



The Plant Press

THE ARIZONA NATIVE PLANT SOCIETY

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The Creation of a Wildflower Poster

Julia Fonseca

Margaret Pope, botanical illustrator, has been working steadily for the past year on the upcoming ANPS desert wildflower poster. While the work has progressed more slowly than anticipated, the poster committee is very pleased with the extraordinary quality of the illustrations. Margaret has been drawing and observing plants for years and we are fortunate to have the benefit of her familiarity with Arizona's wildflowers.

Margaret begins by collecting information about each plant in a notebook: notes from Arizona Flora, field notes, sketches, and photographs. Antoinette Segade has been of particular assistance by lending Margaret detailed photographs of the plants. Linda Brewer, Linda Burbach, and Jane Evans provided much of the fresh plant material.

Margaret painstakingly renders the plant using pencil, based on fresh plants and photographs. The pencil version is not a sketch. It contains all of the shading needed to show details for the final color version. Each drawing shows the flower and leaf of the plant and most have the fruit and/or various stages of the flower. Twenty-seven drawings have been completed as of the end of May. Margaret prioritizes completing the black-and-white illustrations because that is the stage of the process where most of the thinking is done and it is also the stage that depends on the availability of plant material.

Next the artist uses photocopy reductions of the pencil work to decide how the final drawing will look in the poster, set among the other flowers. Sometimes at this stage she decides to reduce the number of stems and foliage, or to change the orientation of a cluster of flowers.

Next Margaret traces the drawing in color pencil, using the black-and-white drawing as a guide. Minor adjustments in shading may be made at this time. Ten color illustrations are ready. At this stage and at the previous one, review comments by members of the poster committee are taken into consideration. Adjustments have been made in leaf shape, flower color, and several other characteristics based on their input. Special recognition here goes to Linda Brewer, Kristin Johnson, and others for their involvement in this process.

We know you will love these beautiful illustrations as much as we do. The ANPS poster committee hopes to have the poster available for sale before Christmas 1998 and hope also to use the illustrations to make items such as notecards. Margaret will make some of the original illustrations available for purchase.

See samples of Margaret's drawings on pages 10 and 14.

INSIDE: J.J. Thornber p. 3; The Celastraceae p. 4; *Canotia holocantha* p. 5; Wupatki Plant List p. 6; Book Reviews p. 11; Conservation Update p. 12

President's Column

Late autumn rains and abundant winter rains spawned by El Nino produced an exceptional spring wildflower bloom in southwestern Arizona and northwestern Sonora. From the Yuma dunes to Organ Pipe Cactus National Monument to the Gran Desierto, wildflowers began to bloom in late fall and early winter and continued through April. It was a wonderful surprise, coming on the heels of two dry winters nearly devoid of wildflowers.

Organ Pipe Cactus National Monument (where I work) was full of wildflower enthusiasts. We had traffic jams caused by visitors stopping to gasp at outrageous fields of color. Professional photographers vied for images of the astounding views. Kids romped in flowers while mom or dad operated the videocamera. People wore grins and giggled reflexively.

Wrapped up in my botanizing, I occasionally looked up long enough to see the business going on around me. If I had any doubt that wildflower viewing stimulates the economy, it was put to rest this spring. March visitation at Organ Pipe increased 40 percent over previous years. At the visitor's center, sales of educational books, postcards, and other materials skyrocketed. Local campgrounds and hotels were full. Restaurants, gas stations, and other services were pushed to their limits.

The Pima County Board of Supervisors recently approved the development of a county-wide Sonoran Desert Protection Plan. It was an economically responsible thing to do. Open spaces bring opportunities for viewing plants and animals and just plain enjoying ourselves. The value of these amenities is expressed in many ways: the grins on faces, the cash in the till. I hope the Supervisors and the people of Pima County continue to value open spaces when the time comes to implement the Sonoran Protection Plan.

Sue Rutman Co-President

Editor's Column

This issue of the Plant Press begins some new feature sections, written by various ANPS members. Steve McLaughlin will provide an annotated plant list of a national park, national monument or historic site (p. 6). Virginia Saylor will share with us pages from her botanical notebook, which describes characteristics of Arizona specimens of various plant families (p. 4). Sue Rutman will write a plant profile for each issue, highlighting some of the more interesting and lesser known plants of our area, taking her example from the plant family Virginia is featuring (p.5). Julia Fonseca will continue her conservation articles (p. 12). Barbara Tellman will give short biographies of some of Arizona's past noteworthy botanists (p. 3). Starting with the next issue, Gary Bachman and Pam Davis will write landscaping articles. We will also feature brief reviews of interesting new books (p. 11).

We hope you will enjoy these sections and welcome your comments on them. We also welcome suggestions of feature articles or books to review (especially if accompanied by an offer to write the article, or a suggestion of a potential author).

Many thanks to our proof-reader, Jean Searle of Sedona, who has done a thorough job of editing the articles herein for typos, grammar and clarity. Any remaining errors are mine.

Barbara Tellman

Thank you Balbir!

Many, many thanks to Balbir Backus who has been editor of the Plant Press for the past five years! Balbir produced a fine newsletter with a professional flair and many interesting articles. Best wishes to Balbir in her continuing pursuit of a degree at Arizona State University.

Outstanding Arizona Botanists

I. John James Thornber 1872-1962

Barbara Tellman

In a great Eastern city, an artist said to me: "I am told that you live in the desert." "Yes," I returned humbly, "I do." "But I don't understand," he said - with an air - "what inspiration can one possibly find in a desert?" "Have you ever been west of the Mississippi?" I asked. "No" "Then I said gently, "it would be useless for me even to attempt to tell you about it." I was not being rude, I merely expressed the feeling of helplessness which always comes over me when I am asked to tell why I love the desert or what it means to me.

Thus J.J. Thornber began his 1930 *Ladies' Home Journal* article describing the wonders of the desert. John James Thornber, Arizona's pre-eminent botanist in the early part of the twentieth century, was a complex and fascinating man. He resigned his post as Dean of the College of Agriculture at the University of Arizona after eight years, far preferring botanizing and teaching to administrative duties.

