Special 25th Anniversary Issue

The Plant Press

THE ARIZONA NATIVE PLANT SOCIETY

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ANPS AT 25 -- REFLECTING ON OUR PAST

Ron Gass

People who lived in Arizona before Europeans arrived deeply appreciated our native plants. Perhaps their appreciation will never be surpassed; their very survival depended on the plants that grew here. We newcomers can only guess the true bounty yielded by plants. Using plants as a daily source of food, medicine and tools, and observing the bonds between plants and game animals, early Arizona residents would have been reminded constantly of just how intertwined their relationship was with plants.

Skipping to the turn of the 20th century, many of the older societies faded away as Europeans populated what is now Arizona. Europeans brought plants to support themselves and their animals. To them, these non-native plants were important.

Still, many people intrigued with Arizona's native flora studied and grew natives as research subjects and as landscape plants. There is a wonderful book entitled A Sense of Place by Janice Emily Bowers.

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On the first page, she quotes Forrest Shreve whose powerful words from 1926 could serve as written inspiration for the Arizona Native Plant Society, even though it was founded 50 years later. If you don't own this book, I encourage you to borrow it from a library to read what Shreve said. You won't regret it. And I suspect you will be fascinated. I hope this book is still in print.

It was appropriate that as the Arizona Native Plant Society worked to achieve legal status, some of its founding members came from institutions that pioneered public education in native plant studies. The Boyce Thompson Southwest Arboretum, the Desert Botanical Garden, and the Arizona-Sonora Desert Museum had already been in existence for many years and their collections (plantings) and knowledge were priceless for anyone interested in native plants. The USDA Plant Materials Center in Tucson offered a wealth of information in the practical aspects of testing and introducing new species and varieties. This organization also had a reverence for native species.

The articles of incorporation list the original directors as follows and I am sharing what I most remember about each one:

Frank Crosswhite from the Boyce Thompson Southwest Arboretum in Superior had the knowledge and enthusiasm to keep us motivated and in good spirits.

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PRESIDENT'S MESSAGE

Barb Skye

Dear ANPS members,

Hallelujah! Cool temperatures have arrived. Plants and people don't look as stressed now that summer is behind us. It is a shame that invasive exotic plants did not seem to be adversely affected by the drought!

Arizona Native Plant Society's habitat restoration group, the Sonoran Desert Weedwackers, is seeing a marked increase in volunteers willing to pull invasive exotic grasses. We are also encouraged to see neighborhood associations organizing eradication efforts. My husband Doug Siegel and I gave a presentation in September to Trails End Associations I and II, which is located on the east side of the Tucson Mountains. The Associations were split on a decision of whether or not to eradicate the fountain grass that has heavily infested their neighborhood. After Doug and I highlighted the dangers of fire and ecological degradation that can be caused by invasive exotics, they changed their vote to remove the fountain grass. Yeah!

A highlight of the meeting was the frightening tale told by one of the Trails End homeowners who described a mishap of a mailbox repair job. A welder accidentally overshot the mailbox post and torched 88 feet of roadside grasses in 7 minutes. To everyone's great relief, the fire truck arrived to put the fire out before it traveled around someone's home!

In addition to Weedwacker's conservation and outreach work, the Board is gearing up to increase ANPS activities statewide. On September 14th, the Board met at Tohono Chul Park for a strategic planning retreat. As a result, board members proposed measurable and attainable goals for 2003. The next step is to involve members as we strive to accomplish goals to broaden knowledge and appreciation of plants and habitats native to Arizona, protect those native plants, and encourage landscaping with native plants and other noninvasive plants appropriate to Arizona.

I encourage you all to check our Website (www.aznps.org) as we post volunteer opportunities as they arise.

Thanks for loving Arizona's native plants!

Barbara Skye Siegel, President

(From the editor: please note! Our president's name is now elongated, which means she tied the knot with Doug Siegel in August. Congratulations and may you have many years of marital happiness!)

ECOLOGICAL RESTORATION IN NORTHERN ARIZONA PONDEROSA PINE FORESTS:

Effects on Native and Introduced Plant Species

Judy Springer

Memories of the worst drought and fire season in recent history are still vivid. There is an ongoing and unprecedented bark beetle outbreak that is killing numerous trees in northern Arizona's forests. Forest restoration projects attempt to regain forest health by lowering tree density and reintroducing fire. These actions enhance habitat for many plant and animal species and decrease the risk of catastrophic wildfire.

Environmentalists, scientists, land managers, and citizens attempt to find common ground in the complex challenge of forest restoration. Unfortunately, following a large and devastating wildfire, there is a willingness to assign blame, oversimplifying the issue. Meaningful dialogue and compromise on how reforestation can be accomplished are lost in finger pointing.

Because ecosystems differ, it's dangerous to apply restoration principles garnered from one part of the country to ecosystems in another part of the country. There's no one-size-fits-all application of restoration. Tree thinning is subject to debate although the majority of the floral and faunal diversity is on the forest floor and in the soil, not in the tree crowns. Still, there are many types of fauna that do rely on the tree crowns, so conservation of old-growth trees is paramount. Restoration of fire-suppressed forests and recovery following wildfires in northern and eastern Arizona will take decades -- potentially centuries.

Ecological restoration is defined as "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (Society for Ecological Restoration 2002). Before restoration can be implemented on the ground, we must determine reference conditions and do a site assessment.

Reference conditions create a target for site restoration, usually to the former state existing before people of European descent settled the area. The ideal reference for the plant community is a relict area that has never been grazed by domestic animals, has not been commercially logged, and has maintained a regular fire interval. Such areas are very rare, but a few sites occur on the North Rim of the Grand Canyon and on mesas in southern Utah.

Site assessments involve gathering information on details of forest structure and fire history, composition and abundance of plant and animal species, physical and chemical characteristics of the soil, presence of pathogens, and land use history. Decomposition rates of dead trees in the Southwest are slow, allowing dendrochronologists (scientists who study tree rings) to reconstruct what the forest looked like in the late 1800's. Many tree species -- ponderosa pine in particular -- will form scars during fires. Dendrochronologists can date these scars to reconstruct fire history. Non-woody herbaceous species do not leave much permanent evidence to aid in re-establishing the herbaceous plant community, but historical accounts and photographs, oral histories, pollen studies and packrat middens could be used.

Southwestern ponderosa pine forests are characterized by frequent, cool, and low-to-the-ground fires that occur every 2-20 years. The Rodeo-Chediski fire in the White Mountains differs from these smaller fires by its severe heat that burned into the crowns of trees. A severe fire like the Rodeo-Chediski is uncharacteristic of this ecosystem.

Other definable characteristics of our local forest are large trees interspersed with grassy meadows and a diverse productive understory of native grasses, sedges, wildflowers and shrubs. Since approximately 1850 when European-Americans began to settle the land, an increasing number and density of small trees have led to a closed tree canopy causing little light to reach plants on the ground. Factors such as active fire suppression by government agencies, increased woody material (fuel load) on the forest floor, and overgrazing by both cattle and elk have all contributed to a

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Ecological Restoration (cont'd. from page 3)

decreased abundance and diversity of understory plants.

After European colonization, we hypothesize that the plant community has declined in species palatable to cattle and elk, in disturbance-adapted species or early successional species, and in understory diversity and biomass. The percentage of shade-tolerant species has probably increased. Wetland habitat has also disappeared in these forests, fostering an equal decline in aquatic species.

Restoring overcrowded forests can be expensive, both economically and ecologically. Various approaches are used such as removing some small trees while retaining old-growth trees, followed by prescribed burning. There is not a commercial market for many of the small trees, so they are often left on the ground to be burned, thus contributing to the fuel load. If the fuels burn too hot, some nutrients may volatilize and be forever lost from the site. Researchers are examining ways to market the small timber and to burn the thinning slash so that nutrients will remain on site and to lessen the impact on extant vegetation above ground and in the soil seed bank.

A favorable restoration increases light, water, nutrients, and exposed mineral soil to act as a seedbed. Natural regeneration relies on the soil seed bank and the colonizing ability of existing plants to re-vegetate an area following restoration treatment. In areas that have been heavily impacted, there may be a depauperate seed bank and few native plants to act as a seed source. On a small scale, seeds could be collected in a homeowner's yard, then brought to the site. On a large restoration project, a commercial source of seeds may be the only option if ground cover is needed to prevent soil erosion.

Seeding and transplanting are still experimental. Seeding with native species might achieve success, provided there is sufficient rainfall or snowfall. Seeding will increase species diversity and abundance, but there are many drawbacks. Native species are expensive and it is difficult to locate a sufficient supply of locally collected seeds. But perhaps the most undesirable effect is the introduction of new genotypes that originate far from the study area. These genotypes can interbreed with, or even outcompete, the locally adapted stock, leading to potentially undesirable changes in the gene pool. They may not be adapted to harsh conditions, such as severe drought, and may die if these conditions arise. New species can be unintentionally introduced through seed mixes or carried on tools, clothing and vehicles.

Non-native species are often an undesirable outcome of restoration. In many cases, both native and non-native early successional species are present in the soil seed bank and emerge following thinning and burning. Most non-natives are not detrimentally affected by fire, having evolved in ecosystems with frequent fires, quickly capitalizing on the newly created habitat. Whether native or not, early successional species can play a valuable role by preventing soil erosion, but monitoring is essential to detect invasions by noxious weeds. To prevent serious outbreaks, control efforts may need to be instituted prior to (or early in) the restoration process.

Further research is necessary to study the effects of restoration on rare species. Uncommon species are infrequently detected during monitoring. Plenty of habitat is created by thinning and burning, fostering the potential for an increase in rare species, particularly those that prefer increased light. But shade-tolerant species also need to be identified and protected and, for many species, there is insufficient seed source to quickly colonize a restored area. Ant- and gravity-dispersed species are particularly susceptible to competition from animal- or wind-dispersed species.

For more information on ecological restoration and restoration ecology:

Center for Restoration Ecology
http://www.ies.wisc.edu/cre/
Ecological Restoration Institute
http://www.eri.nau.edu
Native Plant Propagation Network
http://www.nativeplantnetwork.org/network/
Society for Ecological Restoration
http://www.ser.org/

Our Anniversary (cont'd. from page 1)

Dan Ducote from the Arizona-Sonora Desert Museum provided insight from the Museum's perspective and a lot of encouragement.

Mary Rose Duffield quietly guided us with her thoughts from her viewpoint and experience as a Tucson landscape architect. Her knowledge and work were of great value.

Rodney Engard from the Desert Botanical Garden in Phoenix brought thoughtfulness and humor, and a deep love of desert plants.

Ron Gass from Mountain States Wholesale Nursery, being totally disorganized, was in awe of the organizational skills of this group.

Louis Hamilton was retired from the USDA in Tucson and was a mentor of great skill who treasured native plants.

William Harlow from Harlow and Co. in Tucson brought extensive knowledge of the retail nursery business and a genuine appreciation of the potential of native plants.

Larry Holzworth from the Plant Materials Center in Tucson brought encouragement, enthusiasm, knowledge and an always-positive attitude.

Warren Jones, Professor of Landscape Architecture from the University of Arizona always inspired us with his contagious enthusiasm and incredible understanding.

Wayne Marx from Frontier Landscaping in Tucson helped develop decisions through the perspective of a landscape contractor and could quickly see to the heart of an issue.

William McGinnies from the Office of Arid Land Studies at the University of Arizona brought wisdom and the heart of a gentleman together with his dedication to desert plants.

