

SAGUAROWOOD

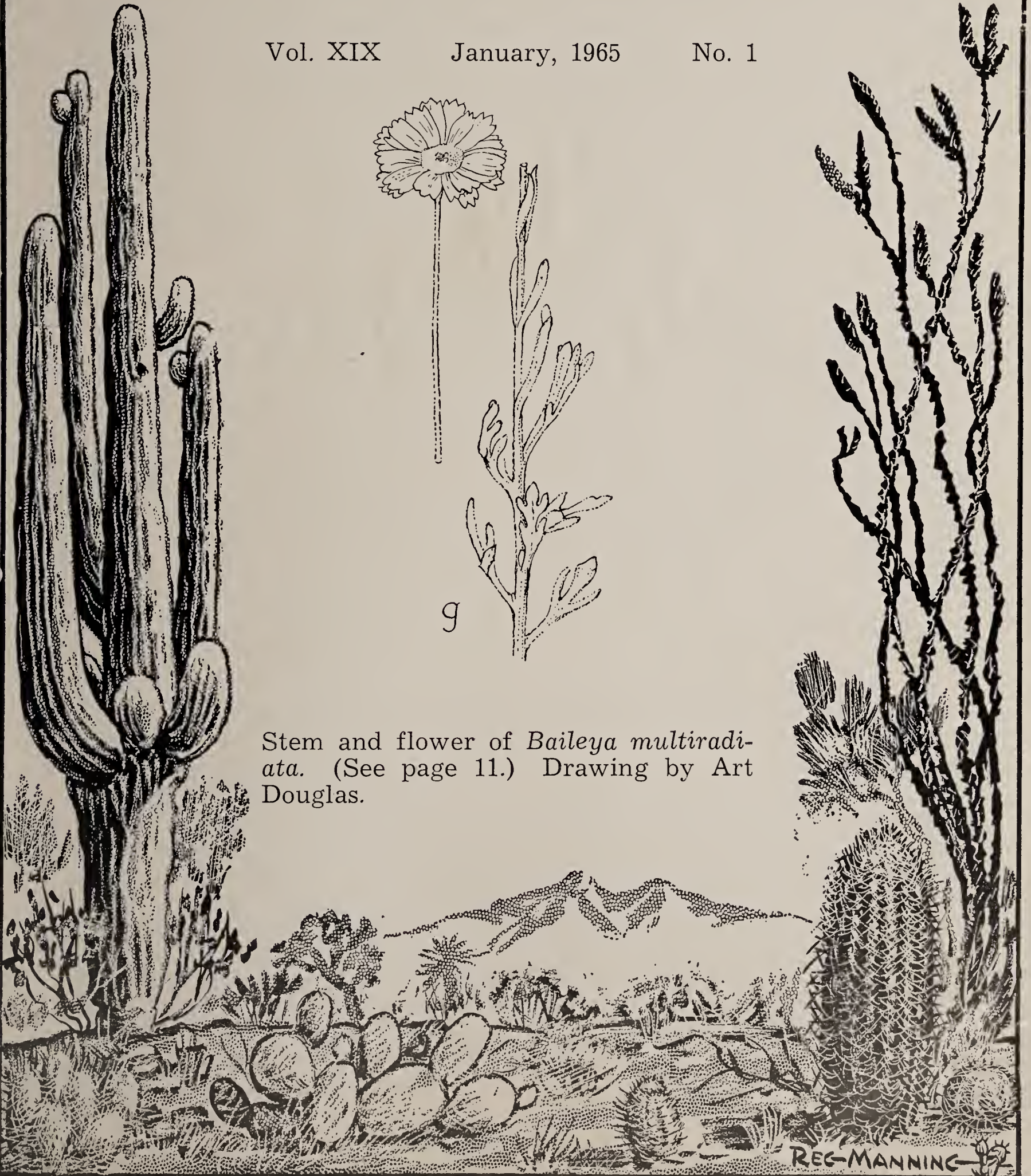
BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

Vol. XIX

January, 1965

No. 1



Stem and flower of *Baileya multiradiata*. (See page 11.) Drawing by Art Douglas.