He had three great botanical interests.

- ◆ He cataloged, described, and studied cacti -- from the marvels of the thorns to the oddities of shapes, especially crested forms.
- ◆ He was fascinated by the grasses, but never completed his great planned work on the grasses of Arizona, although he accomplished much work in that area. One of his most influential activities was to study the condition of the ranges after overgrazing in the 1880s and 1890s. He clearly described the mechanisms by which overgrazing degraded the ranges so severely and worked tirelessly for regulation of grazing on public lands to cure the problem, sometimes alienating the College of Agriculture's constituents. His interest in grasses stemmed from his desire to repair the damaged ranges.
- ◆ He brought in new varieties of plants for landscaping purposes. The University of Arizona campus contains a variety of trees from other lands, many of which were initially brought in by Thornber and his colleagues. When asked if he was responsible for bringing in the saltcedar, Thornber modestly said that others should take the credit. His 1914 Cooperative Extension pamphlet was influential in spreading the word about this species most of us now love to hate.

The first Mrs. Thornber was a remarkable person in her own right. She founded the Arizona chapter of the Audubon Society in the early 1900s, and was a pioneer in environmental education and even taught bird taxonomy to children. She sometimes taught J.J.'s botany classes when he was away and when she was not working on her own book on the birds of Arizona.

Selected publications

- Thornber, J.J. 1909. Relation of Plant Growth to Climatic Conditions. *Plant World*, vol. 12.
- Thornber, J.J. 1910. The Grazing Ranges of Arizona. University of Arizona Agricultural Experiment Station. Bulletin 65. Tucson, AZ
- Thornber, J.J. 1911. Native Cacti as Emergency Forage Plants. University of Arizona, Agricultural Experiment Station, Technical Bulletin 67. Tucson, AZ
- Thornber, J.J. 1911. Plant Acclimatization in Southern Arizona *Plant World*, vol.14.
- Thornber, J.J. 1914. The Practical Application of the Kent Grazing Bill to Western and Southwestern Grazing Ranges. Denver, American National Live Stock Association.
- Armstrong, Margaret and J.J. Thornber. 1915 *Field Book of Western Wildflowers*. New York, C.P. Putnam's Sons.
- Thornber, J.J. 1916. Tamarisks for Southwestern Planting. University of Arizona Agricultural Experiment Station. *Timely Hints for Farmers* #121. Tucson, AZ
- Thornber, J. J., and Frances Bonker. 1932. *The Fantastic Clan. The Cactus Family*. New York, The Macmillan Company, 194 p.
- Benson, Lyman David and J.J. Thornber. 1940. *The Cacti of Arizona*. Tucson AZ. University of Arizona, Biological Science Bulletin no. 4.

PAGES FROM GINNY'S NOTEBOOK I: The Celastraceae

Virginia Saylor, ANPS member from Green Valley, is producing a notebook with information on plant families. Ginny has offered to share her work with us and this is the first installment

23

CELASTRACEAE - STAFF-TREE BITTERSWEET FAM.

Genus Common Name	Form	Flower		No. Pts Stms	FR mm	Leaf cm lg. x mm	G WF	K CF	TX RK
		Color	Shape						
<i>Canotia</i> Crucifixion Thorn	Wd Sh	grn-wh	A-Cy	5	Caps 12-14	A - scales	—	526	—
	Sm Tr	yel-wh		5		1-2 mm.	—	—	—
<i>Celastrus</i> Bittersweet	Tw Sh	grn-wh	R	5	Caps. orch-yel	A	984	—	999
			4 mm		5		5-10	—	—
<i>Eunonymus</i> Burning Bush	Wd Sh	brn-pi	4-6.5 mm Pet.	4-5	Caps. variable	O	983	—	998
	Sm Tr	grn±		4-5		3-14	—	969	—
<i>Maytenus</i>	Wd Sh	yel±	1.5 mm Pet.	5	Caps.	A	—	—	999
	Sm Tr	grn	A	5		1.5-3 x 10-20	—	BC 625	—
<i>Mortonia</i>	Wd Sh	wh	4 mm dia.	5	AK	A	—	525	1001
	Evgr.		CR	5		3-1.5 3-9	—	968	—
<i>Paxistima</i> Box-leaf	Sb Sh	marh	1.5-2 mm Pet.	4	Caps.	O	963	525	—
	Evgr.	(grn)		4		8-2.7 4-10	—	967	313
<i>Schaefferia</i>	Wd Sh	grn±	3mm Pet.	4	Drupe red 3-5	A-CR	—	—	1001
								BC 625	

About 850 spp. in 50+ genera. Worldwide

FORM: Wd Sh = Woody Shrub, Tw Sh = Twining Shrub

Sm Tr = Small Tree, Sb Sh = Subshrub, Evgr = Evergreen

FLOWER: A-Cy = Axillary-Cyme, R = Raceme, A = in leaf axils

CR = Cluster

FRUIT: Caps = Capsule, AK = Achene,

LEAF: A = Alternate, O = Opposite, CR = Cluster

Our Unique Flora: I. *Canotia holocantha* Sue Rutman

Travellers passing through the Verde Valley on Interstate 17 might notice the green-barked tree on lower elevation slopes. The tree is *Canotia holocantha*, a species found almost entirely in Arizona.

Canotia, a member of the Celastraceae, is a shrub or small tree usually less than 20 feet tall. The yellow-green branches are slender, parallel, and upright and each is spine-tipped. The green bark is photosynthetic. The plant is usually leafless; the scale-like leaves don't persist for long.

The fruit, a somewhat woody 5-valved capsule, can help distinguish *Canotia* from other green-barked trees and shrubs. The capsules develop during the summer and when ripe split at the apex into two long, slender horns. These brown capsules often persist on the plants until the following spring, providing a year-long identifying characteristic and providing many sharp points throughout most of the year.