Charles Sacamano from the Plant Sciences Department in the College of Agriculture at the University of Arizona exuded energy and brought his knowledge and teaching skills as superb contributions.

Irving Vincent from Florence guided us as legal counsel in the incorporation process and impressed everyone with his generosity with his services and his penstemons.

You can only imagine the ways that plant discussions tried to insert themselves as this group gathered. To be able to work with these people was a special gift and their diplomacy, kindness, and dedication will serve as lessons of a lifetime. Perhaps a tiny bit of organization might have also rubbed off. As in most of life, we owe a debt we can't repay to those who went before us, and we can only attempt to contribute something good to the world for those who follow us. The formation of a native plant society was a step in this direction.

From the beginning, the Arizona Native Plant Society integrated the concepts of encouraging native plant use with acknowledging the merits of arid land plants from other deserts. Reflecting back on the discussion, I remember we recognized the activities and decisions of the Boyce Thompson Arboretum and the Desert Botanical Garden in their search for useful desert plants without geographic restrictions. So with their work, together with collections by Warren Jones as evidence, there appeared to be little conflict. We also recognized the special mission of the Arizona-Sonora Desert Museum that limited its work to the Sonoran Desert. I remember we ended our discussion in agreement -- that introduced desert plants were too valuable to be excluded from consideration.

Both our native plants and adapted arid lands plants appeared to be suitable subjects for landscapes. Together they offered the prospect of beauty and adaptability to harsh conditions. This acceptance was centered on designed landscapes, but not on the revegetation of a natural Sonoran Desert or other native habitat.

Today, it is difficult to visualize our landscapes without native and other desert plants. Thirty years ago it was quite different. In the 1960's and 1970's, the landscape palette included privet and various cultivated junipers for groundcover and hedges. These and other southern California nursery plants were used in Tucson and Phoenix. For the fastest growing shade tree, nurseries usually recommended the fruitless (male) mulberry.

As for native plants, we owe a debt to the pioneer growers such as the Wheat family in Phoenix and Ralph and Lila McPheeters in Tucson for the good examples of established native plantings that were in existence at that time. Today's introduced species -- the genera of Acacia, Dalea, Salvia, and Leucophyllum -- expands our garden palette with their beauty. Janice Bowers's book A Sense of Place is aptly named and, in fact, I believe it inspired our early discussion on native and introduced desert plants. Dan Ducote wisely observed that beauty is the ultimate goal of using native plants - not low water use or heat tolerance. These attributes simply accompany the beauty.

PRUNERS IN THE WILDERNESS

Michael J. Plagens

A gardener or horticulturist is often astonished by the beauty and form of desert trees and shrubs encountered far from civilization where no pruning shears have gone before. This is in marked contrast to a native shrub kept in the garden, where pruning often involves considerable time and expertise and where the result is often a pale second to Nature's effort. How is this possible?

Shrubs often drop branches and twigs without any assistance, especially those that have become shaded or when drought stricken. But shrubs also get considerable pruning assistance from a variety of wildlife. The most frequent pruners are beetles of many kinds. Adult beetles crawl over the plant and visit the flowers, but the stage responsible for most pruning activities are the larvae (white grubs) that bore through the woody stems and branches.

There are two principal kinds of boring beetles, flat-headed and round-headed, whose galleries in cross section easily distinguish them. Flat-headed borers create a flattened oval hole, while round-headed borers make a perfectly round hole. Some beetles prefer the phloem (the germ layer just beneath the bark) and others the solid xylem. As adults the flat-borers are known as Long-horned beetles for their long, conspicuous antennae. Round-headed borers are the metallic wood-boring beetles as adults.

Although woodborers will occasionally bore straight into healthy, living branches, the vast majority prefers dead or weakened ones. As a tree grows, it begins shading lower growth. Earlier branches become stressed as the host shrub diverts water and minerals to more productive branches. The dead or dying branch is attractive to beetles, where they lay eggs, and the hatchling grubs proceed to hollow out the twig. Once the twig becomes riddled with gallery tunnels, it's easy for a gust of wind to sheer it off.

Unlike the garden tree that gets frequent, or at least regular watering, the tree in the wilderness is subject to climate variations. A series of drought years may be occasionally punctuated by extraordinarily wet years. Without access to long-range NOAA (National Oceanic and Atmospheric Administration) forecasts, the tree responds to natural conditions. With the onset of drought, the tree must abort twigs and branches that can no longer be sustained. The ever-present beetles are ready to assist.

So what keeps these beetles from tunneling into green twigs? The answer is sap. A small beetle grub, just emerged from its egg, who attempts to bore into a healthy stem will be swept out or trapped by a gush (relative to the size of the insect) of often sticky or chemically noxious sap. The copious and heavy sap of mesquite trees (*Prosopis*) will even gum up the larva's breathing and locomotion and kill it. The tree is not defenseless in protecting its investments.

Yet there is one common desert beetle that has figured a way to breach the mesquite's defense. The Mesquite Girdler (Cerambycidae: *Oncideres rhodosticta*) finds a mesquite twig about 1 cm in diameter and then cuts a groove with its sharp mandibles around the circumference of the twig, thus girdling it. Once done, the beetle lays an egg in the distal portion of the twig where the flow of sap has been interrupted. Hatchling grubs make easy passage into the twig. The twigs whither and die shortly after being girdled, and are weakened enough to eventually break off at the girdle. Occasionally, great numbers of these beetles will severely prune every tree over an extended area.

The Mesquite Girdler is one of the flat-headed borers, so it is surprising that many of the girdled twigs have round instead of flattened oval boreholes. To solve the mystery, we find that round-headed borers usurp the girdler's ingenious effort by laying their own eggs in the withering twigs. The round-headed borers often out-compete the girdlers putting an end to the girdlers' population explosion. Next season, all the boring beetles are gone since the round-headed kind cannot attack green twigs. The trees rebound with a uniform crown of new growth.

Whether from the girdler or from the hundreds of other species of woodboring beetles, desert trees typically present countless tunneled galleries through their dead or dying branches. The tunnels offer nest sites for many desert bees that, in turn, are vital pollinators for trees and wildflowers.

Your garden probably has some of these desert pruners, especially if you've left your sheers in the shed.

UNIVERSITY OF ARIZONA CAMPUS ARBORETUM

Patsy Waterfall

On September 28th the University of Arizona Campus Arboretum celebrated its grand opening and acceptance into the American Association of Botanical Gardens and Arboreta. The speeches, food, tours, a vine-cutting, membership sales, and boojums ended three years of hard work by the Arboretum Committees and Elizabeth (Libby) Davison, Arboretum Director.

Early attempts at establishing an arboretum on campus had been unsuccessful. But in 1999, concern over the vulnerability of old trees near new building construction prompted the general question of how best to preserve historic and botanical resources on the University's grounds. A campus committee of faculty, staff, and academic professionals met and established the University of Arizona Campus Arboretum. Committee members represent the UA Alumni Association, the College of Agriculture and Life Sciences, the College of Architecture, Planning, and Landscape Architecture, Campus and Facilities Planning, Facilities Management, Plant Science Department, University of Arizona Herbarium, Pima County Cooperative Extension, and the Desert Legume Program. Working in concert with the campus committee is an advisory committee comprising community professionals and volunteers who provide advice, professional time, in-kind and financial support, and volunteer time.

There are many reasons to protect the campus trees. First, the University of Arizona plant collection has historical significance. Landscaping the campus was a priority from the time Old Main was built. Many plants have been installed by faculty and students, or donated by graduating classes. Robert H. Forbes, an early faculty member, planted the hundred-year-old olives trees that shade the north mall. Several dozen campus trees are the only existing specimens in Arizona, and some are unique in the entire Southwest. A few trees were the first to be planted in the Western Hemisphere.

Although there are many exotic species on campus, most trees are from arid areas that are well-suited to the rigors of our Sonoran Desert climate. The Joseph Wood Krutch Desert Garden is a legacy from the original late-1920's cactus garden that once filled the entire mall east of Old Main. In later years, Warren Jones, Professor of Landscape Architecture, was instrumental in bringing many new species from other arid environments to the campus.

The University of Arizona campus qualifies as an arboretum. The grounds contain thousands of trees representing over 300 species from around the world, and have a comparable number of shrubs. The 115-year-old collection is valuable for its breadth, its age and the rarity of dozens of individual species. The 350-acre grounds are used for instruction, research and outreach. On an annual basis, 600 students enroll in classes which use the campus as a classroom. The University of Arizona campus landscaping has been a "field trip destination" for docents from the Tucson Botanical Gardens, members of the Arizona Native Plant Society, Master Gardeners, Trees for Tucson, and other interested citizen groups.

The mission of the UA Campus Arboretum is "to preserve, manage, enhance, and expand a vital collection of plants in an active, urban Sonoran Desert setting; and to showcase the historic, aesthetic, environmental, economical, and educational value of these plants within our community and the American Southwest." The Campus Arboretum also plays an important role as part of the "urban forest" of greater Tucson. The University of Arizona is the only land grant institution in the Sonoran Desert. The UA Campus Arboretum has the potential to become a valuable botanical, instructional, and community resource for the citizens of Tucson and university visitors, for its plants from the Sonoran Desert and from other arid regions throughout the world.

For more information visit our Website
http://arboretum.arizona.edu
or contact Libby Davison at
(520) 621-7074 / edavison@ag.arizona.edu

CASNER RESEARCH NATURAL AREA PLANT LIST

Max Licher

Research Natural Areas (RNA) are specifically-defined acreage within National Forests where natural processes are permitted free rein, and are preserved exclusively for research and education. The Casner RNA is one of two such designated areas in the Red Rock Ranger District of the Coconino National Forest. The other RNA is a portion of the West Fork of Oak Creek. Casner provides a valuable research laboratory because of its exemplary stands of Arizona cypress and exposed layers of Supai sandstone.

Established in 1973, the Casner RNA is located approximately 2.4 miles northeast of Sedona, Arizona, east of Oak Creek at the mouth of Oak Creek Canyon. Elevations range from 4,500 to 5,800 feet. Steep topography and rough terrain limit access. The Casner RNA has no designated roads, trails, or recreation sites. Livestock grazing and mineral exploration and extraction are prohibited.

The Casner RNA covers 565 acres that are comprised of cypress woodlands (438 acres) and slickrock benches and cliffs (115 acres). Casner Wash, carrying seasonal spring snowmelt and monsoon runoff, forms the northern boundary. The RNA includes several upper draws below Schnebly Hill Road and a major side canyon to the south. The washes, draws, and steep slopes contain a prime example of the Arizona cypress woodland environment. Supai sandstone benches separate the draws, rising to the Schnebly Hill cliff formations at the southern boundary. These slickrock areas support a unique association of plant species. In some places, chaparral thickets (12 acres) form a transition between the cypress woodlands and the slickrock benches.

When the Casner RNA was designated in 1973, there was little baseline data on vegetation. In 2000, the local Friends of the Forest volunteer program began field work to make a complete plant listing. During 2000-2001, Max Licher conducted approximately 15 hikes through the RNA for visual observation. Although some plant samples were taken for herbarium comparisons, official collections are not presently a part of this project. The plant list is a work-in-progress. Several taxa need to be observed in flower or seed for specific identification. Because of recent forest closures due to this year's drought, data collection for the plant list has been curtailed.