REG-MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona. P. O. Box 5415, Phoenix 10. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription \$5.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor
Lillian Diven, Associate Editor

Volume XIX

JANUARY, 1965

No. 1

Arizona Cactus and Native Flora Society

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Desert Botanical Garden of Arizona

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GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

SEDUM COCKERELLII BRITTON

Fam. CRASSULACEAE

By John H. Weber, Botanist

The Orpine family is represented in Arizona by only ten species and three genera. The genus *Sedum* has five species, all but one of which occur above 1,500 meters (5,000 ft.) elevation. *SEDUM COCKERELLII* is widely distributed in north central and eastern Arizona at elevations from 1,500 to 3,500 meters (5,000 to 11,500 ft.).

In form, *SEDUM COCKERELLII* is a perennial herb with succulent leaves and stem, and a fleshy rootstock. This is a low-growing species seldom reaching 5 cm. in height. The basal leaves are rosulate and measure 12 mm. in length and 4 mm. in breadth. These are spatulate while the cauline leaves are linear-lanceolate to oblong-lanceolate in shape and have entire margins. These stem leaves measure 5-18 mm. in length and 2-6 mm. in breadth. With an alternate position, the leaves are divergent from the stem at an angle of 45° and extend up to the inflorescence. They are glaucous with a light bloom and light green in color.

Flowering commences in June and extends through October. The perfect flowers number 5 to 11, occurring in a terminal cyme. There are 4 or 5 petals which are erect at the base, then spreading. These are united at the base only and are distinct above. Petals are lance-shaped with acute tips and are as much as 9 mm. in length. In color, they are white tinged with purple. Sepals also number 4 or 5 and are linear-oblong in shape. Anthers vary in color from pink or red to purple. Pistil is 4-8 mm. long. The carpels, when mature, are erect and the seed is very small and not papillose.

In Arizona *SEDUM COCKERELLII* is found in Apache, Coconino, Gila and Graham counties. It is common at many sites in the Sierra Ancha Mountains and along the Mogollon Escarpment. It grows most frequently on north exposures associated with mosses and liverworts. It



Sedum cockerellii with 6"-8" long flowering stalks

is found in wooded ravines and on rocky situations under partial shade. This species also extends into New Mexico and Colorado.

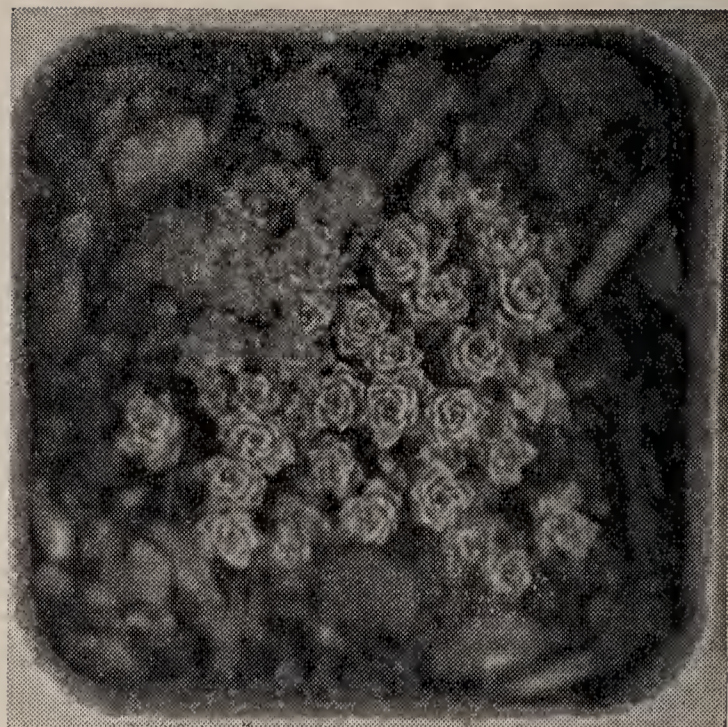
It has proved difficult to cultivate this species in the low desert areas of southern Arizona where high summer temperatures are coupled with rainfall. With the use of shredded bark and other coarse organic materials instead of soil mixes, the evaporation rate is high and the root zone is maintained at a cool level. By utilizing such a medium and planting in a shaded or partially shaded

site, *SEDUM COCKERELLII* will thrive from one season to another.

