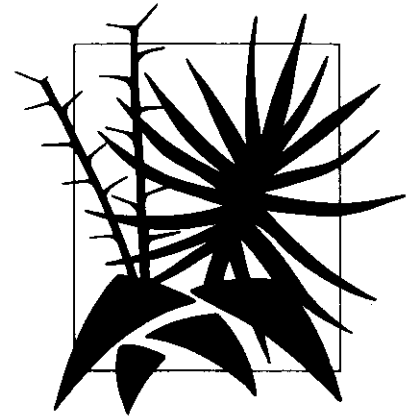


Volume 16, No. 1 Spring, 1992

The Plant Press

THE ARIZONA NATIVE PLANT SOCIETY



JOJOBA: A Dry Farming Promise

A few steps down into the earth of central Arizona, a small semi-subterranean greenhouse, warmed by the sun and humidified by an ingenious misting system, shelters the cloned offspring of jojoba "super" parents. The carefully constructed stone and plastic greenhouse rests unobtrusively in the backyard of owners Robert and Lois Stryker. They designed and built the greenhouse just 12 years ago, yet its form seems as inherent to its site as does their adjacent territorial adobe home, erected here by previous owners in 1886. Planted around the greenhouse and the adobe are jojoba shrubs in various stages of maturity, attractive additions to the original landscaping of this residential lot near downtown Florence, Arizona. This site serves as the Stryker's home laboratory for a much larger undertaking--Stryker's Jojoba Experimental Farm--that lies a few miles outside of town.

How the Strykers came to involve themselves with Jojoba is a story that unfolds almost as if by design. What set the stage for the story's development was the inheritance of an 80 acre homestead eight miles south of Florence, which Robert Stryker received from his grandfather. At that time, he and Lois lived miles away in San Bernardino, California, raising a family and engaged in high school teaching careers in science and in English. During their 30 years together in California, the Florence homestead was but a possible destination of unknown promise.

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Jojoba plantings on the Stryker farm, showing "harvested" water standing between the bermed rows.

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Notes from the President

The summer and fall of 1991 saw one of the best years in many for seed set of wild jojoba in Arizona. All over our state, crews of seed pickers were very active in taking the seed for sale to seed brokers. These crews were usually made up of poor, out-of-work young Mexican nationals for whom the low prices paid by seed brokers and the rigors of sleeping rough in the desert were preferable to near starvation in their native land.

Superior, where I live, lies in the heart of one of the largest natural stands of jojoba in Arizona. Consequently, we who live in this area have witnessed first hand the impacts of this "wild harvest." In addition, as one who has had past experience with jojoba domestication, I take a special interest in the situation. We first became aware of this activity during the summer when a crew of pickers was found camped on Arboretum land. Negative impacts of the activity included injury to jojoba bushes resulting from beating of the shrubs to release seed. In many instances, the piles of "seed" on the ground were comprised as much of leaves and branches as of fruit with seed. In addition, the camp was very trashy, fires were not attended and no provision for sanitary disposal of human waste had been made. The crew had simply been dumped in our area by the seed broker and left to shift for themselves.

Later in the season, long after the above-mentioned condition had been cleared up, a more serious situation came to light in the neighborhood of the proposed White Canyon Wilderness area located about 10 miles from Superior off the road to Kearny. This extensive area is mostly under BLM control, with some isolated sections of Arizona State land. Crews of 20 to 30 men were active picking jojoba seed in the area all summer and into the fall. Campsites were quite littered, fires were found still smoldering with no one in attendance, and human waste was not disposed of properly. At the White Canyon campsite that I visited on December 15, a semi-permanent rock privy had been set up about 15 feet from and about 3 feet above the stream. Leachate from the privy would seem to pose a contamination threat to the waters of White Canyon. This situation has been repeated in numerous campsites over a period of several months, creating a potential groundwater contamination situation. This is particularly important in light of the fact that there exists a developed spring near the confluence of White and Walnut canyons which is utilized for its purportedly clean, high quality water by people from all over the district.

The remoteness of the area, the patchwork of public land ownership and agency responsibilities, lack of manpower for investigation and follow-up, and a certain indifference to environmental infractions by local law enforcement agencies, have all contributed to the situation's persistence after numerous calls were made to alert responsible parties of the problem.

In thinking about this year's "wild harvest" of jojoba seed, I would like to pose some questions. What is the impact of this kind of seed removal on the natural stands of jojoba? What is the impact of this kind of activity on the biotic communities and waters of the areas effected? How does this "wild harvest" effect the emerging domesticated jojoba industry?