Lycopodiophyta	**CLUBMOSSES**
Selaginellaceae	SPIKEMOSS FAMILY
Selaginella underwoodii	Underwood's Spikemoss
Pteridophyta	**FERNS**
Pteridaceae	MAIDENHAIR FERN FAMILY
Cheilanthes feei	Slender Lip Fern
Cheilanthes fendleri	Fendler's Lip Fern
Cheilanthes wootonii or C. yavapensis	Beaded Lip Fern /Yavapai Lip Fern
Pellaea atropurpurea	Purple Cliff Brake
Pellaea truncata (Pellaea longimucronata)	Spiny Cliff Brake
Coniferophyta	**GYMNOSPERMS**
Cupressaceae	CYPRESS FAMILY
Cupressus arizonica	Arizona Cypress
Juniperus coahuilensis (Juniperus erythrocarpa)	Redberry Juniper
Juniperus osteosperma (Juniperus utahensis)	Utah Juniper
Pinaceae	PINE FAMILY
Pinus edulis	Pinyon
Pinus ponderosa	Ponderosa Pine
Gnetophyta	**JOINT-FIRS**
Ephedraceae	EPHEDRA FAMILY
Ephedra viridis	Mormon Tea
Magnoliophyta	**FLOWERING PLANTS**
Magnoliopsida	**DICOTYLEDONS**
Amaranthaceae	PIGWEED FAMILY
Amaranthus blitoides (Amaranthus graecizans)	Prostrate Pigweed
Anacardiaceae	SUMAC FAMILY
Rhus ovata	Sugar Sumac
Rhus trilobata	Squaw Bush
Toxicodendron rydbergii (Rhus radicans var. rydbergii)	Poison Ivy
Apiaceae	PARSLEY FAMILY
Aletes macdougalii	MacDougal's Indian Parsley
Daucus pusillus	American Carrot
Asclepiadaceae	MILKWEED FAMILY
Asclepias asperula	Antelope Horns
Asteraceae	SUNFLOWER FAMILY
Acourtia wrightii (Perezia wrightii)	Brownfoot

Ambrosia confertiflora (Franseria confertiflora)	Slimleaf Bursage
Ambrosia psilostachya (Franseria psilostachya)	Western Ragweed
Artemisia campestris var. scouleriana (Artemisia pacifica)	Field Sagewort
Artemisia dracunculus (Artemisia dracunculoides)	False Tarragon
Artemisia ludoviciana	Louisiana Sagewort
Baccharis emoryi	Emory's Baccharis
Baccharis sarothroides	Desert Broom
Bahia dissecta	Ragleaf Bahia
Brickellia californica	California Brickellbush
Brickellia microphylla var. scabra (Brickellia scabra)	Rough Brickellbush
Chaetopappa ericoides (Leucelene ericoides)	Rose Heath
Conyza canadensis	Horseweed
Ericameria laricifolia (Haplopappus laricifolius)	Turpentine Bush
Erigeron divergens	Spreading Fleabane
Erigeron flagellaris	Trailing Fleabane
Erigeron oreophilus	Chaparral Fleabane
Gutierrezia microcephala	Threadleaf Snakeweed
Gutierrezia sarothrae	Broom Snakeweed
Heliomeris longifolia var. annua (Viguiera annua)	Annual Goldeneye
Hymenopappus filifolius	Fineleaf Woollywhite
Hymenothrix wrightii	Wright's Thimblehead
Hymenoxys cooperi	Cooper's Rubberweed
*Lactuca serriola	Prickly Lettuce
Machaeranthera canescens (inc. Aster canescans & Aster tephrodes)	Hoary Tansyaster
Machaeranthera pinnatifida (Haplopappus spinulosus)	Lacy Tansyaster
Melampodium leucanthum	Blackfoot Daisy
Packera quercetorum (Senecio quercetorum)	Oak Creek Ragwort
Parthenium incanum	Mariola
Pseudognaphalium canescens (Gnaphalium wrightii)	Wright's Cudweed
Solidago wrightii	Wright's Goldenrod
*Sonchus asper	Spiny Sowthistle
Stephanomeria minor (Stephanomeria tenuifolia)	Narrowleaf Wirelettuce
*Taraxacum laevigatum	Red-seeded Dandelion
Tetraneuris acaulis	Stemless Fournerve Daisy
Townsendia incana (inc. Townsendia arizonica)	Hoary Townsend Daisy
*Tragopogon dubius	Yellow Salsify
Uropappus lindleyi (Microseris linearifolia)	Silverpuffs
Berberidaceae	BARBERRY FAMILY
Berberis haematocarpa (Mahonia haematocarpa)	Red Barberry
Brassicaceae	MUSTARD FAMILY
Arabis perennans	Perennial Rockcress
Draba asprella	Rough Draba
Draba cuneifolia	Wedgeleaf Draba
Erysimum capitatum	Western Wallflower
Lepidium sp.	Pepperweed sp.
Lesquerella cinerea	Basin Bladderpod
Streptanthus cordatus	Heartleaf Twistflower
Thelypodium wrightii	Wright's Thelypody
Thysanocarpus curvipes	Sand Fringepod
Cactaceae	CACTUS FAMILY
Echinocereus coccineus var. coccineus (Echinocereus triglochidiatus var. melanacanthus)	Claret Cup Cactus
Escobaria vivipara (Coryphantha vivipara)	Spinystar
Opuntia engelmannii	Engelmann Pricklypear
Opuntia phaeacantha	Brownspine Pricklypear
Capparaceae	CAPER FAMILY
Polanisia dodecandra (Polanisia trachysperma [in part])	Western Clammyweed
Caryophyllaceae	PINK FAMILY
Silene antirrhina	Sleepy Catchfly
Chenopodiaceae	GOOSEFOOT FAMILY
Chenopodium fremontii	Fremont Goosefoot
Convolvulaceae	MORNING-GLORY FAMILY
*Convolvulus arvensis	Field Bindweed
Ipomoea costellata	Crestrib Morning-glory
Crossosomataceae	CROSSOMA FAMILY
Glossopetalon spinescens var. aridum (Forsellesia nevadensis)	Spiny Greasebush
Ericaceae	HEATH FAMILY
Arctostaphylos pringlei	Pringle's Manzanita
Arctostaphylos pungens	Pointleaf Manzanita
Euphorbiaceae	SPURGE FAMILY
Chamaesyce fendleri (Euphorbia fendleri)	Fendler's Sandmat
Chamaesyce revoluta (Euphorbia revoluta)	Threadstem Sandmat
Chamaesyce serpyllifolia (Euphorbia serpyllifolia)	Thymeleaf Sandmat
Euphorbia spathulata	Warty Spurge
Fabaceae	LEGUME FAMILY
Astragalus lentiginosus	Freckled Milkvetch
Astragalus nuttallianus	Smallflowered Milkvetch
Astragalus tephrodes	Ashen Milkvetch
Dalea formosa	Feather Dalea
Lotus humistratus	Hill Lotus
Lotus mearnsii	Mearns' Lotus
Lupinus concinnus	Elegant Lupine
*Melilotus alba	White Sweetclover
*Melilotus officinalis	Yellow Sweetclover
Psoralidium tenuiflorum (Psoralea tenuiflora)	Slimflower Scurfpea
Robinia neomexicana	New Mexico Locust
Vicia ludoviciana (inc. Vicia exigua)	Louisiana Vetch
Fagaceae	BEECH FAMILY
Quercus arizonica	Arizona White Oak
Quercus chrysolepis	Canyon Live Oak
Quercus emoryi	Emory Oak
Quercus gambelii	Gambel Oak
Quercus palmeri (Quercus dunnii)	Palmer Oak

Quercus X pauciloba (Quercus undulata)	Wavyleaf Oak
Quercus turbinella	Scrub Oak
Garryaceae	SILKTASSEL FAMILY
Garrya flavescens	Yellowleaf Silk Tassel
Garrya wrightii	Wright's Silk Tassel
Gentianaceae	GENTIAN FAMILY
Frasera albomarginata (Swertia albomarginata)	Desert Frasera
Geraniaceae	GERANIUM FAMILY
*Erodium cicutarium	Filaree
Hydrangeaceae	HYDRANGEA FAMILY
Fendlera rupicola	Cliff Fendlerbush
Philadelphus microphyllus	Littleleaf Mock Orange
Hydrophyllaceae	WATERLEAF FAMILY
Eriodictyon angustifolium	Narrowleaf Yerba Santa
Juglandaceae	WALNUT FAMILY
Juglans major	Arizona Walnut
Lamiaceae	MINT FAMILY
Hedeoma drummondii	Drummond's False Pennyroyal
Hedeoma oblongifolium	Oblongleaf False Pennyroyal
Monarda fistulosa var. menthifolia (Monarda menthifolia)	Wild Bergamot
Malvaceae	MALLOW FAMILY
Abutilon parvulum	Dwarf Indian Mallow
Sphaeralcea fendleri	Fendler's Globemallow
Sphaeralcea parvifolia	Littleleaf Globemallow
Moraceae	MULBERRY FAMILY
*Morus alba	White Mulberry
Nyctaginaceae	FOUR O'CLOCK FAMILY
Mirabilis pumila (Oxybaphus pumilus)	Dwarf Four O'clock
Oleaceae	OLIVE FAMILY
Forestiera pubescens var. pubescens (Forestiera neomexicana)	Desert Olive
Fraxinus anomala	Singleleaf Ash
Fraxinus velutina (Fraxinus pennsylvanica ssp. velutina)	Velvet Ash
Menodora scabra	Rough Menodora
Onagraceae	EVENING PRIMROSE FAMILY
Oenothera caespitosa	Tufted Evening Primrose
Platanaceae	PLANE TREE FAMILY
Platanus wrightii	Arizona Sycamore
Polemoniaceae	PHLOX FAMILY
Ipomopsis multiflora (Gilia multiflora)	Manyflowered Gilia
Polygonaceae	
BUCKWHEAT FAMILY	
Eriogonum heermannii	Heermann's Buckwheat
Eriogonum jamesii var. flavescens (Eriogonum bakeri)	James' Buckwheat
Eriogonum pharnaceoides	Wirestem Buckwheat
Eriogonum wrightii	Wright's Buckwheat
*Polygonum aviculare	Prostrate Knotweed
Portulacaceae	PURSLANE FAMILY
*Portulaca oleracea	Common Purslane
Ranunculaceae	BUTTERCUP FAMILY
Anemone tuberosa	Desert Windflower
Delphinium scaposum	Barestem Larkspur
Myosurus cupulatus	Arizona Mousetail
Thalictrum fendleri	Fendler's Meadow Rue
Rhamnaceae	BUCKTHORN FAMILY
Ceanothus greggii	Desert Ceanothus
Frangula californica (Rhamnus californicus)	California Buckthorn
Rhamnus ilicifolia (Rhamnus crocea var. ilicifolia)	Hollyleaf Buckthorn
Rosaceae	ROSE FAMILY
Cercocarpus montanus var. paucidentatus (Cercocarpus breviflorus)	Hairy Mountain Mahogany
Fallugia paradoxa	Apache Plume
Purshia stansburiana (Cowania mexicana var. stansburiana)	Stansbury Cliffrose
Rubiaceae	MADDER FAMILY
Galium wrightii	Wright's Bedstraw
Rutaceae	RUE FAMILY
Ptelea trifoliata (Ptelea angustifolia & P. pallida)	Common Hoptree
Salicaceae	WILLOW FAMILY
Populus fremontii	Fremont Cottonwood
Salix exigua	Coyote Willow
Salix gooddingii	Goodding's Willow
Salix laevigata (Salix bonplandiana var. laevigata)	Red Willow
Santalaceae	SANDALWOOD FAMILY
Comandra umbellata ssp. pallida (Comandra pallida)	Bastard Toadflax
Saxifragaceae	SAXIFRAGE FAMILY
Heuchera parvifolia	Littleleaf Alumroot
Scrophulariaceae	FIGWORT FAMILY
Castilleja linariifolia	Wyoming Indian Paintbrush
Cordylanthus parviflorus	Purple Bird's-beak
Cordylanthus wrightii ssp. tenuifolius (Cordylanthus tenuifolius)	Wright's Bird's-beak
*Linaria dalmatica (Linaria genistifolia ssp. dalmatica)	Dalmatian Toadflax
Mimulus guttatus	Common Monkeyflower
Pedicularis centranthera	Dwarf Lousewort
Penstemon barbatus	Beardlip Penstemon
Penstemon eatonii	Eaton's Penstemon
Penstemon linarioides	Toadflax Penstemon
Penstemon palmeri	Palmer's Penstemon
Penstemon pseudospectabilis	Desert Penstemon