Canotia is most abundant between 2,000 - 5,200 feet elevation along the sub-Mogollon Rim on limestone and other deeply permeable substrates. Disjunct populations, thought to be Pleistocene relicts, occur elsewhere in Arizona and in three widely separated areas in Sonora, Mexico. One disjunct *Canotia* forest can be found on a shady north-facing slope in the Sand Tank Mountains, growing with *Artemisia ludoviciana*. Another can be found on Isla Tiburon in the Gulf of California.

Crucifixion thorn and corona de Cristo, the English and Spanish common names for this species, describe its thorny appearance. A crown made of the branches of *Canotia* would resemble the crown of thorns that Christians believe Jesus wore at his crucifixion.

Drawings from *Shrubs and Trees of Southwest Deserts* by Janice Bowers and *Rocky Mountain Trees* by Richard Preston, Jr.

Notes To Ginny's Notebook (page 4):

The last three columns refer to pages in which the species is described in standard books.

G: M.L. Fernal, ed. 1988. *G: Gray's Manual of Botany* 8th ed. Dioscorides Press. 1632 pp.

K: Thomas Kearny and Robert Peebles. 1951. *Arizona Flora*. University of California Press. 1032 pp.

TX: Donovan Correll and Marshall Johnson. 1970. *Manual of Vascular Plants of Texas*. Texas Research Foundation. 1881 pp.

WF: Harold Rickett et al. 1970. *Wild flowers of the United States, Vol. 4 the Southwest*. New York Botanic Garden.

CG: Philip Munz. 1959. *California Flora*. Rancho Santa Ana Botanic Garden. 1681 p.

RK: John Coulter and Aven Nelson. 1902. *New Manual of Botany of the Central Rocky Mountains*. American Book Company. 1902. 646 pp.

FLORAS OF ARIZONA NATIONAL PARKS AND MONUMENTS

I. WUPATKI NATIONAL MONUMENT

Steve McLaughlin

Readers of the Plant Press have often indicated that they find the floras and species lists published in this newsletter to be valuable. We encourage ANPS members to prepare species lists for publication here for areas that they have become very familiar with through study and frequent visitation. Meanwhile, we will print from time to time lists for various national parks, monuments, and historic sites in Arizona.

The lists that will appear here can be obtained from the World Wide Web at <http://ice.ucdavis.edu/nps>, an online database created and maintained by the Information Center for the Environment (ICE) at the University of California at Davis.

This is a very useful website, providing lists of plants and animals from parks from throughout the United States. Names appearing on these lists, however, have not been verified by ICE and may have some nomenclatural problems. Each list will be edited by ANPS member Steve McLaughlin, a professor at the Office of Arid Lands Studies, University of Arizona.

The lists will be edited for synonymy (the same plant species occurring under two or more Latin names), exotic species will be marked with an asterisk (*), and updated nomenclature will be provided along with Latin binomials that may be more familiar to most ANPS members.

The Wupatki species list.

The list, available from the ICE website, is based largely on W. B. McDougall's "Seed plants of Wupatki and Sunset Crater National Monuments" (1962, Museum of Northern Arizona Bulletin 37). The ICE list contains four species of *Amsonia*, a difficult genus in the Apocynaceae. *Amsonia peeblesii* is certainly a conspicuous member of the flora at Wupatki, and this national monument is well within the range of *A. tomentosa* var. *stenophylla*. It seems unlikely, however, that either *A. palmeri* or *A. jonesii* are actually members of this flora.

Wupatki National Monument

Wupatki National Monument is Arizona's "Pompeii." The Monument was created in 1924 to preserve some 800 important Indian ruins. In 1064 nearby Sunset Crater erupted, burying the area and depositing ash over some 800 square miles. The ash proved to be excellent fertilizer and made farming possible in a region that receives only about seven inches of rain per year. People then migrated into the area so that the resulting sites show both the pre-volcanic cultures and influences of three more recent major cultures in proximity to each other, an unusual feature in Arizona. Most of the sites were abandoned by about 1300 A.D., apparently because of drought.

The site encompasses 56 square miles of land near Highway 89, about 28 miles north of Flagstaff. A loop drive takes the visitor past both Sunset Crater National Monument and the Wupatki ruins. The area is rich in plant species, with more than 250 species listed.

For Monument information, contact the National Park Service at 520 679-2365; HC 33 Box 444A, Flagstaff AZ 86004; or www.nps.gov.

**PLANTS OF ARIZONA NATIONAL PARKS,
MONUMENTS, AND HISTORIC SITES
I. WUPATKI NATIONAL MONUMENT**

Steve McLaughlin

Introduced species indicated by an asterisk (*).