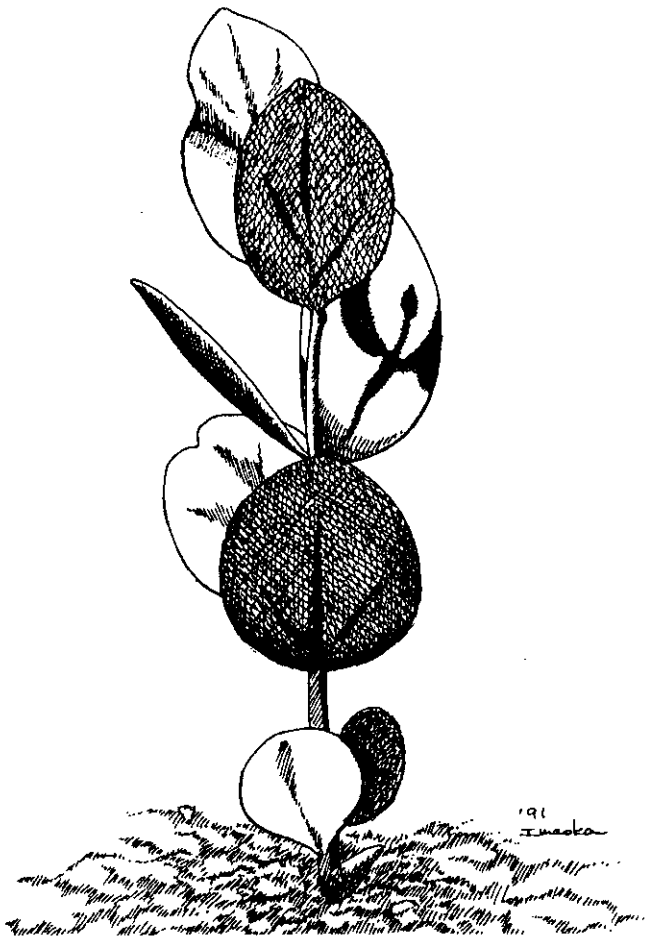
Regarding the impact of the activity on the jojoba stands themselves, studies conducted in the 1970's showed that this kind of seed removal led to significant degradation of the jojoba plants themselves by loss of leaf and stem biomass from beating, as well as from compaction and trampling of the soil around the shrubs during picking. I know of no studies that have looked at the effect of repeatedly removing a very great proportion of seed during bountiful seed years, but I don't think the effect is likely to be negligible over say twenty years time. When very poor people with no other options are conducting seed removal virtually every seed they can find is taken. Jojoba is an intermittent bearer of seed and very good years occur infrequently. In effect, we are penalizing the population for producing bountiful seed during "on" years.

As to the impact of the activity on the general area and its waters, I consider the impact to be detrimental both in terms of trashing/littering and in its potential for pollution of local waters and of introducing disease organisms into the locality. As is true for much economic activity that results in adverse environmental impacts, costs are displaced onto the land, waters and society in general. In this case, costs to provide decent living conditions for the wretched pickers are avoided by the seed buyers, with the real costs being displaced onto the land.

Finally, how does such activity effect the emerging jojoba industry. Industry representatives don't seem to have strong opinions on the matter, considering it an intermittent problem more or less in the hands of Providence. I was involved in jojoba domestication for most of the period from 1974 to 1983 and have kept up with the development of this promising new crop since that time. Many hardworking people have poured years of their lives and much of their resources into the attempt to domesticate this native of the Sonoran Desert. While some may benefit from the windfall of lower priced native seed during bountiful years, lower

prices to agricultural producers also seem to result. This along with supply fluctuations from year to year may not enhance market stability of the new industry. I would much rather see our jojoba oil and valuable by-products coming from plantations which utilize our marginal farmlands or replace more water-intensive crops than from the degradation of wide areas of our beautiful state's land and waters. □

Bill Feldman



"Jojoba Emerging" by Keiko Imaoka. Keiko Imaoka is a Tucson based artist working in small and large scale tile murals of plants and animals.

Ode to Jojoba

Bearing heat and dryness
in stress unseen;
Bearing leaves of endurance
ever grey-green;
Bearing bountiful fruit
where harvest is lean;
Jojoba, your virtues
deserve esteem.

Position Opening PLANT PRESS EDITOR

Qualifications:

- Enthusiasm for Arizona's native plants;
 - Ability to procure and edit items for publication;
- (Newsletter experience and desktop publishing skills helpful but not essential; Training in these areas may be available.)

Contact: Bill Feldman,
ANPS President,
P.O. Box AB,
Superior, AZ 85273

OR

Karen Breunig, Editor
1540 W. Flower Cir. So.
Phoenix, AZ 85015

Editor's Desk

Jojoba, Arizona's oil-rich desert native plant, moves to center stage in this issue through two articles, a line drawing and a poem. Lest this appear to be careful editorial planning, let me explain that it was not. It was serendipity.

The cover story on the Stryker's Jojoba Experimental Farm had been in my "work-to-be-finished" pile for nearly two years when Bill Feldman's "Notes from the President" reached my mailbox. Reading his words, I resolved to finish the Stryker article. Bill's concern about possible over-harvesting of wild jojoba highlights the need for reliable agricultural production of this valuable crop. One can hope that research such as the Strykers' will advance jojoba's agricultural success, thus reducing the type of harvesting threats to its wild populations that Bill observed around Superior last fall.

Just when these articles were coming together, the mail surprised me with Keiko Imaoka's drawing "Jojoba Emerging"--an unsolicited "dessert" to the jojoba menu that was taking shape.

My thanks go out to the many people who contributed art, articles, and other support for this issue. Above all I want thank my mother, Ann Enyedy. Her extensive help at home gave me the time to complete these pages.

Karen Enyedy Breunig

Plant Law Committee Begins Work

by Robert G. Breunig

Under the initiative of Keith Kelly, Director of Arizona's Department of Agriculture, a Technical Advisory Committee to the 1989 Arizona Native Plant law has now been formed. The Native Plant Law suggests—but does not require—the formation of an advisory committee. Director Kelly is to be commended for forming the committee, which held its first meeting last November.

Serving on the nine-member committee are: Rita Jo Anthony, Robert Breunig, Jim Elliott, Jane Evans, William Feldman, Ron Gass, Phil Hebets, Charles Mason and Donald Pinkava. Breunig was elected chairman of the committee and Anthony vice chairman. On the committee's roster are several members of the Arizona Native Plant Society, including ANPS President Bill Feldman.

The purpose of the committee is, in the words of the law: "...[to] review whether plant species, communities or populations are being depleted, to recommend revisions to the protected categories and to recommend priorities for additional monitoring and scientific study."

The actions of the committee are advisory only. The director of the Department of Agriculture retains the right to accept or deny the committee's recommendations.