Penstemon rostriflorus (Penstemon bridgesii)	Bridge's Penstemon
Solanaceae	NIGHTSHADE FAMILY
Datura wrightii (Datura metcloides)	Sacred Datura
Nicotiana obtusifolia (Nicotiana trigonophylla)	Desert Tobacco
Physalis hederifolia	Ivyleaf Groundcherry
Tamaricaceae	TAMARISK FAMILY
*Tamarix chinensis (Tamarix pentandra)	Fivestamen Tamarisk
Ulmaceae	ELM FAMILY
Celtis laevigata var. reticulata (Celtis reticulata)	Netleaf Hackberry
Verbenaceae	VERBENA FAMILY
Glandularia gooddingii (Verbena gooddingii)	Southwestern Mock Vervain
Violaceae	VIOLET FAMILY
Hybanthus verticillatus	Babyslippers
Viscaceae	MISTLETOE FAMILY
Arceuthobium divaricatum	Pinyon Dwarf Mistletoe
Phoradendron coryae (Phoradendron villosum ssp. coryae)	Oak Mistletoe
Phoradendron densum (Phoradendron bolleanum var. densum)	Dense Mistletoe
Phoradendron juniperinum	Juniper Mistletoe
Phoradendron macrophyllum	Big-leaf Mistletoe
Vitaceae	GRAPE FAMILY
Vitis arizonica	Canyon Grape
Liliopsida	**MONOCOTYLEDONS**
Agavaceae	AGAVE FAMILY
Agave parryi	Parry's Agave
Nolina microcarpa	Beargrass
Yucca baccata	Banana Yucca
Cyperaceae	SEDGE FAMILY
Carex sp.	Sedge
Cyperus squarrosus (Cyperus aristatus)	Bearded Flatsedge
Juncaceae	RUSH FAMILY
Juncus bufonius	Toad Rush
Juncus dudleyi (Juncus tenuis var. dudleyi)	Dudley's Rush
Juncus ensifolius (inc. Juncus saximontanus)	Swordleaf Rush
Liliaceae	LILY FAMILY
Calochortus ambiguus	Doubting Mariposa Lily
Dichelostemma capitatum (Dichelostemma pulchellum)	Bluedicks
Poaceae	GRASS FAMILY
Achnatherum hymenoides (Oryzopsis hymenoides)	Indian Ricegrass
Achnatherum speciosum (Stipa speciosa)	Desert Needlegrass
Aristida adscensionis	Sixweeks Threeawn
Aristida oligantha	Prairie Threeawn
Aristida purpurea var. longiseta (Aristida longiseta)	Red Threeawn
Aristida purpurea var. nealleyi (Aristida glauca)	Blue Threeawn
Aristida purpurea var. purpurea	Purple Threeawn
Aristida schiedeana var. orcuttiana (Aristida orcuttiana)	Orcutt's Threeawn
Bothriochloa barbinodis (Andropogon barbinodis)	Cane Bluestem
Bouteloua aristidoides	Needle Grama
Bouteloua curtipendula	Sideoats Grama
Bouteloua gracilis	Blue Grama
Bouteloua hirsuta	Hairy Grama
*Bromus japonicus	Japanese Brome
Bromus marginatus/polyanthus	Mountain Brome
*Bromus rubens	Red Brome
*Bromus tectorum	Cheatgrass
*Echinochloa crus-galli	Barnyard Grass
Elymus elymoides (Sitanion hystrix)	Squirreltail
Enneapogon desvauxii	Spike Pappusgrass
Eragrostis intermedia	Plains Lovegrass
Eragrostis mexicana (inc. Eragrostis neomexicana)	Mexican Lovegrass
Eragrostis pectinacea (inc. Eragrostis diffusa & E. arida)	Tufted Lovegrass
Erioneuron pilosum (Tridens pilosus)	Hairy Tridens
Hesperostipa comata (Stipa comata)	Needle and Thread
Leptochloa dubia	Green Sprangletop
Leptochloa panicea ssp. brachiata (Leptochloa filiformis)	Red Sprangletop
Lycurus setosus	Bristly Wolfstail
Muhlenbergia emersleyi	Bullgrass
Muhlenbergia fragilis	Delicate Muhly
Muhlenbergia minutissima	Annual Muhly
Muhlenbergia pauciflora	New Mexico Muhly
Muhlenbergia rigens	Deergrass
Panicum hallii	Hall's Panicgrass
Poa bigelovii	Bigelow's Bluegrass
Poa fendleriana	Muttongrass
*Polypogon monspeliensis	Annual Rabbitsfoot Grass
*Polypogon viridis (Agrostis semiverticillata)	Water Bentgrass
Schizachyrium scoparium (Andropogon scoparius)	Little Bluestem
Sporobolus compositus (Sporobolus asper)	Tall Dropseed
Sporobolus contractus	Spike Dropseed
Sporobolus cryptandrus	Sand Dropseed
Sporobolus neglectus	Puffsheath Dropseed
Tridens muticus	Slim Tridens
Vulpia octoflora (Festuca octoflora)	Sixweeks Fescue
Typhaceae	CATTAIL FAMILY
Typha sp.	Cattail

2002 SUPPLEMENT FOR FLORA OF THE GRAN DESIERTO & RÍO COLORADO OF NORTHWESTERN MEXICO

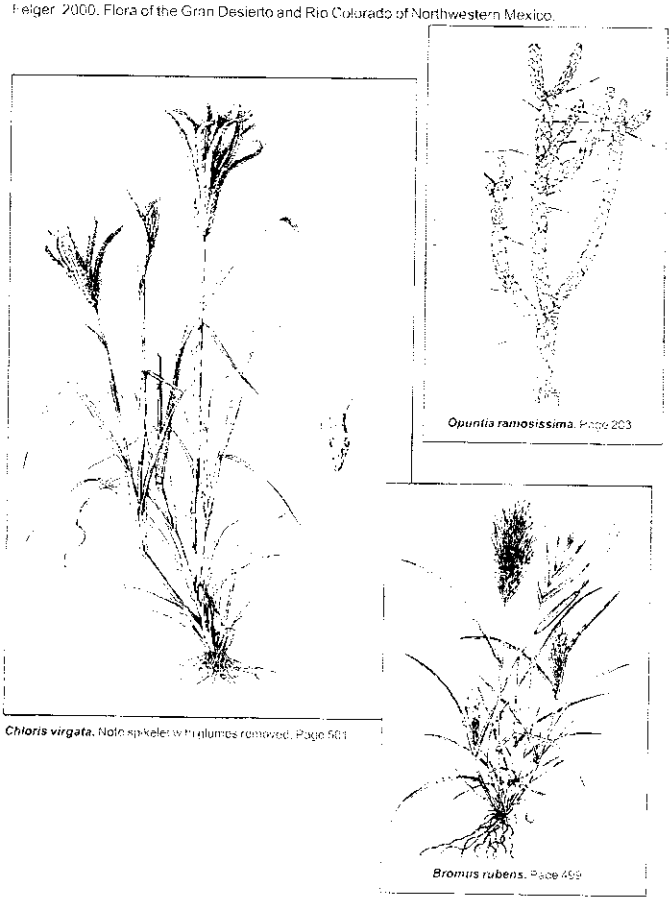
Richard Stephen Felger

University of Arizona Press. 2000.
Also see: University of Arizona Herbarium (ARIZ) website:
http://eebweb.arizona.edu/HERB/index.html

Page 41. Table 2, gives 79 non-native species; the correct number is 88: 54 Dicotyledons and 34 Monocotyledons (p. 33 and Appendix D, p. 604).

Page 45. Astrolepis instead of Astrolepsis.

Selaginellaceae: Habit drawing represents S. eremophila. (A) S. arizonica; (B) S. eremophila. The illustrations represent dorsal (adaxial) surfaces of leaves. The larger leaves (1) are from the undersides of stems, the smaller leaves (2) are from the upper sides of stems.



Page 74. Rhus aromatica. The variety in the flora area best conforms to var. trilobata (Nuttall) A. Gray [R. trilobata Nuttall ex Torrey & A. Gray]. Western North America from Alberta to Iowa to northern Mexico.

Page 85. Add to the flora: Matelea parvifolia (Torrey) Woodson. Small perennial vines. Leaves more or less arrow-shaped. Flowers olive green to brown-purple; fruits elongated with a few blunt tubercles. Found at the northeastern margin of the flora area. Vining in shrubs along washes and small arroyos in the Sierra Cipriano southwest of Sonoyta; more common in nearby Arizona. Mojave Desert in California and southern Nevada to Texas, Baja California and Sonora.

10 km SW of Sonoyta on Mex Hwy 8, locally common, F 88-172.

Page 128. Encelia farinosa. Hierba del bazo, not hierba del vaso.

Page 203. Illustration for Opuntia ramosissima is a repeat of O. fulgida (see page 4.

Page 215-223. Opuntia. There is strong evidence for more natural generic definitions in the subfamily Opuntioideae. In this regard, Opuntia sensulato in western North America is treated as three rather well defined genera: Cylindropuntia, Grusonia (Corynopuntia), and Opuntia. References: E. F. Anderson. 2001. The Cactus Family. Timber Press. Portland, Oregon. D. Hunt & N. Taylor, eds. 2002. Studies in the Opuntioideae (Cactaceae). David Hunt. Sherborne, England.

Cylindropuntia. Cholla. Southwestern United States, Mexico, and the Caribbean; 34 species. Reference: D. J. Pinkava. 1999. Vascular Plants of Arizona: Cactaceae, Cactus Family, part three, Cylindropuntia (Engelm.) Knuth, Chollas. Journal of Arizona-Nevada Academy of Science 32:32-47.

cont'd. on page 13

Flora of Gran Desierto (cont'd. from page 12)

Cylindropuntia acanthocarpa (Engelmann & J. M. Bigelow) F. M. Knuth [Opuntia acanthocarpa Engelmann & J. M. Bigelow].

Cylindropuntia acanthocarpa var. coloradensis (L. D. Benson) Pinkava [Opuntia acanthocarpa var. coloradensis L. D. Benson].

Cylindropuntia acanthocarpa var. major (Engelmann & J. M. Bigelow) Pinkava [Opuntia acanthocarpa var. major (Engelmann & J. M. Bigelow) L.D. Benson].

Cylindropuntia arbuscula (Engelmann) F. M. Knuth [Opuntia arbuscula Engelmann].