REFERENCES:

Clausen, Robert T., Cactus and Succulent Journal Vol. XXII, No. 3, Page 89.
Kearney & Feebles, Arizona Flora.

At right: *Sedum cockerellii* (x $\frac{1}{2}$) being grown in redwood bark, which we find quite suitable for use in our low humidity.



CARNEGIEA GIGANTEA

CACTACEAE CACTUS FAMILY

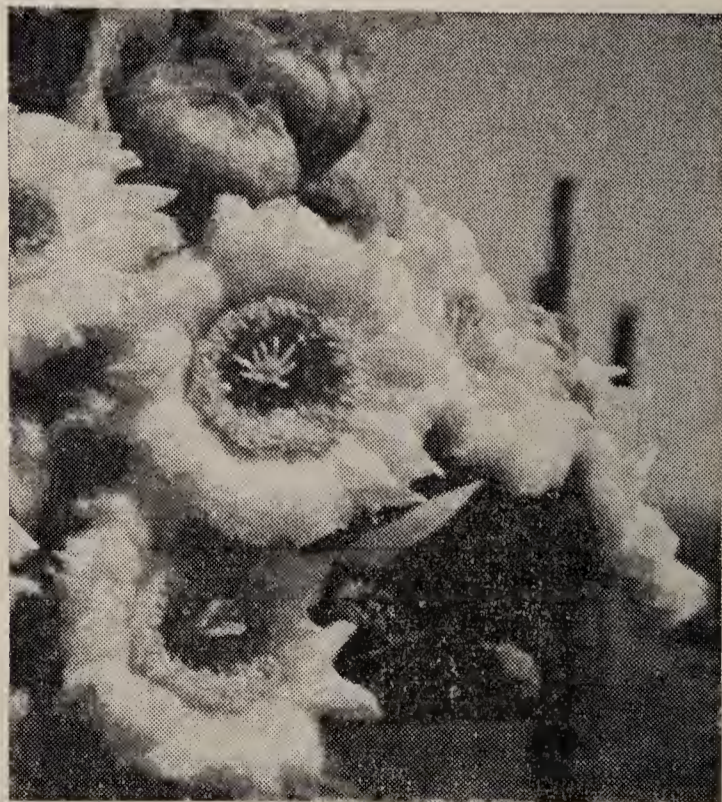
SAGUARO or GIANT CACTUS



Mature Saguaro, 45' tall. Moisture may make up 98 per cent of weight.

The Saguaro's average annual growth-rate is $\frac{1}{2}$ " for the first 30 years, but it may reach 40' in height during its optimum life span of 150-200 years. The skeleton is comprised of 12-24 woody rods, joined at frequent intervals.

For such a large and heavy plant, the



Flowers are 3"-4" long and as broad, night-blooming in late May and June.

tap root is comparatively short, but both balance and water supply are provided by long, shallow radial roots up to 50' long. In sheltered locations the Saguaro is a single-stemmed plant, but when wind or earth movement effect its balance, it will throw out a compensating branch.

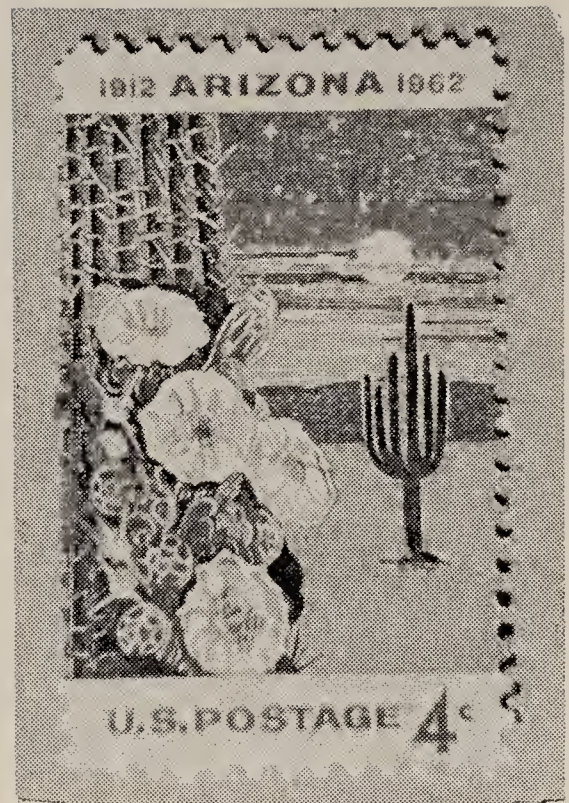
The Saguaro flower is the State Flower of Arizona, and can be seen on the stamp at the right which celebrated 50 years of statehood. The red-purple fruit, to 3½" long, is harvested by Papago Indians for its sweet pulp and edible seeds.