In general, the committee focuses on Appendix A of the law, which consists of a listing of protected native plants that is subdivided into the following categories: Highly Safeguarded, Salvage Restricted, Salvage Assessed, Harvest Assessed and Export Restricted, each with varying degrees of legal protections and restrictions.

The Technical Advisory Committee has accomplished much during the two meetings since its formation. They voted to recommend to replace a previous version of Appendix A (developed by the former Department of Agriculture and Horticulture) with one that was developed by Steve McLaughlin and other leading botanists in the state. The new list reflects botanic conventions such as listing plants by taxonomic names and their authors and it encompasses more carefully considered decisions regarding each species' need for protection. As specified by the law, the committee identified all federally-listed Endangered, Threatened and Category-1 plants and placed them in the Highly Safeguarded Category. They also recommended to add the following non-federally listed plants to this category: *Agave delamateri*, *Agave shottii* var. *treleasei*, *Penstemon albomarginatus*, *Rhus kearnyi*, *Camissonia exilis*, *Coryphantha scheeri* var. *valida* and *Eriogonum apachense*.

In other measures they:

1.) rejected a motion to remove *Carnegiea gigantea* 'crested' or 'fan top' form (crested saguaros) from the Highly Safeguarded Category; 2.) voted to move *Stenocereus thurberi* and *Washingtonia filifera* (California fan palm) from the Highly Safeguarded Category to the

Salvage Restricted Category; 3.) and placed *Erraurizia rotundata* in the Salvage Restricted Category.

Several members of the Technical Advisory committee, representing commercial seed and plant growing businesses, felt that the law's blanket prohibition on collection of seed from all plants in the Highly Safeguarded Category was too restrictive. After consulting the language of the law it was tentatively determined that the Secretary of Agriculture could create a sub-category of the Highly Safeguarded Category which would provide all safeguards of that Category while permitting collection of seed. There was lengthy discussion of this issue and the committee voted to recommend that all species on the Highly Safeguarded list be exempt from the prohibition on the collection of seed—except those species which were federally listed as Threatened, Endangered or Category-1 plants and any other species for which the committee elected to retain prohibition on seed collection.

The committee invites suggestions and specific recommendations from ANPS members regarding placement of individual native plant species in the law's appropriate categories. Of particular interest is any plant that is rare or threatened with extinction and which is not yet in the Highly Safeguarded Category. Send information or suggestions to: Robert G. Breunig, Ph.D.; Chairman, Native Plant Law Technical Advisory Committee; c/o Desert Botanical Garden; 1201 N. Galvin Pkwy.; Phoenix, AZ 85008.

Robert G. Breunig is Executive Director of the Desert Botanical Garden in Phoenix and is Chairman of the Native Plant Law Technical Advisory Committee. He also serves on the ANPS Board of Directors.

DEADLINE FOR L. B. HAMILTON NOMINATIONS NEAR!

Help the Arizona Native Plant Society place Lucretia Breazeale Hamilton in the Arizona Women's Hall of Fame! Send a letter supporting her nomination to the address below by March 15, 1992. Support from all geographic areas of the state is an important criteria for election, so please, everyone: write those letters!

One of our society's founding members, Lucretia was an outstanding botanical illustrator who illustrated *Trees and Shrubs of the Southwest Deserts*, *Arizona Weeds*, and *Plants that Poison*, among others publications. She is considered to be Arizona's preeminent plant illustrator. She contributed uniquely and unforgettably to Arizona's natural and artistic heritage.

Send your nominations to:

Arizona Women's Hall of Fame Project
Dept. of Libraries, Archives, and Public Records
State Capitol—1700 W. Washington
Phoenix, Arizona 85007

If Lucretia Breazeale Hamilton's illustrations assist you in your work or leisure activity, please include specifics of this in your letter of nomination. Questions should be referred to Mona McCroskey at (602) 776-4689, who is coordinating her nomination.

The Native Landscaper: Introductions to Little Known and Seldom Grown Species

Alkali Pink: by Bob Wilson

Nomenclature: *Sidalcea neomexicana* Alkali Pink;
Family *Malvaceae*

Description: Herbaceous perennial with upright flower stems 2-3 feet in height. Lower leaves are round in outline with shallow, rounded lobes. Cauline leaves are more deeply lobed and become 5-9 parted near the inflorescence. Pink to rose flowers are borne in a raceme and are 1 inch across. Plants will bloom continuously throughout the summer and die back to the ground in winter.

Habitat and Distribution: This plant is native from Wyoming and Idaho south to California and northern Mexico. In Arizona it is found from Apache to Coconino and Yavapai counties and in the Chiricahua and Huachuca Mountains of Cochise Co. It grows in moist meadows and along streams between 5000 and 9500 feet.

Propagation and Cultural Requirements: Seeds germinate readily without pretreatment under warm, moist conditions. Indoors, 4 inch container plants can be grown in 3-4 months from seed. Plants transplant easily outdoors, but if propagated indoors, should have a period of exposure to lower humidities prior to planting. Will grow in full sun to partial shade. Needs supplemental watering during drought periods. Can exist with much less water when sheltered from sun and wind. Cold hardy at least to USDA Zone 4. Not suitable in hot, dry areas.

Landscape Application: Alkali Pink is suitable where it can be viewed at fairly close range. The colors are not stunning, but soft and subtle. It captures the delicate beauty and line often found in nature but lost in many horticultural varieties. The fine lines in the petals will be overlooked by placing this plant in the back of a flower border. Flower colors vary geographically. Those in Coconino and Yavapai counties bloom a pastel pink. Plants in Apache County have a deeper rose-pink flower. Commercial availability is the only thing limiting wider use of this native. To my knowledge, there is no nursery growing plants for sale despite its ease of cultivation.

References: Isaacson, R.T. 1989. *Anderson Horticultural Library's Source List of Plants and Seeds*. Anderson Horticultural Library, Chanhassen, MN.