Cylindropuntia bigelovii (Engelmann) F. M. Knuth var. bigelovii [Opuntia bigelovii Engelmann var. bigelovii].

Cylindropuntia echinocarpa (Engelmann & J. M. Bigelow) F. M. Knuth [Opuntia echinocarpa Engelmann & J. M. Bigelow].

Cylindropuntia fulgida (Engelmann) F. M. Knuth var. fulgida [Opuntia fulgida Engelmann var. fulgida].

Cylindropuntia leptocaulis (de Candolle) F. M. Knuth [Opuntia leptocaulis de Candolle].

Cylindropuntia ramosissima (Engelmann) F. M. Knuth [Opuntia ramosissima Engelmann].

Grusonia. North American deserts; 13 species. Reference: D. J. Pinkava. 1999. Vascular Plants of Arizona: Cactaceae, Cactus Family, part 4, Grusonia F. Rchb., Club-chollas. Journal of Arizona-Nevada Academy of Science 32:48-52.

Grusonia kunzei (Rose) Pinkava [Opuntia kunzei Rose].

Page 229. Wislizenia refracta subsp. palmeri.

Page 297. Couplet 1' should read: 10-20 mm wide.

Page 369. Boerhavia caribaea Jacquin. Since publication of the Gran Desierto Flora, Richard Spellenberg (personal communication, 2001) has concluded that B. caribaea and B. diffusa are distinct species. In this interpretation B. caribaea is the species in the Gran Desierto and elsewhere in the Sonoran Desert.

Page 373. Mirabilis laevis (Bentham) Curran var. villosa (Kellogg) Spellenberg [M. bigelovii A. Gray]. Spellenberg's interpretation of this species includes three varieties, ranging from eastern Oregon and southwestern Utah to northern Baja California Sur and northwestern Sonora; he maps var. villosa from southern Nevada and southwestern Utah to Baja California and northwestern Sonora. Reference: R. Spellenberg & S. Rodríguez Tijerina. 2001. Geographic variation and taxonomy of North American species of Mirabilis, Section Oxybaphoides (Nyctaginaceae). Sida 19:539-570.

Page 436. Petunia parviflora Jussieu [Calibrachoa parviflora (Jussieu) D'Arcy]. Following the work of Hunziker, Philip Jenkins (personal communication 2002), in his studies for the Flora of North America project, found no reason to segregate Calibrachoa from Petunia. Reference: A. T. Hunziker. 2001. The genera of Solanaceae. A. R. G. Gantner. 2001. Königstein, Germany.

Page 499. Illustration for Bromus rubens is a repeat of B. berterianus (see p. 4).

Page 501. Illustration for Chloris virgata is a repeat of Cynodon dactylon (see p. 4).

Page 559. Stuckenia pectinata Börer [Potamogeton pectinatus Linnaeus]. Reference: R. Haynes & C. B. Hellquest. 2000. Potamogetonaceae. In vol. 22 of Flora of North America north of Mexico, 47-74. Oxford University Press. New York.

HAPPY 25th ANNIVERSARY to the Arizona Native Plant Society !

FIRES IN ARIZONA FORESTS

Jon Titus

In the aftermath of this summer's huge forest fires, everyone is wondering: "What are the consequences of these fires?" The answer depends upon the ecosystem within which the fire occurred: fire plays a very different role in different ecosystems. Fire in the Sonoran Desert differs from that in forest ecosystems. This article concerns fire in the most common forest type in Arizona -- ponderosa pine forest.

In many parts of the country, post-fire landscapes are famous for becoming magnificent sweeps of wildflowers with rare and unusual plants suddenly covering the landscape. For example, the rare turkeybeard lily (*Xerophyllum asphodeloides*) made a magnificent showing recently after a fire in the southern Appalachians. Cape lilies lie dormant until a fire passes through and then blossom. The herbaceous species in Arizona's ponderosa pine forests are adapted to cool fires that are part of a normal cycle for the region.

Historically, Arizona fires started during the monsoon season as a result of lightning strikes and were often extinguished by rain. Mountain ranges throughout the entire Southwest burned in particularly dry years, perhaps four times a century. With few barriers and without human fire fighting efforts, pre-1900 dry year fires may have burned at cool temperatures for months. Arizona ponderosa pine forests occurred across swaths of the Colorado Plateau at elevations above pinyon pine-juniper forest (generally >1750 m) and in the upper elevations of southern Arizona's Sky Islands. Fires passed through these forests with regularity - every 2-12 years. These stately forests supported huge, widely spaced ponderosa pines with lush grassland communities between the trees. Other woody species such as Gambel oak were scattered throughout the forest. Because herbaceous species, particularly graminoids, were the main fuel, the fires were relatively cool and the thick bark of mature ponderosa pines were able to protect the trees, but many of the younger trees succumbed. Ponderosa pines shed lower branches as they mature, which prevent fires from reaching their crowns.

Prior to Anglo-settlement, montane grasslands were common, especially on south-facing slopes throughout ponderosa pine country. The deep, prairie-type soils indicate that productive grasslands have persisted for thousands of years on these sites. For ponderosa pine, good regeneration years are extremely infrequent. That is, the years in which numerous ponderosa pine seeds germinate and seedlings survive are few and far between. Ponderosa pines require good summer rains for seed set. The seeds fall in autumn to germinate the following spring. Good summer rains are required for the next two years for the seedlings to survive and a deep snow pack is required to prevent death from frost. At the Grand Canyon, this unlikely series of events has only occurred twice this century - in 1919 and 1983.

By the turn of the century, most ponderosa pine forests were heavily grazed and could not carry a fire due to the lack of herbaceous undergrowth and eroded soils. Fire suppression was easy then, but as the years passed, understory woody fuels accumulated. The past century of fire suppression by Smokey the Bear's minions has resulted in hazardous thick forest undergrowth in forests throughout Arizona. Smokey represents popular thinking on forest fires: thinking that is not based on long-term observations but in response to a short-term loss of a valuable resource - timber. Now, most fires are due to human causes and occur in late spring -- the driest time of the year. Because of fire suppression, seedlings resulting from the boom years of 1919 and 1983 did not burn and now form extremely dense "dog hair" thickets. The trees germinated in 1919 are small, weak, and disease-prone because of competition with so many neighbors. The great fuel load in these dog hair stands creates very hot fires that leap into the canopy and kill mature trees -- often the entire stand. Beginning in 1992, the amount of acres that burn hot each year in Arizona has skyrocketed. Prior to fire suppression, fires in ponderosa pine forests behaved predictably due to eons of evolution and natural processes, whereas the forest fires of today are erratic. A forgotten campfire may lead to a few trees burning, a few acres burning, or a catastrophic stand-replacing fire sweeping over thousands of hectares.

The grasslands that were once common on south-facing slopes are now uncommon in many parts of the montane southwest because during the last hundred years ponderosa pine and other tree species

cont'd. on page 15

Fire in AZ, cont'd. from page 14)

have invaded these habitats. After an extremely hot fire, the soil surface is exposed and prone to intense erosion with monsoon rains. The first response to this problem was to aerially seed burned landscapes with non-native grasses. This management regime is slowly changing and areas are now sprayed with sterile non-natives that are replaced by native species through natural succession processes. Unfortunately, some of these "sterile" non-natives have turned out to be fertile after all. Clear-cuts and thousands of kilometers of logging roads have greatly altered ecosystems by drying out large areas, causing extensive soil erosion, creating habitat for non-native species and expanses of wood waste. This summer, both logged and non-logged forests burned. In some areas, timber harvest has increased fire severity more than any other activity.

Several of our prominent political leaders erroneously blamed this summers' fires on environmentalists. This obvious untruth was perpetuated to achieve political gain. Environmentalists have been working for the reform of fire management policies for decades. They had been lobbying for controlled burns in many of the areas that burned this summer. At this moment, forest thinning has been proposed throughout the west as a solution to the dangers of forest fires. In addition, the right of environmentalists to challenge any thinning programs is being eliminated. Unfortunately, there is no evidence that thinning would actually reduce forest fire intensity or frequency (in some ways, this is a lot like the Smokey the Bear program). Thinning generally encourages a riot of new growth so that, in just a few years, the forest becomes as flammable as it was before thinning. In any case, thinning Arizona's ponderosa pine forests would cost billions. Rather than thinning, a regular fire regime needs to be established. But with trees at densities 10 times the historical levels and large amounts of fuel on the ground, how can large-scale prescribed burns be safely conducted?

Some believe that thinning is an excuse to allow the removal of economically valuable larger trees and there is some evidence that this has occurred in the past. Additionally, logging has been proposed as a fire control measure. An effective solution appears to be complex, expensive and politically unpalatable. It would involve a mix of controlled burns, some repeated thinning, and for most areas to be left alone. Thinning would not be applied region-wide. Select areas to be thinned or burned would be carefully chosen by computer burn models and would be designed to prevent forest fires in the area from becoming too large. Most importantly, thousands of people who now live on the edge of our National Forests must take responsibility by thinning large trees and clearing pine needles and brush around their houses. They also need to use metal roofs. All of these actions could have saved many of the houses that burned this summer.

Human fire suppression has disrupted Arizona's ecosystems in many ways, including the loss of grasslands as woody plants have expanded in distribution. What are the consequences of these recent, hot, stand-replacing fires on the diversity of understory species in Arizona's forests? The intense heat probably killed many seeds and tubers in the soil, and wildflowers may be slow to reappear. With proper management by agencies and input from the public, controlled fires could lead to the establishment of the species-rich grasslands that once graced our region and the wonderful vistas of wildflowers that these grasslands and forests once provided.

The Plant Press is published three times a year and is a benefit of membership in the Arizona Native Plant Society.

Thank you Contributors! *Many thanks to the authors, editors, illustrators, photographers,and supporters who contributed to this 25th anniversary issue. The knowledge you have shared with ANPS members is valuable and very much appreciated! We especially thank Arizona Game & Fish Department for their help in our ability to deliver our first insert for school children.*

BACKYARD PONDS AND INVASIVE SPECIES

Dennis Caldwell

I've always considered myself a desert rat. I love the desert, and the landscaping I've created in my yard reflects this fact. I've got clusters of columnar cacti, creosote, prickly pear and agave. But next to my patio, under my mini-mesquite bosque, I've taken the idea of mini-oasis literally. Like a lot of other homeowners across the country, I've installed a "water feature." Water features are backyard ponds, fountains, bog gardens, or a combination of all of these. Their popularity is rapidly growing, evidenced by the recent local availability of supplies, pumps, liners, filters, chemicals, and, unfortunately, non-native aquatic plants and animals. With supplies and information so readily accessible, this form of landscaping is becoming irresistible to the do-it-yourselfer. Feeding this interest is the publicity from local media, yard pond tours, water garden clubs, and pet shop and plant nursery displays.

We could embrace this expansion of aquatic habitat as making up for the overall depletion of the green belts that once ribboned through the Tucson basin. Every pond, bog, and miniature stream in town could be colonized by native endangered riparian species of plants and animals, recreating a metapopulation dynamic that's been long gone and sorely missed. The problem is that people aren't planting native plants like Huachuca water umbel, yerba mansa, or monkey flower in their ponds. Instead, many are planting harmful, highly invasive exotics, including hydrilla and giant salvinia, and other non-natives like water lilies, mosquito fern, and floating water hyacinth. Once they have a pond full of plants, they need something to eat the masses of mosquitoes attracted by the moisture, but they're not introducing native Gila topminnow, desert pupfish, or lowland leopard frogs. Instead, they buy invasive, non-natives like crayfish, mosquitofish, and bullfrogs.