TYPE LOCALITY

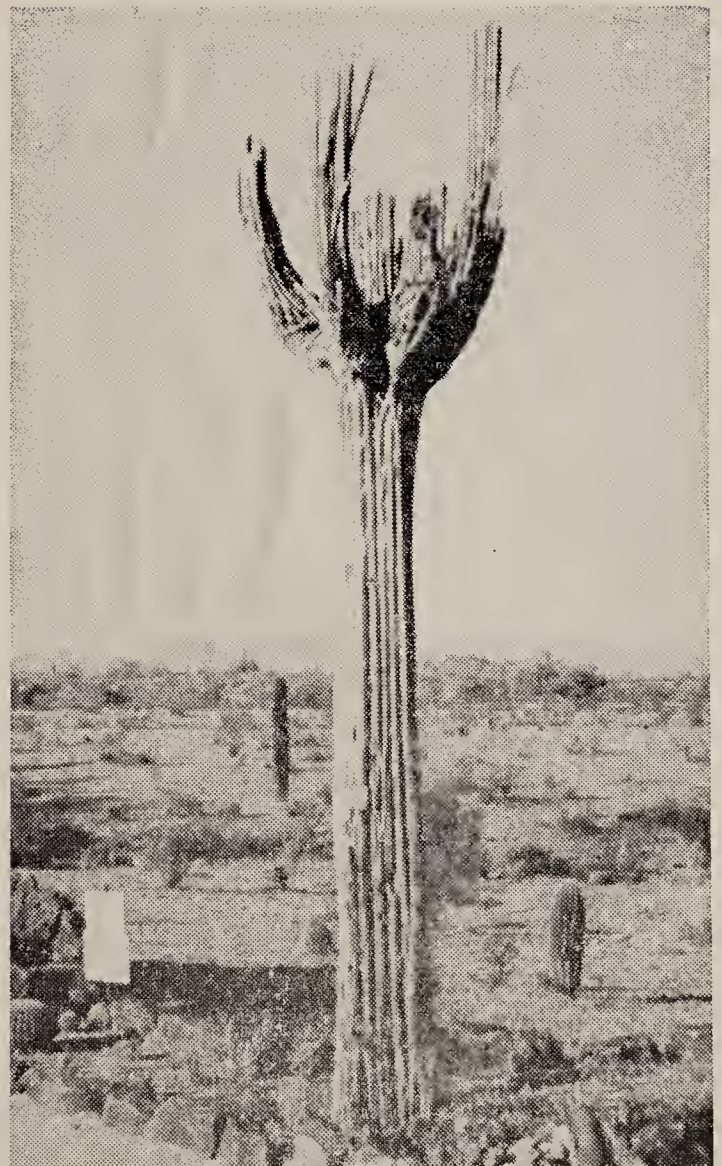
Along the Gila River, Arizona.

DISTRIBUTION

Arizona and Sonora, Mexico.



A saguaro dying from rot caused by larva of *Cactobrosis fernaldalis*.



Saguaro skeleton. The united rods support a plant of up to 8 tons.

WILDLIFE OF THE DESERT



Barren though the desert appears, it supports a surprising variety of wildlife. During the day one can see the big-eared jackrabbit and the comical roadrunner, and hear the call of the Gambel quail. The vulture soars overhead, and the "horned toad" (a lizard) scuttles over the sand. At night the sparrow-sized elf owl is active, as are the coyote, skunk and ring-tailed cat. In subsequent issues individual desert animals will be featured.