I. Ferns and Fern Allies		<i>Artemisia frigida</i>	fringed sagewort
Adiantaceae		<i>Artemisia ludoviciana</i>	Louisiana sagewort
<i>Cheilanthes feei</i>	slender lipfern	<i>Artemisia tridentata</i>	big sagebrush
II. Gymnosperms		<i>Baccharis pteronioides</i>	yerba de pasmo
Cupressaceae		<i>Baccharis wrightii</i>	Wright's baccharis
<i>Juniperus monosperma</i>	oneseed juniper	<i>Brickellia californica</i>	California brickellbush
Ephedraceae		<i>Brickellia oblongifolia</i>	Mojave brickellbush
<i>Ephedra culttri</i>	Mormon tea	<i>Brickellia scabra</i>	rough brickellbush
<i>Ephedra torreyana</i>	Torrey's jointfir	<i>Chaenactis macrantha</i>	bighead dustymaiden
<i>Ephedra viridis</i>	Mormon tea	<i>Chaenactis stevioides</i>	Steve's dustymaiden
Pinaceae		<i>Chaetopappa ericoides</i>	
<i>Pinus edulis</i>	two-needle pinyon	(<i>Leuceline ericoides</i>)	rose heath
III. Dicots		<i>Chloracantha spinosa</i>	
Amaranthaceae		(<i>Aster spinosus</i>)	spiny chloracantha
* <i>Amaranthus albus</i>	prostrate pigweed	<i>Chrysothamnus nauseosus</i>	rubber rabbitbrush
<i>Amaranthus blitoides</i>	mat amaranth	<i>Chrysothamnus viscidiflorus</i>	green rabbitbrush
<i>Amaranthus wrightii</i>	Wright's amaranth	<i>Cirsium arizonicum</i>	Arizona thistle
Anacardiaceae		<i>Cirsium pulchellum</i>	Cainville thistle
<i>Rhus trilobata</i>	skunkbush sumac	<i>Conyza coulteri</i>	conyza
Apiaceae		<i>Dicoria canescens</i>	desert twinbugs
<i>Cymopterus bulbosus</i>	bulbous spring parsley	<i>Encelia frutescens var. resinosa</i>	button brittlebush
<i>Cymopterus multinervatus</i>	purplenerve spring parsley	<i>Erigeron concinnus</i>	
<i>Cymopterus purpurascens</i>	widewing spring parsley	(<i>E. pumilus</i> spp. <i>concinoides</i>)	Navajo fleabane
Apocynaceae		<i>Erigeron divergens</i>	spreading fleabane
<i>Amsonia jonesii</i>	Jone's bluestar	<i>Gaillardia pinnatifida</i>	red dome blanketflower
<i>Amsonia palmeri</i>	Palmer's bluestar	<i>Gutierrezia microcephala</i>	threadleaf snakeweed
<i>Amsonia peeblesii</i>	Peeble's bluestar	<i>Gutierrezia sarothrae</i>	broom snakeweed
<i>Amsonia tomentosa var. stenophylla</i>		<i>Helianthus petiolaris</i>	prairie sunflower
(<i>A. eastwoodiana</i>)	woolly bluestar	<i>Isocoma wrightii</i>	southern jimmyweed
Asclepiadaceae		<i>Iva axillaris</i>	povertyweed
<i>Asclepias involucrata</i>	dwarf milkweed	<i>Machaeranthera canescens</i>	hoary aster
<i>Asclepias latifolia</i>	broadleaf milkweed	<i>Machaeranthera tephrodes</i>	cutleaf goldenweed
<i>Asclepias subverticillata</i>	whorled milkweed	<i>Malacothrix sonchoides</i>	sowthistle desert dandelion
Asteraceae		<i>Malacothrix torreyi</i>	Torrey's desert dandelion
<i>Ambrosia acanthicarpa</i>	flatspine burr ragweed	<i>Pericome caudata</i>	mountain leaftail
<i>Ambrosia artemisiifolia</i>	annual ragweed	<i>Psilostrophe sparsiflora</i>	greenstem paperflower
<i>Ambrosia psilostachya</i>	Cuman ragweed	<i>Sanvitalia abertii</i>	Albert's creeping zinnia
<i>Artemisia bigelovii</i>	Bigelow's sagebrush	<i>Senecio flaccidus var. flaccidus</i>	
<i>Artemisia dracunculus</i>	wormwood	(<i>S. longilobus</i>)	threadleaf groundsel
<i>Artemisia filifolia</i>	sand sagebrush	<i>Senecio multicapitatus</i>	ragwort groundsel
		<i>Senecio multilobatus</i>	lobeleaf groundsel
		<i>Senecio spartioides</i>	broom groundsel
		<i>Stephanomeria pauciflora</i>	brownplume wirelettuce
		<i>Stephanomeria spinosa</i>	thorn skeletonweed
		<i>Stephanomeria tenuifolia</i>	narrowleaf wirelettuce
		<i>Stephanomeria thurberi</i>	Thurber's wirelettuce