Kearney, T.H. and R.H. Peebles. 1951. *Arizona Flora*. University of California Press, Berkeley, CA.

Niehaus, T.F., C.L. Ripper and V. Savage. 1984. *A Field Guide to Southwestern and Texas Wildflowers*. Houghton Mifflin Company, Boston, MA.

Robert Wilson is President of the ANPS Flagstaff Chapter. He has a B.S. in Horticulture and Botany from Oregon State Univ. and an M.S. in Entomology from UCLA at Berkeley; he is the horticulturist at The Arboretum at Flagstaff.



Drawing of *Sidalcea neomexicana* by June Beasley, who holds an M.A. from Ohio University and an M.S. in Botany from the University of Wyoming. She is a member of the Flagstaff Chapter of ANPS and a volunteer at The Arboretum at Flagstaff.

But when the Strykers began to consider their retirement, its potential became more intriguing. At first the possibility of farming the Florence homestead seemed unlikely, as there were no wells on the land and drilling costs for just one well were estimated at \$20,000. Then, in the late 1970s, their son, a landscape architect, introduced them to jojoba. The Strykers also had a greenhouse in San Bernardino and began some preliminary cloning work with jojoba at that location.

Robert Stryker's life-time interest in scientific research, and the Strykers' mutual desire for a source of retirement income combined to inspire the idea of a dry-farming experiment for the Florence farm. They decided to leave San Bernardino and moved to Florence in 1980. Twelve years later, profit from Stryker's Jojoba Experimental Farm is just being realized, but, says Robert Stryker, "the effort has been very rewarding from a scientific point of view."

Stryker's Jojoba Experimental Farm is a research project consisting of three phases:

Phase One -- Dryland farming experimentation;

Phase Two -- Development of a model farm planted with a select population of jojoba;

Phase Three -- Consolidation and publication of information.

A full decade of Phase One research in dryland farming experimentation lies behind the clones now growing in the greenhouse. The first step in Phase One was collecting thousands of jojoba seeds from wild plants and recording their geographic origins. These were then germinated, grown as seedlings, and planted out onto 10 acres of their 80 acre farm for observation under field conditions. During Phase One, the Strykers researched various techniques of water harvesting, planting, fertilizing, pest control, and pollination¹ (proper distribution of male plants), and kept measurements of results.

The clay soil of the Florence area proved excellent for water harvesting. The seedlings were set out on top of berms, in rows that were, initially, ten feet apart. (Row width in later plantings was increased to 18 feet). "Road" areas between the rows were graded at a six inch drop for every ten feet. Sink holes at the base of each slope collected runoff and essentially doubled the water available to each plant. Through this water harvesting technique, the average 11 inches of rain received annually on the farm results in a rainfall equivalent of 20 inches per year delivered to each plant. Successful as this technique has been, Robert Stryker plans to improve on it somewhat when the Phase Two model farm is planted, by placing the seedlings in rather than on top of the berms. Jojoba in the model farm would be planted four feet apart in rows that would be about 40 feet from each other, and would serve as water collection areas.

Seedling survival on the dry farming experiment at first was severely compromised by the harsh environment and by predation from rodents, birds, deer and javelina. The Strykers found that irrigation

by hand was required to establish the seedlings during their first six weeks in the ground. Following this, irrigation was discontinued and the young plants were left to survive solely on the rainfall and runoff collected by the water harvesting treatments. Land clearing, protective planting holes, and seedling shields were among the techniques used to reduce predation. Eventually, a seedling survival rate of 80 percent was achieved.

Each plant on the experimental Phase One dry farm was tagged so that growth rate, frost tolerance, seed production and other attributes could be recorded. "The basic idea of Phase One," Robert Stryker explained, "was to plant jojoba seeds of wild plants, maintain them without irrigation, and from the ones planted find the best producers, test and follow them over a period of years, and then go on to develop a satisfactory desert clone for a model farm."

Stryker identified a five-point criteria for measuring the agricultural potential of individual plants:

- 1.) high seed production (weight of yield per plant)
- 2.) Seeds that both drop and hull easily
- 3.) superior climatic adaptation (drought and frost tolerance)
- 4.) relatively "simultaneous" seed maturation
- 5.) high oil content of seeds

"Early on," Stryker tells, "it became obvious to us that oil content of the seeds must be made a prime concern in the selection of a desert clone." This is due to the fact that the oil content of seeds from different jojoba plants can vary by as much as 40 percent--from a low of 20 percent by weight to a high of 60 percent. Quantity of seed produced per plant is another critical attribute. Jojoba plants are dioecious (male and female flowers on separate plants).² Most female jojoba plants produce flower buds at alternate nodes along their branches. Some plants however--those most desirable for agricultural use--produce flowers at each node, while the least desirable individuals produce flowers only at every third node.

The promising young jojoba plants in the Stryker's backyard greenhouse are clones from several individual plants grown in Phase One that best met the criteria for a superior, desert producing plant. Presently, the Strykers are experiencing difficulty with the viability of some clones. Testing seems to indicate that the trouble might be due to an increase in the salinity of the Florence water supply. This is but another puzzle in the reasearch process, and one they hope to surmount by installing a reverse osmosis water system in the greenhouse. When they have successfully cloned a healthy population of high yielding, oil rich, frost tolerant, jojoba plants that will harvest easily and mature at relatively the same time, they will plant their model farm using the dry farming techniques learned in Phase One of their project. The size of the model farm will be one to two acres with approximately 200 plants per acre.

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In Memoriam: Vernon Kluever

Friend to *Melampodium appendiculatum* and other plants of Cochise County



Jim and Jan Edgerton

Vernon Kluever and his dogs Queenie and Claw; taken in January, 1990 on the E Lazy Heart Ranch where he lived.

