipais used for treatment of diabetes (2)
- used for food by Seri, Tohono O’odham, Hiáced O’ohdam, Eudeve, and River Pima (2)
- Seri remember receiving syrup and preserves from Tohono O’odham, the only way they had access to the plant (2)

Creeping Devil - *Stenocereus eruca*

**Ecology**
- "creeps" across landscape over time: stems grow laterally with only the tip pointed upward, old stems die off as new stems root (6)
- found on central Pacific coast in Baja California (6)

**Indigenous/Medicinal Use**
- immature and mature fruit used for food, fresh or as a preserve (2)
Fishhook Pincushion - *Mammallaria grahammii*

**Ecology**
- small cacti with small pink or white flowers and small fruit (6)
- distinguishable from hedgehog cactus by hooked central spines (6)
- fruits are eaten by birds (6)
- cannot tolerate full sun, grows underneath cholla or desert shrubs such as bursage (6)
- buds produced in summer remain dormant through fall, winter, and spring, and burst into bloom after the first rain (6)

**Indigenous/Medicinal Use**
- edible fruit, called "coyote’s paws" by O’odham (6)

Image: [http://lithops.net](http://lithops.net)

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**Works Cited**