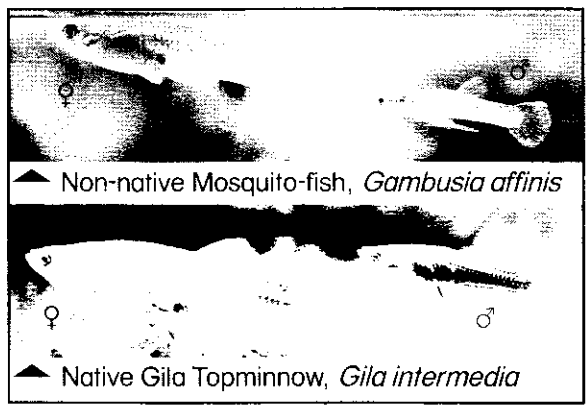
Many of the wholesale growers of aquatic plants operate out of the southeastern U. S. where they import plants and animals from all over the world. Tropical fish expose their stock to exotic organisms and diseases. These companies ship containers of fish and water plants to nurseries all over the country, along with the microbial-soup substrate in which these plants and fish were propagated. We know these containers harbor a lot of species of snails, duckweed, aquatic insects, tadpoles, and crayfish along with their desired product. These are things we can see. How many microorganisms are being transported with these plants into backyard ponds across the country? The impact of these unseen invaders could jeopardize pristine wetlands and native species.

In the urban concrete jungles of Tucson or Phoenix, this may not seem like a big deal. Our streets are crawling with exotic animals and lined with exotic plants. But plant parts and seeds, as well as fish, crayfish, and bullfrogs, have evolved to be great dispersers, especially during the rainy seasons when the temperatures are mild and floods can carry them for miles. This means that these invasive species are ending up in major drainages and riparian corridors. With housing developments rapidly spreading away from urban areas, many backyard ponds are popping up in close proximity to riparian preserves like the San Pedro River and Cienega Creek. Invasive aquatic species are already turning up at many of these preserves. Once established, some cases have proven to be highly detrimental to entire populations of native species. The upper San Pedro River is an excellent example of a highly protected riparian preserve where invasive species are continually escaping from neighboring ponds, displacing the unique native aquatic fauna of that internationally cherished preserve.

I believe most people who are interested in water gardening want to do the right thing. In many parts of the southwest, people are learning the benefits and ethics of landscaping their yards with native plants. In response to this trend, most plant retailers in these areas carry a wide selection of native plants. Could this also be the solution to the aquatics problem? Unfortunately, no. Strangely, our current laws that protect our state's threatened riparian species make it impossible to propagate and commercialize these species.

cont'd. on page 17

Backyard Ponds, cont'd. from page 16) Our native Gila topminnow (*Gila intermedia*) is a good example to demonstrate this paradox. Historically, this small fish was widespread throughout southern Arizona, inhabiting almost every body of water. Due to the loss of aquatic habitat and the introduction of non-native fish, the Gila topminnow is now reduced to just a few isolated populations. The culprit for the topminnow's depletion is its more aggressive, non-native, evolutionary counterpart - the mosquito fish (*Gambusia affinis*). The topminnow is now federally protected as an endangered species. Because the topminnow thrives in warm shallow water and relishes mosquito larva, this fish should be the most important native biological control for mosquitoes in the Southwest. Instead, despite laws prohibiting it, many waterholes, marshes and backyard ponds are being stocked with the non-native mosquitofish, further dispersing this invasive species, displacing the less aggressive, native Gila topminnow.



Gila topminnow breed rapidly in captivity and have great potential for widespread reintroduction throughout their former range, but because of their endangered species protection, state and federal laws prohibit breeding and selling topminnow. State and federal agencies must account for the loss of protected animals and must monitor each reintroduced population. Pond owners have expressed interest in the idea of putting native fish in their ponds. They like the idea of helping endangered species. What a great way to get people interested in native fish!

On the other hand, many ranchers, who often release non-native fish into their livestock ponds to control mosquitoes, might not embrace the idea of introducing a native endangered species into their cow ponds. The same might be true for golf course owners. And it could be that widespread distribution of Gila topminnow might mess up the genetics of some topminnow populations that have lived in isolation for thousands of years.
The complexities of species introductions and reintroductions are vast and far-reaching. We've got to be aware of the threat imposed by the introduction of non-native species and the laws that keep us unable to stock our yard's water feature with endangered native flora and fauna. To safeguard Arizona's riparian ecosystems, it will take education, legislation, and eradication. People who maintain water features and companies that sell plants and animals need to be educated about invasive species and how devastating they can be to native fauna. Tough laws need to be enacted and enforced to prohibit import and sale of harmful, invasive species by commercial operations and private collectors. With restrictions in place, the local water garden industry will need access to sound alternatives. We need to appeal to state and federal governments to protect the native diversity of Arizona by developing programs to permit and facilitate the use of native species in the human-dominated landscape -- in private and public parks, ranches, golf courses, and our own backyard water features.

For more information:

Minckley and Deacon 1991. Battle Against Extinction

Backyard Ponds and Exotic Pests
http://tucsonherpsociety.org/brochure.html

Database on Introductions of Aquatic Species (DIAS)
http://www.fao.org/fi/statist/fisoft/dias/index.htm

Gambusia Control Homepage
http://www.gambusia.net/

Barbara Tellman 2002. Invasive Exotic Species in the Sonoran Region

Aquatic Species Threat in Pima County, Sonoran Desert Conservation Plan

Global Invasive Species Program
http://jasper.stanford.edu/GISP/

Invasive Plants of the Sonoran Desert. 2002. Sonoran Institute et. al.

Harold Mooney and Richard Hobbs. 2001. Invasive Species in a Changing World. Island Press. Washington DC.

IUCN Invasive Species Specialist Group
http://www.issg.org/

Nonindigenous Aquatic Species
http://nas.er.usgs.gov/

Kim Todd. 2001. Tinkering With Eden. A Natural History Of Exotics In America. NY: Norton & Co.

THE ARIZONA STATE UNIVERSITY HERBARIUM

Shannon Doane

When Frederick M. Irish began collecting plants in Arizona in 1896, he may not have fully realized the importance of his collections, or that he was creating an herbarium that would be growing and thriving with more than 330,000 specimens over a hundred years later. Irish was the first science teacher at the Territorial Normal School in Tempe, and his careful collecting of more than 700 plants was the foundation of today's Arizona State University herbarium (ASU) that now contains about 240,000 vascular plants and 90,000 lichens.

Irish and other early 20th century botanists who collected in the Phoenix area give us a glimpse of what the area was like before the damming of the Salt River in the 1930s and the onset of rapid population growth and habitat destruction. Just north of the ASU campus, the Salt River flowed freely and supported a lush riparian area unimaginable to many modern-day Phoenicians. Irish documented these plants housed at ASU as a permanent record of this lost habitat. ASU's herbarium and other herbaria serve as botanical libraries of our floristic history. At herbaria, researchers can study specimens to gain information in myriad fields: systematics, ecology, anthropology, entomology, geology, geography, history, homeopathy, cancer research, journalism, and scientific illustration.

Frederick M. Irish

Leslie R. Landrum is curator of the ASU vascular plant herbarium and Shannon Doane manages the collection. Director emeritus Donald J. Pinkava, along with 8-10 postgraduate students, conduct research at the herbarium. Students have contributed thousands of voucher specimens, fueling the herbarium's growth in the last 30 years. Their floristic studies in central Arizona include the Superstition and Sierra Ancha Wilderness Areas and large regional parks.

Most specimens come from the southwestern United States, northern Mexico, and South America. Nearly 5000 cytological voucher specimens of cacti constitute the largest collection of Cactaceae in the world. The herbarium also has around 6000 specimens of American Myrtaceae.

The herbarium sponsors several continuing projects. The Phoenix Flora project seeks to catalog all wild or cultivated vascular plants growing within a 40-mile radius of the state capitol building. The Vascular Plants of Arizona project is a collaborative effort with two other herbaria, ARIZ at the University of Arizona and ASC at Northern Arizona University, to produce a manual of Arizona's vascular plants. Arizona Flora is nearly 50 years old and needs an update, but it will take several more years to complete. As they become available, special issues of the Arizona-Nevada Academy of Science Journal will contain new treatments, descriptions, distribution maps, and illustrations.

cont'd. on page 19

ASU Herbarium, cont'd. from page 18)

The newest focus at ASU is to make our collections more accessible to researchers worldwide and to the general public. To that end, we have begun databasing our accessioned collections. The database is available and searchable on the World Wide Web (http://ces.asu.edu/explora/main.html), and specimen databases from ASC (Northern Arizona University), and DES (Desert Botanical Garden) can all be searched at the same site. Additionally, in conjunction with the ASU Center for Environmental Studies, we have established a number of Web-based tools for users to explore Arizona's flora. These tools include a vascular plant image library with nearly 3000 images of scanned herbarium sheets and live plants ("vascular plant image explora"), regional checklists searchable by scientific and common names and displayed with images ("flora explora"), and an interactive key to the plants of South Mountain. All of the pages are continually updated.

The ASU Lichen Herbarium employs three permanent staff members: Curator Thomas H. Nash III, Collections Manager Bruce D. Ryan and Academic Associate Frauke Ziemmeck. Major strengths of the Lichen Herbarium include extensive collections from the southwest United States, northwest Mexico and Latin America. Research in the former two areas has resulted in the recently published first volume of the Lichen Flora of the Greater Sonoran Desert Region by T. H. Nash III, B. D. Ryan, C. Gries and F. Bungartz. About 70 percent of the lichen collections are databased and available on-line.

The ASU Vascular Plant and Lichen Herbaria are located on the main campus of Arizona State University in the Life Sciences C-wing, rooms 382 and 180 respectively. We welcome visitors, though it is best to call first (480.965.6162). If you cannot physically visit us, we invite you to pay a virtual visit to the herbarium by exploring our Web pages.

All of the Web tools can be accessed from the Vascular Plant Herbarium main page:
http://lifesciences.asu.edu/herbarium/
and Lichen Herbarium page:
http://ces.asu.edu/ASUlichens/

ANPS ANNOUNCEMENTS

Publications Grant: The ANPS is soliciting proposals for the next Publications Grant awards. The deadline for submissions is March 31, 2003. Awards will be announced on June 15, 2003. Please visit our Website for more information at www.aznps.org

Volunteer Opportunities:

Legislative Watch: We need someone who can watch for ANPS legislative concerns at the county, state, and national level to alert an ANPS email list of members to solicit their concern or support. (e.g., listing buffelgrass on the Noxious Weed List.)

Computer Tutor: We need someone who can teach a Tucson-based person how to use PowerPoint on a Mac to create presentations. (e.g., concerns about the spread of buffelgrass and fountain grass to neighborhood groups)

Grants Search: We need someone to search for grants that match the ANPS mission of education about natural environments. (e.g., workshops for school and community groups)

Outreach Opportunities: Because one of the primary charters of ANPS is education, we need members to notify us of events where we should be present with a staffed display. (E.G., On October 5 & 6, ANPS was present at the Biodiversity Celebration held at the Arizona Science Center in Phoenix. And on October 19, ANPS was present at the Sky Island Conference held at the downtown Radisson in Tucson.)