FIELD NOTES FROM THE ANDES

By Paul C. Hutchison, Expedition Director

University of California Botanical Garden Seventh Expedition to the Andes

EDITOR'S NOTE: Because of the Desert Botanical Garden's contribution to this expedition, we received periodically, during 1964, copies of these informal "Field Notes" by Paul C. Hutchison, director of the expedition. In this and future issues we will print excerpts from the "Field Notes" for readers of the Bulletin. We only regret that we can't reprint it all, for it makes exciting reading.

The area covered by the Expedition included the northern third of Peru, drained by the rivers that eventually form the Amazon River. Additional stops were at Lima and Chiclayo on the coast, and Cali in Colombia. The accompanying maps will indicate the ruggedness of the terrain explored. Approximately 4000 plants were collected, and seed from many plants is now being made available to sponsors and others.

The University of California Botanical Garden Seventh Expedition to the Andes was co-sponsored with the Chicago Natural History Museum, Honolulu Botanic Gardens, Strybing Arboretum Society of San Francisco, and the Museum of Natural History of the Universidad Mayor de San Marcos, Lima, Peru. Within the University of California at Berkeley, support was provided by the Botanical Garden, Herbarium, Museum of Vertebrate Zoology, Museum of Entomology and the Associates in Tropical Biogeography. Additional institutions providing support include the New York Botanical Garden, Huntington Botanical Garden, Water Isle Botanic Garden (St. Thomas, Virgin Islands), International Succulent Institute (Millbrae, California), Cactus and Succulent Society of Sacramento, California, and the Desert Botanical Garden, Tempe, Arizona. Other firms, societies and individuals made donations through the Strybing Arbo-

retum Society and the University of California Botanical Garden.

* * *

Perhaps the best way to introduce Paul Hutchison to our readers is to reprint this letter your Editor received from him, and then to continue with his Field Notes.

Chiclayo, Peru

Mr. Hubert Earle, Director,
Desert Botanical Garden,
Tempe, Arizona
Dear Hubie:

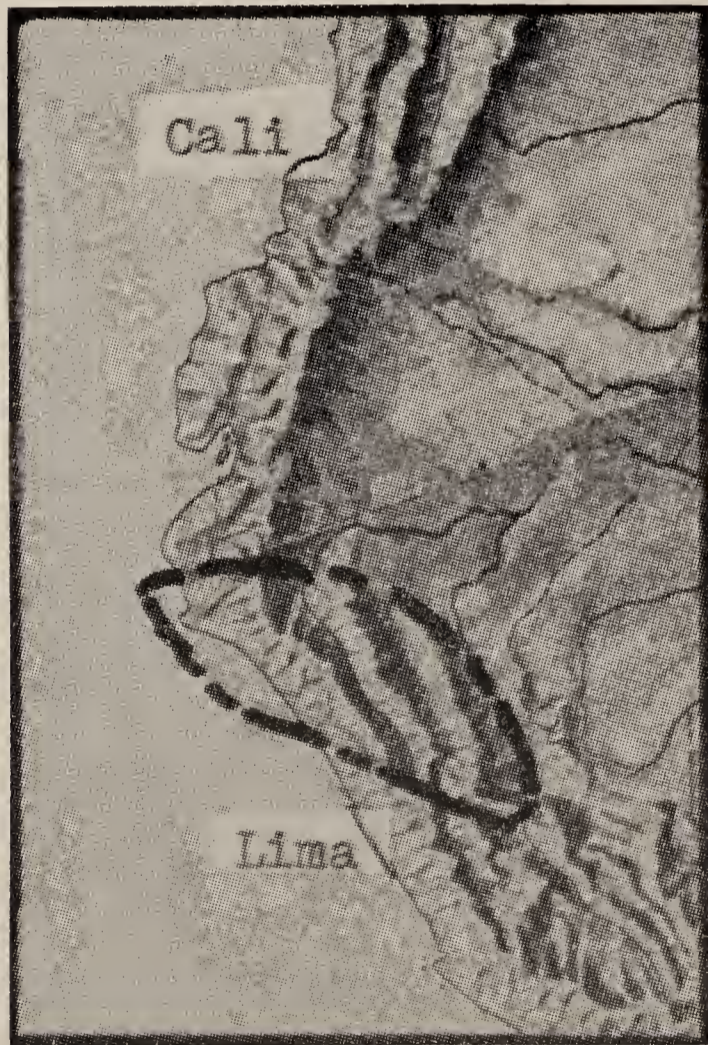
I hope you will forgive the long delay in this note, but it is difficult to keep this old typewriter busy under circumstances like this. I've taken four days off here in Chiclayo on the north Peru coast, just prior to our last excursion in-