<i>Tetradymia canescens</i>	spineless horsebush	<i>Atriplex canescens</i>	fourwing saltbush
<i>Thymophylla pentachaeta</i>		<i>Atriplex confertifolia</i>	shadscale saltbush
(<i>Dyssodia pentachaeta</i>)	fiveneedle pricklyleaf	<i>Atriplex obovata</i>	mound saltbush
<i>Townsendia incana</i>	hoary townsendia	<i>Chenopodium fremontii</i>	Fremont's goosefoot
* <i>Tragopogon dubius</i>	yellow salsify	<i>Chenopodium hians</i>	hians goosefoot
<i>Xanthium strumarium</i>		<i>Chenopodium leptophyllum</i>	narrowleaf goosefoot
var. <i>canadense</i>	Canada cocklebur	<i>Krascheninnikovia lanata</i>	
<i>Zinnia grandiflora</i>	Rocky Mountain zinnia	(<i>Eurotia lanata</i>)	winterfat
Boraginaceae		* <i>Salsola tragus</i> (<i>S. kali</i> var. <i>tenuifolia</i> ; <i>S. pestifer</i>)	Russian thistle
<i>Cryptantha cinerea</i>	James' catseye	<i>Sarcobatus vermiculatus</i>	greasewood
<i>Cryptantha crassiseala</i>	thicksepal catseye	<i>Suneda torreyana</i>	Mojave seabite
<i>Cryptantha pterocarya</i>	wingnut catseye	Convolvulaceae	
<i>Heliotropium curassavicum</i>	salt heliotrope	<i>Evolvulus nuttallianus</i>	
<i>Lappula occidentalis</i> var. <i>occidentalis</i>		(<i>E. pilosus</i>)	shaggy dwarf morningglory
(<i>L. redowskii</i>)	desert stickseed	Crossosomataceae	
<i>Lappula occidentalis</i> var. <i>cupulata</i>		<i>Glossopetalon spinescens</i>	
(<i>L. texana</i>)	flatspine stickseed	(<i>Forsellesia nevadensis</i>)	spiny greasewood
<i>Tiquilia hispidissima</i>		Cucurbitaceae	
(<i>Coldenia hispidissima</i>)	hairy coldenia	<i>Cucurbita foetidissima</i>	Missouri gourd
<i>Tiquilia nuttallii</i>		Euphorbiaceae	
(<i>Coldenia nuttallii</i>)	Nuttall's coldenia	<i>Chamaesyce albomarginata</i> (<i>Euphorbia albomarginata</i>)	whitemargin sandmat
Brassicaceae		<i>Chamaesyce fendleri</i>	Fendler's sandmat
<i>Descurainia pinnata</i>	western tansymustard	(<i>Euphorbia fendleri</i>)	
<i>Dimorphocarpa wislizenii</i>	tourist plant	<i>Chamaesyce micromera</i>	Sonoran sandmat
<i>Lesquerella arizonica</i>	Arizona bladderpod	(<i>Euphorbia micromera</i>)	
<i>Lesquerella intermedia</i>	mid bladderpod	<i>Chamaesyce parryi</i>	Parry's sandmat
* <i>Sisymbrium altissimum</i>	tall tumbledustard	(<i>Euphorbia parryi</i>)	
<i>Stanleya pinnata</i>	desert prince's plume	<i>Chamaesyce revoluta</i>	threadstem sandmat
<i>Streptanthella longirostris</i>	longbeak streptanthella	(<i>Euphorbia revoluta</i>)	
Cactaceae		<i>Chamaesyce serpyllifolia</i>	thymeleaf sandmat
<i>Coryphantha vivipara</i>	spiny star	(<i>Euphorbia serpyllifolia</i>)	
<i>Echinocactus polycephalus</i>	cottontop cactus	<i>Croton texensis</i>	Texas croton
<i>Echinocereus fendleri</i>	pinkflower hedgehog	<i>Euphorbia exstipulata</i>	squareseed spurge
<i>Opuntia erinacea</i>	grizzly bear pricklypear	<i>Tragia nepetifolia</i>	catnip noseburn
<i>Opuntia macrorhiza</i>	twistspine pricklypear	Fabaceae	
<i>Opuntia whipplei</i>	Whipple cholla	* <i>Alhagi camelorum</i>	camelthorn
<i>Pediocactus simpsonii</i>	Simpson hedgehog cactus	<i>Astragalus allochrous</i>	halfmoon milkvetch
Capparaceae		<i>Astragalus amphioxys</i>	crescent milkvetch
<i>Cleome serrulata</i>	Rocky Mountain beeplant	<i>Astragalus episcopus</i>	bishop's milkvetch
<i>Polanisia dodecandra</i>		<i>Astragalus lancearius</i>	bishop's milkvetch
ssp. <i>trachysperma</i>	sandyseed clammyweed	<i>Astragalus lentiginosus</i>	specklepod milkvetch
<i>Wislizenia refracta</i>	jackass clover	<i>Astragalus lentiginosus</i>	
Caprifoliaceae		var. <i>albiflorus</i>	specklepod milkvetch
<i>Symphoricarpos</i>	whortleleaf snowberry	<i>Astragalus praelongus</i>	stinking milkvetch
oreophilus		<i>Astragalus tephrodes</i>	ashen milkvetch
Caryophyllaceae		<i>Astragalus wootonii</i>	Wooton's milkvetch
<i>Arenaria eastwoodiae</i>	Eastwood's sandwort		
Chenopodiaceae			
<i>Allenrolfea occidentalis</i>	iodinebush		

<i>Caesalpinia drepanocarpa</i> (<i>Hoffmannseggia drepanocarpa</i>)	sicklepod holdback	<i>Gaura coccinea</i>	scarlet bee blossom
<i>Caesalpinia jamesii</i>	James' holdback	<i>Oenothera pallida</i>	pale evening primrose
<i>Dalea filiformis</i>	Sonoran prairie clover	<i>Oenothera pallida</i> <i>ssp. runcinata</i>	pale evening primrose
<i>Dalea lanata</i> var. <i>terminalis</i>	woolly prairie clover	Polemoniaceae	
<i>Lotus wrightii</i>	Wright's deervetch	<i>Gilia hutchinsifolia</i>	desert pale gilia
<i>Lupinus pusillus</i>	rusty lupine	<i>Gilia leptomeria</i>	sand gilia
<i>Parryella filifolia</i>	common dunebroom	<i>Gilia sinuata</i>	rosy gilia
<i>Phaseolus angustissimus</i>	slimleaf bean	<i>Gilia tenuiflora</i>	greater yellowthroat gilia
<i>Psoralea thompsoniae</i> var. <i>whitingii</i>	Whiting's smokebush	<i>Ipomopsis gunnisonii</i>	sanddune skyrocket
<i>Senna bauhinioides</i> (<i>Cassia bauhinioides</i>)	twinleaf senna	<i>Ipomopsis longiflora</i> (<i>Gilia longiflora</i>)	flaxflowered gilia
Grossulariaceae		<i>Ipomopsis multiflora</i>	many-flowered gilia
<i>Ribes cereum</i>	wax current	<i>Ipomopsis polycladon</i>	many-branched gilia
Hydrophyllaceae		Polygonaceae	
<i>Nama dichotomum</i>	wishbone fiddleleaf	<i>Eriogonum corymbosum</i>	crispleaf buckwheat
<i>Nama hispidum</i>	bristly nama	<i>Eriogonum corymbosum</i> var. <i>glutinosum</i>	crispleaf buckwheat
<i>Phacelia crenulata</i>	cleftleaf wild heliotrope	<i>Eriogonum deflexum</i>	flatcrown buckwheat
<i>Phacelia integrifolia</i>	gypsum scorpionweed	<i>Eriogonum divaricatum</i>	divergent buckwheat
<i>Phacelia welshii</i>	Welsh's phacelia	<i>Eriogonum hookeri</i>	Hooker's buckwheat
Juglandaceae		<i>Eriogonum jonesii</i>	Jones' buckwheat
<i>Juglans major</i>	Arizona walnut	<i>Eriogonum leptocladon</i>	sand buckwheat
Lamiaceae		<i>Eriogonum wetherillii</i>	Wetherill's buckwheat
<i>Hedeoma drummondii</i>	Drummond's false pennyroyal	Portulacaceae	
<i>Hedeoma nana</i>	false pennyroyal	<i>Portulaca mundula</i>	kiss me quick
* <i>Marrubium vulgare</i>	horehound	<i>Portulaca retusa</i>	little hogweed
<i>Poliomintha incana</i>	hoary rosemary mint	Rosaceae	
Loasaceae		<i>Fallugia paradoxa</i>	Apache plume
<i>Mentzelia albicaulis</i>	whitestem blazingstar	<i>Petrophytum caespitosum</i>	mat rock spiraea
<i>Mentzelia pumila</i>	dwarf mentzelia	<i>Purshia stansburiana</i> (<i>Cowania mexicana</i>)	Mexican cliffrose
Malvaceae		Salicaceae	
<i>Abutilon parvulum</i>	dwarf Indian mallow	<i>Populus fremontii</i>	Fremont's cottonwood
<i>Sphaeralcea grossulariifolia</i>	gooseberry-leaf globemallow	Scrophulariaceae	
<i>Sphaeralcea leptophylla</i>	scaly globemallow	<i>Castilleja angustifolia</i> var. <i>dubia</i> (<i>C. chromosa</i>)	northwestern Indian paintbrush
<i>Sphaeralcea parvifolia</i>	smallflower globemallow	<i>Castilleja integra</i>	wholeleaf Indian paintbrush
<i>Sphaeralcea subhastata</i>	globemallow	<i>Castilleja linariifolia</i>	Wyoming Indian paintbrush
Nyctaginaceae		<i>Mimulus guttatus</i>	seep monkeyflower
<i>Abronia elliptica</i>	fragrant white sand verbena	<i>Mimulus rubellus</i>	red monkeyflower
<i>Allionia incarnata</i>	trailing windmills	<i>Penstemon ambiguus</i>	gilia beardtongue
<i>Boerhavia coulteri</i>	Coulter's spiderling	<i>Penstemon barbatus</i>	beardlip penstemon
<i>Boerhavia spicata</i>	creeping spiderling	* <i>Verbascum thapsus</i>	common mullein
<i>Boerhavia wrightii</i>	largebract spiderling	Solanaceae	
<i>Mirabilis multiflora</i>	Colorado four o'clock	<i>Chamaesaracha coronopus</i>	greenleaf five eyes
<i>Tripterocalyx micranthus</i>	smallflower sand verbena	<i>Datura innoxia</i>	angel's trumpet
Oleaceae		<i>Lycium andersonii</i>	Anderson's wolfberry
<i>Forestiera neomexicana</i>	stretchberry	<i>Lycium pallidum</i>	pale wolfberry
Onagraceae		<i>Nicotiana attenuata</i>	coyote tobacco
<i>Calyophus lavandulifolius</i>	lavenderleaf sundrops	<i>Nicotiana trigonophylla</i>	desert tobacco
<i>Camissonia boothii</i>	booth's evening primrose	<i>Physalis fendleri</i>	Fendler's groundcherry
<i>Camissonia walkeri</i>	Walker's suncup	<i>Physalis hederifolia</i>	ivyleaf groundcherry