For more information about these and other volunteer ANPS opportunities, please contact Marilyn Hanson at mfhanson@mindspring.com, or at the

ARIZONA NATIVE PLANT SOCIETY
P.O. Box 41206
Tucson AZ 85717

BOOK REVIEWS

Cactus Hotel, by Brenda Guiberson and illustrated by Megan Lloyd. Henry Holt and Company, New York. 1991. 32 pp. Hardcover. $16.95.

Young children will enjoy this story about a giant desert saguaro cactus and the animals that live there. As the author Brenda Guiberson says, "If 4- and 5-year-olds are interested in natural history, why channel them in another direction?" The idea of a saguaro as the main character was appealing to my preschooler. The book's depth held my middle-school child's attention, providing fun facts. The book is a good length for bedtime reading. The story will fascinate a class. Then everyone can choose a favorite part to draw or write about.

Kids love to compare themselves to a 10-year-old saguaro that is only four inches tall. At 150 years, the saguaro "weighs about as much as five automobiles" (8 tons). It's then that the saguaro is at the height of its popularity as a hotel for animals, providing a protective home. The animals provide mutual benefit to the saguaro by eating insects that could cause damage and disease.

At the end of the book, the summary of ecological information on the Saguaro Forest could have been expanded to include specific notes about the animals mentioned in the story. This additional information would make the book a useful reference for older children when writing reports.

Lloyd's illustrations are detailed enough to be accurate, but lush enough to create vivid desert landscapes that invite the reader to step in and enjoy the scenery. The border on the cover gives a tempting hint of the exciting creatures you will meet inside.

Submitted by Holly Eckstein, science teacher.

Invasive Exotic Species in the Sonoran Region, Barbara Tellman, Editor; University of Arizona Press and The Arizona-Sonora Desert Museum, Tucson, AZ. 2002. Hardcover. $75.00

In May 1998, a conference on exotic species of the "Sonoran Region" was held at the Arizona-Sonora Desert Museum. Information presented by the participating scientists and other authorities is published in this volume. Part One contains a

generalized look at the region with an overview of species changes throughout the Cenozoic Era. Part Two details numerous studies of exotic plants and vertebrate animals that have naturalized throughout the region. It also explains their detrimental effects on native species and ecosystems. Part Three discusses various methods of managing and controlling exotics plus information on federal and state programs.

Included within the "Sonoran Region" are the Sonoran Desert and adjacent areas of Sonora and Arizona where a continuum of desert vegetation extends into grasslands, thornscrub and riparian areas along the Colorado River from the Grand Canyon area south to the Sonoran Desert. Note that the map of the region in the introduction of the book does not include some of these areas beyond the desert proper. Note also on the map that Hermosillo and Tucson have been misplaced outside of the region. This should not detract from the fact that this is a very good publication. It is a valuable reference for anyone who needs to know more about the invasives problems and solutions.

This book is user-friendly because of its glossary of scientific terms, the summary of applicable laws, and the extensive list of naturalized exotic plant and animal species, including vertebrates and invertebrates. There is also a fairly complete index and over 30 high-quality line drawings of important exotic plants and animals. The bibliography (47 pages) contains over 800 cited references!

In summary, naturalized exotic species are here, expanding their range and currently causing serious problems throughout the region. Furthermore with the trend toward introduction of more alien xeric species for landscaping, additional serious threats may be on the horizon. It's time to get interested and act!

Submitted by Michael M. Bauer, a member of ANPS Tucson Chapter and Sonoran Desert Weedwackers.

ANNUAL MEETING SUMMARY

Ken Morrow

The ANPS Annual Meeting was held Sunday, July 7th at The Arboretum at Flagstaff. Located about 5 miles southwest of Flagstaff, the Arboretum is situated within a second-growth ponderosa pine forest typical to the area. The weather was warm and dry, and the monsoon was not yet present. The meeting's theme was the restoration and conservation of the plants and habitat of northern Arizona. This was a timely topic because the huge Rodeo-Chediski fire, 110 miles to the southeast, had just been contained. The Coconino National Forest was among other parks that were closed due to tinder-dry conditions. "No Entry" signs forbade travel off the gravel road leading to the Arboretum. The extreme dryness and overly dense pine forest made fire danger seem ominously palpable.

The Arboretum is a 200-acre oasis in which staff and volunteers have thinned the existing forest. Our conference was held in one wing of the lushly planted main building. The meeting room had large picture windows looking out onto the gardens, but unfortunately, we had to draw the drapes over them during the speakers' visual presentations.

After a continental breakfast and brief social time, the meeting was called to order at about 9:00 am by Ken Morrow, ANPS Vice-President. Our President, Barb Skye, could not attend due to a family wedding. After a few introductory comments, Dr. Nancy Morin, Director of The Arboretum at Flagstaff, welcomed us and gave background information on the facilities and updates on current on-site work and research. Later in the evening, Dr. Morin was elected to the ANPS board, along with fellow newcomers Muffin Burgess, Priscilla Titus, and Dr. Brad Fiero.

Our first scheduled speaker was Ron Gass, owner of Mountain States Wholesale Nursery. Ron is a pioneer in growing native and drought-resistant plant material for the deserts and mid-elevation regions of the Southwest. Ron spoke on "25 Years of Native Plants," a reference not only to his long experience as a grower, but also because he was one of several ANPS founding members in 1977. He reminisced about the early days of ANPS. Then he showed a great series of slides of many species that his company has attempted to grow and market over the years.

Our second speaker of the morning was Larry Stevens of the Grand Canyon Wildlands Council. Larry's organization has done a wonderful job of mapping and quantifying the various ecosystems and habitats in the vicinity of the Grand Canyon -- everything from the piñon-juniper community, covering hundreds of square miles, to the freshwater spring habitats which, even when combined, cover only a few acres. His main point, illustrated with an excellent collection of photos, maps, and graphs, was that the ecosystems supporting the greatest diversity of plant and animal species are also the smallest in terms of total area. These small but diverse ecosystems, such as springs, stream-fed riparian areas, and seeps at the bases of cliffs, deserve the greatest protection because they are sensitive to disturbance by human activities such as ranching and mining.

The final speaker of the morning was Judy Springer from the Ecological Restoration Institute at NAU. Her topic was "Ecological restoration in northern Arizona ponderosa pine forests: effects on native and introduced plant species." Her research has shown that thinning small-diameter trees from a given plot does not always mean that understory plants historically found in the area will reappear and permanently thrive. Instead, what species will reappear is based upon a complex set of factors: soil seed bank makeup, competition from introduced exotics, and sunlight/available water relationships.

After lunch, election of the above-named new board members, and the introduction of our new Plant Press editor, Pamela Saalbach, most of the 40 or so registered participants went on one of two field trips. Some chose a short tour of the Arboretum grounds with one of the docents on duty, while others accompanied Judy Springer to a couple of her nearby research areas. Unfortunately, access was restricted into national forest sites. In order to see what work had been done, we had to peek through the fence. Considering the dry conditions and the national holiday weekend, the 25th Annual Meeting was a great success, apparently enjoyed by all attendees.

Happy 25th Anniversary, ANPS!

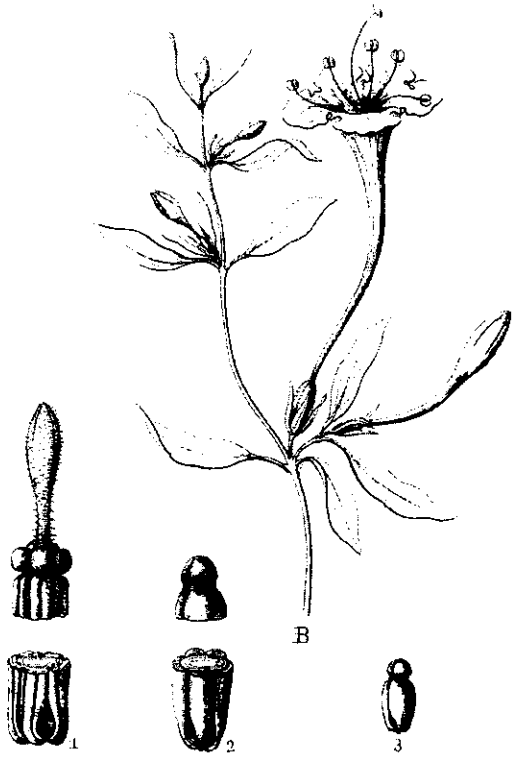
OUTSTANDING BOTANISTS: CHARLES WRIGHT

Barbara Tellman

Charles Wright, the most widely traveled botanist of the 19th century, vastly increased botanical knowledge of his day. Arizona botanists are familiar with the name "wrightii" attached to quite a few species, such as *Platanus wrightii.*

Wright was born in 1811 in Connecticut. He graduated from Yale College in 1835 where his main interest was biology even though Yale had no biology teacher. After graduating, he became a private tutor in Mississippi, and then walked to Texas, collecting plants along the way. A surveyor by trade, he learned how to survive on the frontier, becoming a "pretty fair" deer hunter. In 1844, he began corresponding with Asa Gray on botanical subjects and sent his first collection of plants of east Texas to Cambridge.

In 1847-8, he joined a volunteer company for the Mexican War. He obtained a position with moderate pay and light duties and continued his botanical explorations. The next year, he was posted on the Texas-Mexico border where he continued to collect plants, journeying on foot and enduring many hardships. His collections from west Texas were published in Smithsonian Contributions to Knowledge in 1852.



Pentacrophys wrightii from Emory 1859

He joined the U.S.-Mexico Boundary Survey as botanist-surveyor under Lt. W.H. Emory, the head of the project. On this trip, he collected plants in southeastern Arizona, one of the first botanists to do so. In August-October 1851, his surveys in Arizona and Sonora included the "Chiricahui (sic) Mountains," San Pedro River, Santa Cruz, Valleys of Sonora, the Sonoita Valley, the "Barbocomori," (sic) Agua Prieta, and San Bernardino. Living and collecting conditions with the Boundary Commission were very difficult.

When Wright left the commission in 1852, Emory ordered him to take two panniers of botanical specimens to Dr. John Torrey. Wright assisted Torrey by arranging and collating them and preparing publication notices of new and rare plants. Torrey was inundated with specimens from other expeditions, so sent Wright to Cambridge where his results were published as *Plantae Wrightianae* Part 2. This enraged Emory who felt that publication should have been saved for the official report. Wright was only one of several botanists on the survey; others were angered that Wright took most of the credit. The dispute with Emory was quickly settled, but botanist John Bigelow was not appeased, using the verb Wrightyize for situations in which one person takes the credit for another's work.

In 1854, Wright made his first major trip abroad with the North Pacific Exploring Expedition, traveling by sailing ship around the Cape of Good Hope. There he collected about 800 species, then sailed to Australia and Hong Kong where he collected another 500 species. From there, he traveled to Japan and the Arctic Ocean, then down the American coast to California and home by way of Nicaragua, collecting as he went.

This was not the last of his foreign collections. The next year, he spent several years in Cuba amassing a rich collection that was distributed to several herbaria. His materials were partially published in Flora Cubana, 1873.

Outstanding Botanists, cont'd. from page 22)

Although he took other short trips, the majority of his collecting days were over. He died of some "organic disease of the heart" in 1885. Asa Gray wrote in Wright's obituary: "Mr. Wright was in person of low stature and well-knit frame, hardy rather than strong, scrupulously temperate, a man of simple ways, always modest and unpretending, but direct and downright in expression, most amiable, trusty, and religious. He accomplished a great deal of useful and excellent work for botany in the pure and simple love of it; and his memory is held in honorable and grateful remembrance by his surviving associates."