Relief map of South America shows area covered by Andean Expedition.

to the north Peru interior, to answer the tremendous pile-up of letters and do one more edition of the Field Notes. It is a great pleasure to have Desert Botanical Garden among our supporters for several reasons. Of course we needed the money, but also, I'm delighted that your income this year was sufficiently good to enable you to participate so generously in our work here. The long association between our two institutions is bonded all the more firmly, and, well, frankly I'm really very pleased.

We've taken a tremendous lot of succulent stuff, much of which I think is new, especially some fine succulent Peperomias, Puyas, Echeverias, and cacti. As anticipated nearly all the Rio Utcubamba cacti were new, and many of those in the upper Marañon gorge are new or are recent Ritter species which he did not adequately write up or localize. Last month I wound up my work on Matucana with re-collections of M.



Broken line indicates area explored. Altitude here is from 0-22,000 feet.

aurantiaca at the type locality, and a transect of highland Dept. Cajamarca to get at the many populations of various ones reported for there. I'm inclined to accept Kumnach's thesis that the M. haynei complex of species is all the same; but I think that northern Peru is another story, with many species involved. Also I've decided to accept Matucana as a genus on what I think, now, are firm morphological grounds.

Very sincerely,

Paul

FIELD NOTES FROM THE ANDES

4 February 1964, Campomientos Ingenio the Rio Utcubamba, Dept. Amazonas, Peru.

Yesterday proved to be the most fabulous day of discovery of my life as a professional botanist, and prompts this effort to communicate with the sponsors, supporters and contributors to this expedition, and with collectors of succulents in general, about some of the remarkable plants we have found here, and which we hope we can get into cultivation in the United States. The three intervening months since departure from California have been very full, and since no report has, until now, been submitted, it seems pertinent to give a resume.

Preparations for this Seventh Botanical Garden Exposition to the Andes of the University of California had been underway for nearly two years when I finally departed Berkeley on November 3, 1963. There were an infinity of frustrations involved in acquiring nearly seven thousand dollars worth of equipment for shipping to Peru on a time schedule that had been fixed months in advance. The specially built Ford F250 6 cylinder truck, for example, was one of the first from the assembly lines of the 1964 models, yet its delivery was nearly 3 weeks after the date we wanted it. It had then to be equipped with

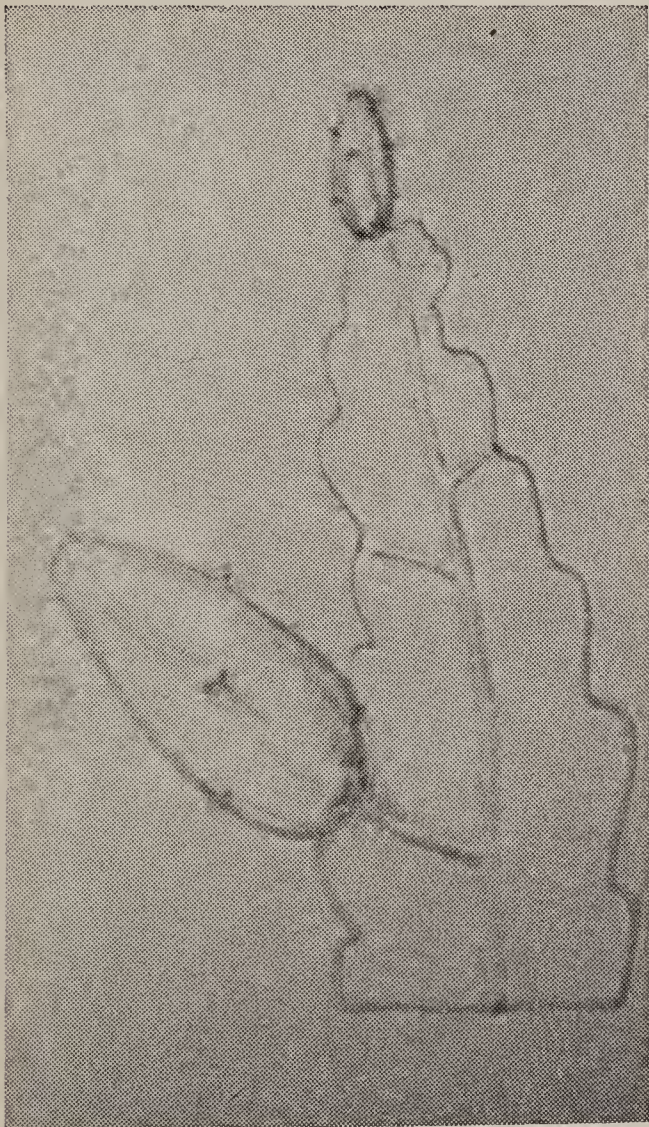
a special mobile laboratory built of steel in Berkeley, and a front-end winch. Necessary spare parts were difficult to acquire so soon after the new model appeared. And similar difficulties were associated with the acquisition of much of the other equipment and supplies.