Solanum elaeagnifolium silverleaf nightshade
Tamaricaceae
 **Tamarix chinensis* fivestamen tamarisk
Ulmaceae
Celtis laevigata var. *reticulata* netleaf hackberry
Verbenaceae
Aloysia wrightii Wright's beebrush
Glandularia gooddingii
 (*Verbena gooddingii*)
Glandularia wrightii
 (*Verbena wrightii*) Davis Mountain mock vervain
Tetradlea coulteri Coulter's wrinklefruit
Viscaceae
Phoradendron juniperinum juniper mistletoe
Zygophyllaceae
Kallstroemia parviflora warty caltrop
 **Tribulus terrestris* puncture vine
IV. Monocots
Agavaceae
Yucca baileyi var. *navajoa* Navajo yucca



Hibiscus coulteri and *Ipomea coccinea*
 by Margaret Pope

Poaceae
Andropogon gerardii var. *paucipilus* sand bluestem
Aristida barbata Havard's threeawn
Aristida purpurea var. *purpurea* purple threeawn
Aristida purpurea var. *longiseta*
 (*A. longiseta*) Fendler threeawn
Bothriochloa barbinodis cane bluestem
Bouteloua barbata sixweeks grama
Bouteloua curtipendula sideoats grama
Bouteloua eriopoda black grama
Bouteloua gracilis blue grama
Distichlis spicata var. *stricta* inland saltgrass
Elymus elymoides
 (*Sitanion hystrix*) bottlebrush squirreltail
Enneapogon desvauxii nineawn pappusgrass
Erioneuron pulchellum
 (*Tridens pulchellus*) low woollygrass
Hilaria jamesii galleta
Muhlenbergia porteri bush muhly
Oryzopsis hymenoides Indian ricegrass
Phragmites australis common reed
Scleropogon brevifolius burrograss
Setaria leucopila streambed bristlegrass
Sporobolus airoides alkali sacaton
Sporobolus contractus spike dropseed
Sporobolus flexuosus mesa dropseed
Sporobolus giganteus giant dropseed
Stipa arida arid dropseed
Stipa comata needle and thread
Stipa neomexicana New Mexico needlegrass
Stipa speciosa desert needlegrass

Chiricahua Workshop

As usual, the annual Chiricahua Workshop will take place in the refreshing atmosphere of the American Museum of Natural History's Southwest Research Station at Portal over Labor Day Weekend, September 4-7. A mailing will go out this summer with details and forms.

Be sure to register early, as the workshop usually fills up quickly and there is a limit on the number of participants.

Book Reviews

At the Desert's Green Edge: An Ethnobotany of the Gila River Pima
by Amadeo Rea. University of Arizona Press, 1997. 430 p.

I love this book. The motive for this book is a compelling one: reconstruction of the relationship of Gila River Pima Indians to plants of the Sonoran desert.

It is a sad story, because it is a story of loss. Once the women of the tribe were never more than walking distance from foods and the raw materials for baskets. Now the Akimel O'odham—the River People—are people without a river. Upstream dams, water diversions, and off-reservation schooling caused their way of life to change, and one result is that members of the tribe born after 1920 know only one-half to one-third the number of folk taxa that the older people knew. Many of the plants and their uses are simply gone.