Mamillaria wrightii (1-8) M. goodridgii (91-6) from Emory 1859

References:

Emory, W.H. 1859. Report on the United States and Mexican Boundary. Part I. Botany of the Boundary. 34th Congress. Ex. Doc. 108. Washington D.C.

Gray, Asa. 1886. Botanical Necrology of 1885. American Journal of Science. 31(1):12-17.

McKelvey, S.D. 1998. Botanical Exploration of the Trans-Mississippi West 1790-1850.

Shaw, Elizabeth. 1987. Charles Wright on the Boundary 1849-1852. Meckler Publishing Corp. Cambridge. This book has an unusual feature: microfiche copies of his field notes.

Underwood, L.M. 1905. A Summary of Charles Wright's Explorations in Cuba. Bulletin of the Torrey Botanical Club. 32(6): 291-300.

Wooton, E.O. 1906. Southwestern Localities visited by Charles Wright. Bulletin of the Torrey Botanical Club. 33(11): 561-566.

Barbara Tellman has been a member of ANPS since the early 1980's, and a previous editor of the Plant Press.

Corporate & Business Awards

One of our board members, Doug Green, received a $200 award for outstanding service to the community from 3M, his employer upon retirement. The company awards this amount to an organization on behalf of an employee who renders volunteer service of 25 hours or more per year.

Doug encourages members to seek these kinds of opportunities with their employers. Funds for donation purposes may reside in the Human Resources organization, the company's Foundation, the PR department, or other internal organization. You can help ANPS by availing yourself of these opportunities.

For more information about these and other volunteer ANPS opportunities, please contact Marilyn Hanson at mfhanson@mindspring.com, or at the

Arizona Native Plant Society
P.O. Box 41206
Tucson AZ 85717

UPCOMING EVENTS

U.S. Composting Council
Conference and Annual Meeting - January 28-31, 2003
The USCC Annual Conference and Trade Show will be held at The Golden Nugget in Las Vegas, Nevada. For more information, visit the website at http://www.compostingcouncil.org/ or call 631-864-2567

American Society of Plant Biologists
This organization lists a number of upcoming conferences of interest to plant biologists under the "Meetings" link at http://www.aspb.org/meetings/

Monocots III: Third International Conference on the Comparative Biology of the Monocotyledons and Fourth International Symposium on Grass Systematics and Evolution - 30 March-5 April 2003, Rancho Santa Ana Botanic Garden, Claremont, CA
The Third International Conference on the Comparative Biology of the Monocotyledons and Fourth International Symposium on Grass Systematics and Evolution will be hosted by Rancho Santa Ana Botanic Garden (Claremont, California, U.S.A.) on 30 March-5 April 2003. Topics will include morphology, anatomy, development, reproductive biology, molecular biology, cytology, genomics, genetics, biochemistry, paleobotany, phylogenetics, classification, biogeography, ecology, and data integration. Sessions will be devoted to particular groups within monocots such as grasses and orchids. Monocots III will provide a rare opportunity for researchers in diverse fields to interact, share ideas, and form collaborations. We invite proposals from those who wish to organize sessions. A call for contributed papers and posters will follow. The conference proceedings will be published. Springtime marks the flowering peak of the diverse California flora, and field trips are planned. Visit www.monocots3.org for conference details; or write Monocots III, Rancho Santa Ana Botanic Garden, 1500 North College Avenue, Claremont, California 91711-3157 U.S.A.; e-mail info@monocots3.org; fax 1.909.626.7670; telephone 1.909.625.8767 ext. 333. Co-sponsors include the American Society of Plant Taxonomists, Botanical Society of America, and the International Association for Plant Taxonomy.

IUCN RED LIST OF THREATENED SPECIES

The 2002 Red List of Threatened Species is now online at http://www.redlist.org

The World Conservation Union, through its Species Survival Commission (SSC), has for four decades been assessing the conservation status of species, subspecies, varieties and even selected subpopulations on a global scale to highlight taxa threatened with extinction, and promote their conservation. Although today we are operating in a very different political, economic, social and ecological world from that when the first IUCN Red Data Book was produced, the SSC remains firmly committed to providing the world with the most objective, scientifically-based information on the current status of globally threatened biodiversity.

The taxa assessed for the IUCN Red List are the bearers of genetic diversity and the building blocks of ecosystems. Information on their conservation status and distribution provides the foundation for making informed decisions about preserving biodiversity at local to global levels.

The main purpose of the IUCN Red List is to catalogue and highlight taxa that are facing a higher risk of global extinction (i.e., those listed as Critically Endangered, Endangered and Vulnerable). The list also includes information on taxa that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e., Data Deficient); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e., Near Threatened).

The list of threatened taxa is maintained in a searchable database by the SSC Red List Programme as part of the SSC's Species Information Service (SIS). The only taxonomic groups which have been comprehensively assessed are birds and mammals. The vast majority of plant taxa listed in the 1997 IUCN Red List of Threatened Plants have not yet been evaluated against the revised Red List Criteria and are therefore not included. To learn about the conservation status of plants, users must search both the Red List database and the UNEP-WCMC Threatened Plants database.

NATIVE PLANT ANNOUNCEMENTS

Executive Director
Native Seeds/SEARCH, an established and well respected non-profit conservation organization in Tucson, Arizona, seeks candidates for the position of Executive Director. NS/S protects, regenerates and disseminates indigenous and traditional crop genetic resources of the southwest US and northern Mexico. The NS/S Seed Bank currently holds over 2000 crop varieties. More information about NS/S, our programs and priorities can be found on our Website, www.nativeseeds.org.

Qualified candidates will have a proven track record in fundraising, financial planning and oversight, Board development, and public relations. The Executive Director will work directly with individual donors and foundation contacts in partnership with our Membership Director. She/he will also oversee the general administration of the organization. Excellent communication, personnel and administrative skills are required.

To apply, please send cover letter, resume and salary requirements to:

Todd Horst
Native Seeds/SEARCH-ED
526 N. Fourth Avenue
Tucson, AZ 85705
(application via postal mail preferred)
email: todd@nativeseeds.org

2003 Budweiser Conservation Scholarship Program
Anheuser-Busch and the National Fish and Wildlife Foundation are seeking applications for the 2003 Budweiser Conservation Scholarship Program. This competitive scholarship program supports and promotes innovative research or study that seeks to respond to today's most pressing conservation issues. The Conservation Scholarship Program is designed to respond to many of the most significant challenges in fish, wildlife, and plant conservation in the United States, whether it is the sustainable use of natural resources, including sportfish and game, recovery of an endangered species, or control of invasive exotic species, by providing scholarships to eligible graduate and undergraduate students who are poised to make a significant contribution to the field of conservation.

Under the 2003 Budweiser Conservation Scholarship Program, ten scholarships of up to $10,000 each will be awarded to cover students' expenses for tuition, fees, books, room and board, and other direct expenses related to their studies. Awards will be made based on merit and will take into consideration the student's academic achievements and their ability and commitment to develop innovative solutions that are designed to address real and pressing issues affecting fish, wildlife and plant conservation efforts. The Foundation welcomes applications from all qualified students. Upon receipt of the applications, the Foundation will work with leading professional organizations, academic institutions, and federal resource agencies to glean qualified applications from throughout the United States. The program is highly competitive with nearly 400 applications having been received for thirty scholarships awarded in the first two years of the program; click here for a list of scholarship recipients and summaries of their research.

Applications are availableat http://www.nfwf.org

RESTORATION STUDY: Public Comments Needed

Julia Fonseca

A draft report by the U. S. Army Corps of Engineers recommends changes at Pima County's Roy P. Drachman-Agua Caliente Park to stem habitat loss. Wetland plant and animal species that once used spring-fed wetlands have been lost over time. And the ability of native riparian trees to establish and thrive has been impaired. Biologists predict a decline in the quality of the riparian areas over time.

Transforming two of the three spring-fed ponds into a system of streams and wetlands would allow native species like fish and lowland leopard frogs to supplant non-native bullfrogs, sunfish, and tilapia that now rule the 101-acre park. A combination of deliberate plantings and stream channel environments would increase the extent and variety of riparian vegetation. Local biologists and Pima County staff developed this alternative. Pima County invited the Corps to study the feasibility of restoring habitat and ecological functions to the spring ecosystem, using the Corps' Section 206 funding.

The Pima County Board of Supervisors will decide whether to proceed with the alternative. If the board approves an agreement with the Corps, detailed design studies will follow. The Corps has agreed to contribute up to 65 percent of the estimated $1.1 million cost of the project and the county the remainder in in-kind services or cash.

The recommended alternative is described in a report, along with other ideas and information, on the Website, http://www.dot.co.pima.az.us/flood/AguaC/index.htm.

ANPS MERCHANDISE

You can purchase ANPS booklets and posters from our local chapters or by mail order.

In addition, you can find posters at Saguaro Park - East and West, Tohono Chul Park, the Audubon Society, Arizona Sonora Desert Museum, Organ Pipe National Monument, Boyce Thompson Arboretum, and Desert Botanical Garden (obtain through Kathy Rice, Phoenix Chapter President, who works there.)

ANPS Booklets
Desert Accent Plants, Desert Butterfly Gardening, Desert Bird Gardening, Desert Grasses, Desert Ground Covers and Vines, Desert Shrubs, Desert Wildflowers

Prices per booklet ordered:

Quantity	
1-9	$2.25 each (any combination of titles)
10-49	$1.75 each (any combination of titles)
50+	$1.25 each (any combination of titles)

Price per booklet ordered includes postage for U.S. addresses only.

Non-U.S. Prices (shipped via airmail; no quantity discounts)

Canada/Mexico:	$2.75 each (price includes postage)
All others:	$4.25 each (price includes postage)

ANPS Posters
Wildflowers of Northern Arizona, Sonoran Desert Wildflowers

Retail:
$14.00 each (non-members)
$12.00 each (ANPS members)

Shipping and Handling:
$2.50 for first poster & $.50 each additional poster mailed to the same address (U.S. addresses only)

Wholesale:

10-49	$8.00 each
50+	$7.20 each

Shipping and handling are an additional charge depending on the size of the order. Please contact ANPS for specifics on shipping costs.

Send orders to:

Arizona Native Plant Society
P.O. Box 41206
Tucson AZ 85717

For order forms, visit the ANPS Website at www.aznps.org

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NEW MEMBERS WELCOME

People interested in native plants are encouraged to become members. People may join chapters in Central, Northern, or Southern Arizona, or may be members only of the statewide organization. For more information, write to ANPS at the address below, visit the ANPS Website at www.aznps.org, or contact one of the people below.

State President	Barb Skye Siegel	520.740.1981
State Vice President	Ken Morrow	602.828.8265
Northern AZ Chapter President	Nancy Morin	928.214.2543
Central AZ Chapter President	Kathy Rice	602.808.9304
Southern AZ Chapter President	Jeff Kreamer	520.318.0914

Membership Form

Name
Address
City **State** **Zip**
Phone Number

Chapter preferred: __ State __ Central __ Northern __ Southern

Enclosed:

__ $ 15 Senior (65+)/Student
__ $ 35 Organization
__ $ 75 Sponsor
__ $1,000 Lifetime
__ $ 20 Family/Individual
__ $ 50 Commercial
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Tucson AZ 85717
www.aznps.org

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Please check your address label to make sure you are current with your membership.

If the year in the upper right-hand corner is not 2003, please be sure to renew so you stay current with ANPS news!

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