Vernon Kluever, an enthusiastic naturalist who botanized in Cochise County and was a member of the Arizona Native Plant Society, passed away last year. Born in 1917 on a farm in Iowa, he moved west in 1945, working for many years as a supervisor at Kaiser Aluminum in Oakland, California. He moved to Arizona in 1980, living in the natural world he loved, on ranches near Bisbee and Douglas. He is survived by a daughter, Rosiland Kluever, who lives and teaches school in Tucson.

For the use of those who would follow him, Vernon Kluever left behind 1,015 carefully identified color photographs of flowering plants from Cochise County. This volume of work records his resolve to learn every plant he encountered on his frequent walks in southeast Arizona. What is most impressive about Vernon Kluever's botanizing is that it all took place in the last seven years of his life.

In the fall of 1981, Mr. Kluever moved a travel trailer onto a ranch alongside the Geronimo Trail, bought a 35mm camera and began photographing wildlife. Flowering plants captured his admiration in the following spring, but it was not until 1984 that he began his deliberate and systematic effort to photograph and identify them.

"Very rarely would Vernon gather a wild plant for identification," explained Cathy Wertz, an ANPS member in Bisbee to whom Mr. Kluever bequeathed his albums. "He would either identify it in the field or find one, two or a few seeds to germinate. He sometimes gave [me] seeds to grow for him, then would return to photograph the plant if it came into flower."

In two letters he wrote to *The Plant Press* in the spring of 1991, Mr. Kluever admitted that "[at first] my ignorance of the genera and species was complete. And when I asked for IDs from the local ranchers, I received answers such as 'a bush', 'a weed', 'a cactus'. Tom Deekon of the Forest Service [first] clued me onto several books containing illustrations and photos...[now] it hurts my pride to not know a plant's ID."

One plant—first observed by Mr. Kluever in 1986 along a roadbank—eluded him for four years. A USDA botanist identified it for him as *Bidens cernua*. "As a full fledged doubting Thomas," wrote Kluever, "I checked the seed and [it was] not *Bidens*." He then sent a plant sample to the University of Arizona Herbarium for further determination but its identification could not be confirmed.

In 1990 Mr. Kluever was volunteering on a plant survey for the San Bernardino Refuge when he met Peter Warren, who most ANPS members know as an ecologist with the Arizona Nature Conservancy. (Recently, Peter accepted a half-time assignment to work as a botanist for the Coronado National Forest.) Peter told Mr. Kluever to call him when the plant next came into flower, saying he would like to return with Becky Van Devender, Assistant Curator at the U. of A. Herbarium, and take a specimen for identification.

"So I did, and we did and Becky sent specimens to Texas," wrote Kluever.

December 12, 1990 was an important day for Vernon Kluever's plant work. A letter from Rebecca Van Devender left the U. of A. Herbarium that day, carrying news that, according to Dr. Billie Turner in Austin, Texas, Kluever's specimen was *Melampodium appendiculatum*, a new record for Arizona.

Continued on pg. 8



Vernon Kluever

Melampodium appendiculatum in flower.

Dr. Turner is a botanist at the University of Texas who is writing a flora of the composites of Mexico. He later concluded that Vernon Cluever's collection is the first record of this plant for the United States. "This is probably correct," says Becky Van Devender. "However, one collection cited (Stuessy, 1972) is a bit ambiguous. In 1893 Mearns collected *M. appendiculatum* on the San Bernardino Ranch." Van Devender suggests that historical research might clarify whether or not part of the ranch extended into Mexico in the 1890s. Regardless of any future conclusions regarding the plant's former collection, it was Vernon Cluever's determination to identify the flower that brought the plant to the attention of today's botanical community.

In his letter dated March 4, 1991, Mr. Cluever, explaining his reason for contacting *The Plant Press* about his discovery of *Melampodium appendiculatum*, wrote: "...This might encourage other ANPS members to try harder. Keep hope." "Yes," we can answer, "it might." And it will.

ANPS members who would like to study, or simply enjoy, Mr. Cluever's photo albums of identified plants from Cochise County may contact Catherine Wertz at P.O. Box 27, Bisbee, AZ 85603.



Drawing of *Astragalus monumentalalis* var. *cottamii* by Vic Stein from the *Handbook of Rare and Endemic Plants of New Mexico*, 1984, U. of N.M. Press.

NEW
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Jojoba - Continued from page 6

Jojoba--the harbinger of a water-conserving desert agriculture that was promoted by ANPS member Dr. Howard S. Gentry and other forward thinking research agronomists--has been slow to prove its promise. On most farms in the Southwest today, jojoba production depends upon expensive machine harvesting techniques as well as irrigation. Even with these, its profitability is marginal.

The Strykers believe that jojoba farming may be best suited to third world countries where labor costs are low enough to allow harvesting by hand. In such countries, where irrigation systems are frequently lacking, dry farming techniques can be an agricultural prerequisite. Moving forward from a foundation of proven jojoba dry farming techniques, what Robert and Lois Stryker achieve on their proposed model farm may bring the vision of profitable, non-irrigated jojoba production into reality--if not for the southwestern United States then for dry lands elsewhere which are even more in need of agricultural success.

¹Jojoba plants are primarily pollinated by wind. Wind speed and direction are subtle factors that may influence the placement of male plants for optimal pollination.

²Reports in the scientific literature mention observation of a rare tendency toward hermaphroditism (male and female parts in the same flower) on a few male bushes (National Academy Press, 1985), although the Strykers haven't observed this in their experience.