While this could be considered "salvage ethnography", it is much more than a dry recording of what once was. It is a joyous celebration of the stories of Rea's Akimel O'odham consultants. Rea's own stories, in which he shares the thrill of reconnecting the names, legends, and uses of hundreds of plants, wild and cultivated, are also fun to read.

The first part of the book describes the setting, introduces the primary O'odham informants and their tribal culture, and discusses previous ethnobotanical investigations and historical observations by Spanish and Anglo travelers. From this section I learned, for instance, that the middle Gila once had extensive sacaton grasslands that were replaced by mesquite and farmlands over time. In this section Rea provides maps showing place names and the former distribution of grasslands and mesquite woodlands, as well as tables of extirpated species, wild food plants, and recently introduced or colonizing species. Diagrams showing O'odham names for various plant parts are also included.

The second part of the book provides information specific to each taxon, and is organized by groups as the O'odham conceive them. Each description of a plant is a story, or series of stories, thus inviting the reader to learn not only religious, culinary, medicinal, and other uses but also habitat preferences, phenology, O'odham history, humor, and language, when the plant was first used (if exotic), and whether the plant continues to be used today. Technical notes describe voucher specimens, and explain discrepancies between Rea's classification and previous work.

More than 100 Japanese-style ink brush paintings illustrate the book. Many capture the essence of the plant's appearance better than a botanical illustration would, but others seem more abstract.

Julia Fonseca

Dry Borders, a double issue of *Journal of the Southwest* (Autumn Winter 1997, 552 pp.) is an impressive collection of articles by various authors, edited by Richard S. Felger and Bill Broyles. Topics include A Botanist's View of the Desert, A Geologic Tour of the Lower Colorado Region, Changing Place Names in the Pinacate, A Gazetteer, and much more.

Dry Borders is available for \$17 from the Southwest Center, University of Arizona, Tucson AZ 85721. Or for \$18 you can subscribe to *The Journal of the Southwest* and get this issue in the bargain.

Studies of the Desert Biome: Uniqueness, Biodiversity, Threats of the Adequacy of Protection in the Sonoran Bioregion by Gary Paul Nabhan and Andrew Holdsworth (81 pp.) is a summary of findings regarding human impacts on the Sonoran Desert. The authors surveyed a wide variety of researchers and environmental others concerned with the desert to present a sobering picture of how activities such as dams, water use, grazing, and urban growth. Available for \$7 from The Wildlands Project, 1955 W. Grant Rd., Tucson AZ 85745.

Conservation Update

Julia Fonseca, Conservation Chair

Will the Baboquivari Wilderness become part of the Tohono O'odham Reservation?

The Tohono O'odham Nation is seeking an act of Congress to transfer the Baboquivari Wilderness to the reservation. The current reservation boundaries follow the watershed divide, in effect dividing management of the Baboquivari Peak, a site which is sacred to the Tohono O'odham, between the Nation and the Bureau of Land Management.

The Baboquivari wilderness area, roughly 2000 acres in size, contains the upper portions of the watersheds of Brown and Thomas Canyons. Vegetation communities in the wilderness area range from an oak-pine woodland to mesquite and saguaro on the lower slopes. *Amsonia kearneyana*, Kearney's blue star, is an endangered plant found in Brown Canyon.

At issue is whether the transfer would subject the lands in question to increased grazing. In survey reports for *Amsonia*, botanists have noted that grazing is damaging vegetation on the Tohono side of the Baboquivari range.

ANPS Seeks Protection for *Dalea tentaculoides*

ANPS is shocked by the recent decision of U. S. Fish and Wildlife Service not to list *Dalea tentaculoides*, a rare legume from only a few places in Sonora and Arizona, under the Endangered Species Act. The plant occurs in Sycamore Canyon near Nogales, and was nearly wiped out by flooding in 1993.

Your Conservation Chair has, under the Freedom of Information Act, twice requested copies of documents relating to the agency's decision not to protect the plant. No response has been forthcoming from the agency. ANPS will seek to ensure the agency complies with applicable laws.

ANPS Tucson Alarmed by Grazing Negligence

Member Greg Brendan has informed Tucson members of destructive grazing practices in Agua Caliente Canyon, located in Coronado National Forest. Brendan is an artist who visits the canyon regularly, relying on the canyon's diversity of plants for guidance as he develops exquisite wildflower models for the Arizona-Sonora Desert Museum.

Brendan found it difficult to obtain information, such as the allotment management plan, from Santa Catalina Ranger District's range conservationist. With the help of other members, the Forest Service is now acknowledging that it "keeps forgetting" to get livestock out of the watershed on a timely basis. After viewing the area on a recent field trip, Forest Service officials explained that none of the observed degradation was unreasonable based on their current standards. According to Lainie Levick, who attended the field trip with Brendan, these current standards do not differentiate riparian versus upland ecosystems and do not include measures to monitor watershed values. They simply measure how much vegetation is utilized by livestock. Most of the other land management agencies are using more sophisticated approaches.

Pima County Improves Native Plant Protection

Ten years after directing staff to develop protection measures for upland vegetation, Pima County Board of Supervisors adopted an ordinance aimed at discouraging destruction of Sonoran desert plant life. The Board's decision was prompted by state legislation which will soon block the ability of county supervisors to regulate destruction of native plants. The new ordinance reportedly draws upon the experience of implementing similar measures in communities of Tucson, Marana, and Oro Valley.

Farming for Nature at Bingham Cienega

Julia Fonseca, Project Manager

With support from the Redington Natural Resource Conservation District, Pima County Flood Control District's proposal to revegetate former farm fields at Bingham Cienega Natural Preserve has been funded. On December 1, 1997, the Arizona Water Protection Fund pledged \$83,179 for the project.

Bingham Cienega Preserve is a 285-acre tract purchased by the Pima County Flood Control District. The Preserve is located one mile north of Redington along the San Pedro River north of Benson. Several natural vegetation communities occur on the site including cattail-dominated wetland, mesquite bosque, ash tree swamp and cottonwood-willow forest. The preserve supports native fish, the lowland leopard frog, a rich assemblage of reptiles and mammals, and more than 300 species of birds.