Editor's note:

I would like to thank Robert and Lois Stryker for their extensive and patient help with this article, and also Bill Macomber, whose article in the *Tri-Valley Dispatch* (September, 1989) first brought this project to my attention. Readers who are interested in learning more about Stryker's Jojoba Experimental Farm may write to Robert and Lois Stryker at P.O. Box 1535, Florence, AZ 85232. □

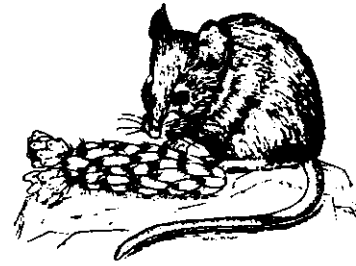
Pressed Pages



The membership roster of the Arizona Native Plant Society has its share of natural history and science writers, and now claims a new publisher as well. Steven Prchal, an ANPS member and the director of Sonoran Arthropod Studies, Inc. (SASI), has overseen the publication of SASI's first major text--*Butterflies of Southeastern Arizona*, by Richard A. Bailowitz and James P. Brock.

The book is a long needed resource giving previously unpublished information about these most popular of all insects.

It covers 246 species recorded from southeastern Arizona and provides details on their habits, distribution, flight periods and foodplant preferences. Included in the book are four color plates and 624 black and white photos showing diagnostic characters, two maps and descriptions of butterfly 'hot spots' in southeastern Arizona, and indices to butterflies and larval foodplants. Add this book to your field trip library and, as a bonus, acquire a reference which doubles as an identification source for native plants that attract colorful, interesting butterflies to home landscapes. *Butterflies of Southeastern Arizona* may be ordered directly from the publisher: SASI, P.O. Box 5624, Tucson, AZ 85703. The non-SASI member price is \$29.95 plus \$3.00 for handling). Mastercard and Visa orders are welcome (602) 883-3945.



Packrat Middens: The Last 40,000 Years of Biotic Change, a book released a little over a year ago, is overdue for recognition in this column. Thomas R. Van Devender, ANPS Tucson Chapter member, is one of the editors of this fascinating book on paleoecology. Van Devender discussed the book at a meeting of the Tucson Chapter meeting last year. Members who were unable to attend that lecture may be especially surprised to discover the extensive wealth of information about the climate, plants, animals and ecology that has been gleaned through analyses of packrat middens. The book shows that middens from the late Quarternary reveal more about vegetation dynamics and climatic change than do pollen records. For a deeper perspective on the sensitivity of desert ecosystems, this book is a must. *Packrat Middens* may purchased for \$55.00 from The University of Arizona Press, 1230 N. Park Ave., Tucson, AZ 85719 (Credit card orders, call 1-800-426-3797 or 602-882-3065).

ANNOUNCEMENT

22nd Annual IOS Conference

(International Organization for Succulent Plant Study)

"Succulent Plants and
Their Biotic Relationships"

April 5-14, 1992

Desert Botanical Garden
Phoenix, Arizona

For Further Information Call
(602) 941-1225

ANNOUNCEMENT

Southwestern Rare and Endangered Plant Conference

March 30 - April 2, 1992

Morgan Hall, New Mexico
State Land Office Building
Santa Fe, NM

For Further Information Call
(505) 827-5830

LEGISLATIVE ISSUES

Endangered Species Act

This year, 1992, as happens every four or five years, Congress must reauthorize the funding authority under the Endangered Species Act. This subjects the law to close scrutiny and opens the door for amendments. In the past this process resulted in a net benefit for endangered wildlife, but 1992 may be different. For example, last summer, Congressman Jim Hansen (R-UT) and thirteen western Republicans introduced legislation to require "that potential economic benefits under ESA outweigh potential economic costs" (H.R. 3092). Under this wording, the determination of whether to list a species as threatened or endangered would no longer rest "solely" on biological factors. Economic factors would have to be considered as well. A group of anti-ESA lobbyists reportedly is preparing a comprehensive bill to weaken the Act. The conservation community, on the other hand, has prepared a list of amendments to streamline the process of listing species, improve critical habitat designation, enhance recovery planning, strengthen enforcement provisions and insure adequate funding for conservation activities. Congressman Gerry Studds (D-MA) chairman of the Fish and Wildlife Subcommittee, introduced an Endangered Species Act reauthorization bill, H.R. 4045, in November '91 that embodies these concepts. His legislation has the full support of the conservation community. Be part of it and write to your representative and urge him/her to cosponsor the Studds Endangered Species Act amendments (H.R. 4045) and to oppose H.R. 3092, Congressman Hansen's "Human Protection Act."

PUBLIC LAND ISSUES

Management Plans for New Wilderness Areas

The BLM is now developing management plans for the new wilderness areas that were created last year. Volunteer advisory committees and task forces are being formed. This is a perfect time to get on board and help maximize the protection of native plants in these new wilderness areas.

Grazing on Public Land

You can learn to find your way through and participate in all phases of the BLM's grazing decisions thanks to the just released publication "How Not to Be Cowed: Livestock Grazing on the Public Lands: An Owner's Manual". This citizen manual is available from Southern Utah Wilderness Alliance, 436 E. Alameda Ave., Salt Lake City, UT 84111. The authors would appreciate your sending a donation of \$3 per copy to cover postage and unexpected cost overruns.

OTHER

LAW Fund and it's Adopt-a-Forest Program

The LAW Fund is a public interest environmental law organization based in Boulder, Colorado that provides free legal service to environmental groups. It seeks, with the assistance of volunteer lawyers and other professionals, to protect the natural resources and environment in the states comprising the Rocky Mountain West. Over the past year, the LAW Fund has formed a "steering committee" of interested attorneys, client group representatives and technical experts in Arizona. Their efforts include the creation of an "Adopt-a-Forest Program". One or more attorneys will "adopt" a federally protected area, such as the Saguaro National Monument and serve as a legal resource and clearing house for interested environmental groups. For more information contact W. Scott Bales at Meyer Hendricks Victor Osborn & Maledon, P.O. Box 33449, Phoenix, AZ 85067-3449, Phone: 602-640-9000.

Sky Island Alliance

A new association of conservationists and scientists has formed to develop a plan for the protection of "sky islands" in the southwestern United States and northwestern Mexico. The Alliance started to meet in April 1991 in response to a U.S.

Forest Service proposal to designate parts of the Coronado National Forest as a National Recreation Area. The alliance maintains that only a National Conservation Area or some equivalent designation which recognizes the unique biological, scientific and educational values of high elevation zones is appropriate. For more information: Sky Island Alliance, 1639 E. First Street, Tucson, AZ 85719, 602-323-0547.

Threatened and Endangered Species News Reports

Nancy Stallcup found an extensive, previously unknown, population of *Senecio huachuensis* in the Santa Rita Mountains. This endangered plant is only known from a very few locations.

Sue Rutman reports that *Limosella pubiflora* (Chiricahua mudwort) has been found on Grey Ranch in New Mexico after decades of being thought to be extinct.

It appears that the Fish and Wildlife Service will delist *Tumamoca macdougalii* from the Threatened and Endangered Species List, because so many plants have been found, largely as a result of studies related to the C.A.P.

ANPS CONSERVATION COMMITTEE NEWS

Plant Information/List Program

Conservation Committee Chairman Barbara Tellman had (only!!!) six responses to the fall *Plant Press* request for people with special knowledge of plants in specific areas and/or plant lists to offer their knowledge to the committee for use as a resource. Two individuals who did step forward were immediately helpful in preparing comments on a proposed land exchange of the BLM in Pima and Pinal Counties. Please, help spread the word and get involved!

Help Wanted

This session of the Arizona Legislature is expected to deal with many issues of concern to Native Plant Society members. Protection of riparian areas is one that will be high on the agenda as well as preservation of the Heritage Fund that we worked so hard to help establish. We know that there will be enormous pressures to erode the Heritage money and to oppose riparian area protection, so badly needed in this state where most of our prime riparian vegetation is long gone.

If you are one of those concerned about these and other conservation items, please let us know. We want to develop a list of people all over the state who will write or phone their legislators when needed on these types of issues. People in rural areas are especially needed. Please put your name, address and phone number on a post card addressed to Barbara Tellman, 127 E. Mabel, Tucson, AZ 85705, or call at 602-792-4515.

Activities Report

1. Barbara wrote two pages of comments to the Department of Water Resources about the proposed new "Riparian Protection Legislation," commending parts of the proposal and urging alternative approaches and timelines for other parts.

2. Andi Laurenzi wrote a letter to Congress for ANPS supporting acquisition of Planet Ranch by USFWS (S. 291 and HR 748) because of its outstanding riparian/wetland habitats.

3. Elaine Averitt attended the Arizona Heritage Coalition meeting in November.

4. The Tucson Chapter, along with numerous other groups, wrote to BLM requesting a public hearing on a proposed land exchange involving over 5000 acres in Pima and Pinal Counties. As far as can be determined, parts of this exchange will be environmentally helpful (Land acquisitions near Cienega Creek and the Empire-Cienega RCA, 20 acres of *Echinocactus horzonthalonius* var. *nicholii* habitat), and others detrimental (trading land designated for a park on the outskirts of Saguaro NM. to a developer). And much land is of a yet-to-be-determined nature regarding mining in the Silverbells. John Wiens and George Montgomery are looking at these sections.

Chapter and Committee News

FLAGSTAFF CHAPTER:

Chapter meetings are held the third Tuesday of each month at 7:00 p.m. on the N.A.U. campus in Rm. 313 of the Biological Sciences Building. Snow still lies on the ground in Flagstaff, covering most plants and discouraging hikes. Flagstaff Chapter members are encouraged to contact chapters presidents or members in the central and southern part of the state, head south, and join in on what may be the best wildflower spring since 1983. For information on the Flagstaff Chapter contact Bob Wilson at 774-1441 (days) or write to him at P.O. Box 670, Flagstaff, AZ 86002.

PHOENIX CHAPTER:

Regular meetings are held September through May on the second Monday of each month at 7:30 in Webster Auditorium at the Desert Botanical Garden. **News Items:** Robert Breunig, executive director of The Desert Botanical Garden spoke on "Arizona's Native Plant Law" at the February chapter meeting. A hike in South Mountain's Pima Canyon was held February 16th. **March Events:** March 9th--"Ethnobotany of Date and Honey Production" by Mike Kuzmik; March 14--Field trip to Queen Creek (meet at Boyce Thompson Arboretum at 10 a.m.) Mar. 21-- **Valley Garden Clubs Fair** (9 a.m.-4 p.m.)--4341 E. Broadway; Mar. 29--tentative wildflower jaunt. **April Events:** "Urban Reforestation" lecture by Bill Ensign at April Chapter Meeting; April 11-12--Ride the Verde River Railroad with ANPS (11th), spend the night in Camp Verde and hike in Fossil Creek on April 12th (\$30.00+ for reservations); **May Events:** May 9th--Meet in El Pedregal Shopping Center at 2 p.m. for end of season chapter meeting/potluck in Rackensack Canyon; Memorial Day Extravaganza May 29-June 1--Mule Shoe Ranch. For information on the Phoenix Chapter contact Chapter President Kent Newland at 8376 Cave Creek Stage, Cave Creek, AZ 85331, (602) 585-3630(H) or Marcia Francis at (602) 992-5435 (H/Ans. Machine).

PRESCOTT CHAPTER: Temporarily inactive.