Six former agricultural fields, totaling 50 acres, occur within the Preserve. Since the property was acquired in 1989, native species of plants have established in some areas formerly farmed, but non-native weeds still dominate. The project targets those areas where colonization by native plants has not occurred. Our objective at Bingham Cienega Natural Preserve is to restore native vegetation to the fields, thereby increasing

the density and diversity of native plant and animal species.

Methods to be used include:

- 1) pole plantings of willow and cottonwood and container planting of other woody species
- 2) suppressing weeds through use of controlled fire, mulching and localized herbicide application
- 3) unirrigated container plantings of sacaton
- 4) irrigation of tree, shrub and grass plantings
- 5) thinning of mesquite saplings
- 6) grazing of selected areas to increase mesquite establishment.

The District has contracted with the Nature Conservancy to oversee the work. With assistance from the Kelly family, who maintain an in-holding at the site, irrigation and grazing will allowed to continue for a maximum of two years on the preserve.

To find out more about the project, contact Julia Fonseca at the District at (520) 740-6350 (201 N. Stone, Tucson, 85705) or Kim Fox at the Conservancy (520) 622-3861. Planting will begin some time in July or August. If you would like to help with the planting effort, call Kim.

ANPS Creates State-level Conservation Committee

The ANPS Board has created a new standing committee for addressing conservation issues. This Conservation Committee will comment on state or federal legislation affecting native plants, and where deemed appropriate, lobby for or against such legislation within the limits set by the Board. Another important function of the new committee is to encourage each chapter to have its own conservation committee to speak out on local issues.

Current projects of the committee include producing a brochure on the Arizona Native Plant Law, trying to get another botanist position for U. S. Fish and Wildlife Service, lobbying for better Endangered Species Act reauthorization bills, and creating Tucson and Phoenix conservation committees. Members of the State Conservation Committee include Julia Fonseca (Tucson), Liz Slauson (Phoenix), Sue Rutman (Ajo), Cathy Wertz (Bisbee), and Mima Falk (Tucson). If you would like to help with the above projects or other state-level conservation activities, please let one of us know!

Conservation Toolkit: 6 Plant Salvage

Conservation kudos to City of Sierra Vista for creating a Plant Sciences Center at the University of Arizona's Sierra Vista campus. The center will receive, store and nurture native plants salvaged from roadside development until they can be reintroduced along city and state roadways. The center will not be a retail plant nursery.

Initially the center will receive plants removed from the path of the State's planned widening of Highway 90 from Sierra Vista to Benson. Reuse of the native plants is a top priority for the state highway department because these plants may transplant more easily and require less long-term maintenance than many non-native species. Taxpayers may also save money by transplanting these plants instead of paying to purchase new ones.

Plants which will be salvaged include many types of plants not usually targeted for transplanting: native grasses, globemallow, condalia, creosote, catclaw acacia, fairy duster, graythorn, hackberry, white dalea, paper flower, mormon tea, and saltbush. Agaves, cacti, yuccas, sotol and ocotillo will also be salvaged.

While salvage of plants is important, we should remember that protection of existing vegetation is more effective. Soil compaction and erosion during construction affects the success of future plantings, and creates conditions which sometimes favor exotic plants such as buffel grass. Plant salvage should not be used as a substitute for incorporating preservation incentives in municipal native plant ordinances.



Calliandra eriophylla and *Janusia gracilis*
by Margaret Pope.

News from ANPS Chapters

Flagstaff

Marc Leiterman reports that the Museum of Northern Arizona has a new building that is being landscaped with native plants, including a replica of a Hopi crop garden. He also wants us to be aware of the fine library facilities available to the public at the Flagstaff Arboretum which has more than 1500 volumes.

The chapter has a number of events scheduled during the summer. For information contact marc@merlin.infomagic.com

Tucson

Tucson Water's Sweetwater Wetlands officially opened in April. Months before this new constructed wetland was open to the public, many species of birds had settled in as well as other creatures - even a bobcat - visited the area. ANPS has been a partner in developing the educational component of the wetland and assisted with plantings. All plant species, both terrestrial and aquatic, are native. The city has been diligent in removing saltcedar before it can take hold.

The Tucson chapter has several field trips scheduled for summer.

Invasive Species in Sonoran Desert Ecosystems A Symposium at the Arizona Sonora Desert Museum

In early May 1998, the Desert Museum sponsored an unusual symposium on exotic species - including both flora and fauna. Tom VanDevender presented the "big picture" talking about plant invasions over the millennia. Richard Felger and Steve McLaughlin gave an overview of exotic plant species and Barbara Tellman described ways in which some plant species reached the Southwest. Many other talks on specific types of species followed: fish (Dean Hendrickson), amphibians (Phil Rosen), bees (Steve Buchman), fire (Todd Esque), buffel grass (Alberto Borquez), and mammals on Gulf of California islands (Eric Mellink). Jane Bock talked generally about invasive species in grasslands. Finally, general issues were discussed by Joel Floyd (controlling the border), Bonnie Harper-Lore (policies of the Federal Highway Administration) and Ron Gass (exotic species in landscapes).

All speakers are contributing chapters for a book on the subject to be published by the University of Arizona Press next year, of which Barbara Tellman is the editor. Participants were given a draft list of plant and animal invaders for comment and input, with a goal of producing a thorough list of species of concern for the book. If you would like to comment on this draft list, contact Tom VanDevender or Gary Nabhan at the Museum. (520 883-1380).

ANPS Website

<http://www.azstarnet.com/~anps/>

The ANPS website has been evolving since its inception. It now contains an online version of the ANPS membership brochure, description of ANPS publications, information on membership and chapter activities, links to other internet native plant resources, and breaking news. In the future we hope to add plant salvage information. If you have information you'd like added or comments (praise or suggestions), please send it to website maintainer David Sewell c/o anps@azstarnet.com

Flagstaff ANPS is also developing a website which can be reached at www.solar-nexus.com/aands/sci/tax/natv/anpsflag and would also like feedback on its site.

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