SOUTH CENTRAL CHAPTER:

Meetings are held on the first Saturday of each month at 9:30 a.m. in the Community Room of the Student Activities Center on the Signal Peak campus of Central Arizona College (CAC) in Casa Grande. **News Items:** Elections for 1992 produced the following slate of officers: Mrs. Muriel Savage, President; Mrs. Frances Ide, Treasurer; Mrs. Tom Donnelly, Recording Secretary; Mrs. Jean England, Corresponding Secretary. Information about the South Central Chapter and its events contact Chapter President Muriel Savage at 450 Sun West Dr., No. 235, Casa Grande, AZ 85222; **February Events:** The chapter will have a booth and will present Bill Kinnison's slide show at the **Heritage Fiesta** on February 29th. The event is sponsored by the Casa Grande Valley Historical Society in Florence at Heritage Hall.

SOUTHEAST CHAPTER:

ANPS members in Graham and Cochise County are in the early stages of forming a new chapter. At present they are operating as a sub-chapter to the Tucson Chapter, and have not elected officers. However, meetings are taking place every 4th Wednesday of the month at the Oscar Yrun Community Center in Sierra Vista. The initial meeting on November 14 drew nine people, representing Wilcox, Sierra Vista and Bisbee. **February Events:** Feb 26--"Salvage Opportunities for Protected Native Plants," a chapter meeting lecture by Cathy Wertz; Feb. 22--**Loop drive** from Ft. Huachuca to Sonoita with

Vincent Lopresti. **March Events:** Tom Woods from Ramsey Canyon will discuss "Vegetation Management and Restoration of Native Plant" at the Chapter Meeting; March 7--**Gold Canyon Gulch** field trip in Bisbee to begin cataloging the plants under the expert guidance of Jack Kaiser. **April Events:** Jack Whetstone, **Wildflower Slide Show of Bisbee Area** at April meeting; Apr. 25--Field trip led by Nancy Stallcup to look at spring wildflowers in the unique floristic area of **Sycamore Canyon**. **May Events:** Meeting lecture--research biologist Donna Howell, will discuss "Agaves and their Pollinators;" May 16--**Revisit Gold Gulch Canyon** in Bisbee to continue cataloging. **June Events:** June 13--Donna Howell will lead a trip to some interesting areas she has studied in the **Muleshoe Nature Conservancy**.

TUCSON CHAPTER:

Regular Meetings are held on the second Wednesday of the month at 7:30 p.m. at the Tucson Botanical Gardens, 2150 N. Alvernon Way, Tucson, AZ unless otherwise noted. (See also newly formed Southeastern Sub-Chapter above.) **News Items:** January's meeting featured Mark Dimmitt's lecture: "Desert Horticulture: Why Are We So Different," and February's topic of discussion was "Program Direction for the Tucson Plant Materials Center," presented by Bruce Munda of the USDA. **February 23--Ragged Top Mountain** exploration led by Gary Mascarinec. **March Events:** Meeting topic is "Plant Die-off and Restoration of the West" by Gary Mascarinec; Mar. 14 (& 15?) **Field Trip--Wildflowers of Organ Pipe National Monument (& Pinacates Dunes on 15?)**, group limited to 20 and already booked but you may place your name on waiting list by calling Mary Erickson at 887-2340; Mar. 28--Field trip to **Bass Canyon** on Muleshoe Ranch. **April Events:** Meeting topic will be "Native Beans of the Southwest," by Russ Buhrow of Tohono Chul Park; **Field Trip** on April 4--**Saint David Cienega Research Natural Area**; Apr. 11--**Nature Photography Walk** with Antoinette Sagade and Clay Evitts; Apr. 18--**Agua Caliente Canyon** with Matt Johnson; Apr. 26--**Wild Seed Farm Tour** by Rita Jo Anthony. **May Events:** Chapter Lecture on "The Establishment of Native Grasses," by Martha Livingston; May 23--**Field Trip to Empire Ranch Cienega Creek RCA**.

YUMA CHAPTER:

Regular Meetings are held on the third Monday of each month at 7:30 p.m. at the Univ. of Az. Agricultural Station in Yuma Valley on 8th St. For information on Yuma Chapter activities contact Chapter President Pat Callahan, Rt. 1, Box 28M, Somerton, AZ 85350 (602) 627-2773

CONSERVATION COMMITTEE:

The Conservation Committee will next meet on **Tuesday, Feb. 25, at 6:30 p.m.** at the Flying J Truck Stop in Eloy. All are welcome to attend. Contact Chairman Barbara Tellman (phone 602-792-4515 at 127 E. Mabel, Tucson, 85705) if you have an interest in this committee. (Also see page 10 of this issue.)

URBAN LANDSCAPE COMMITTEE:

Contact Jane Evans, 2945 N. Fontana, Tucson, AZ 85705; 628-8773(D) 792-1592(E) for information on committee activities.

SUMMER WORK ANYONE?

The Tonto National Forest needs two assistants with plant taxonomic talents to help with a botanical survey of a riparian area from May 1-Aug. 30, 1992. Call Lew Meyers in Phoenix at 252-5255.

Arizona Native Plant Society Board of Directors

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Plant Press Newsletter Contributions

Contributions of articles, artwork, and letters to the editor are gladly received and may be handwritten, typed, or on disk., ASCII format preferred. Disks and diskettes will be returned.

Please send submissions to:

The Plant Press

c/o Karen Enyedy Breunig, Editor
1540 W. Flower Cir. South
Phoenix, AZ 85015
(602) 274-9737

NEXT DEADLINE IS: April 15, 1992

Please direct all other inquiries regarding the Arizona Native Plant Society to the Secretary at our official address:
PO Box 41206 Sun Station, Tucson, AZ 85717

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The Arizona Native Plant Society

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