* * *

Routing to Peru included a planned 30-day trip. Our departure dates had been fixed months in advance, yet we now knew that our equipment would not arrive in Peru earlier than Dec. 3. In Washington I did several days work at the National Herbarium (Smithsonian Institution), and my assistant and expedition zoologist, J. Kenneth Wright, a graduate student in zoology of the Berkeley campus, joined me there. In a severe wind and rainstorm we left Washington for a two-day stop in Florida, then flew direct to Panama for a



Rhipsalis cassutha. From color plate by Britton & Rose.



Epiphyllum phyllanthus.
Line drawing from Britton & Rose.

week's stop at the Smithsonian Institution's research station on Barro Colorado Island in Gatun Lake. With the assistance of their botanist, Dr. R. L. Dressler, we made a large collection of living tropical ornamentals, and sent them by air-cargo to Honolulu Botanic Garden. Only two cacti were found, *Epiphyllum phyllanthus* and *Rhipsalis cassutha*. At night we collected insects which came to the neon light conveniently installed at a low level for just that purpose outside of the dining hall. The night was a marvel of animal sounds and many of these natives visited us.

* * *

On 15 November we flew to Cali, Colombia, where at 7:30 A.M. we were met at the airport by William Kyburz, for many years an exporter of living Colombian plants, and Dr. J. M. Idrobo,

Associate Professor of Botany of the Universidad Nacional at Bogota, who had flown from Bogota to Cali to meet us. In Kyburz' jeep we drove the 1½ hours over the crest of the Cordillera west of Cali and down to Bitaco Valley, where Kyburz has a small finca (farm). I had been commissioned to visit Kyburz by the Honolulu Botanic Gardens to get a selection of ornamental Colombian plants. For nearly all of the some 150 species sent from Kyburz' finca, he could provide very accurate information on where, in Colombia, he had collected

the original plants.

Bitaco Valley is situated on the Pacific slopes of the cordillera at about 1200 to 2000 meters altitude, and Kyburz' finca was at 1600 meters altitude. The climate was cool tropical or subtropical, with a temperature range of 65 to 85° F. Much of the valley was cleared for grazing grassland, but about 15 acres of Kyburz' finca was relatively unspoiled forest, and a biological paradise.

(Continued in next issue)



Members of the Garden's Fall Class (above) venture out on the swaying sheep-crossing bridge across the Verde River during the class field trip. Less venturesome members preferred to wait for them below.



DESERT MARIGOLD

WILD MARIGOLD

This is an unusual desert annual (sometimes perennial) that can be found blooming in all seasons, whereas most annuals blossom during one season. This plant can be found in profusion along the roadways bearing bright yellow flowers from March to November but spasmodically from November to February. The rays (petals) later become dried, papery and reflexed in age.

Baileya (named after Jacob Whitman Bailey, an early American microscopist) *multiradiata* (Latin — bearing many rays) is a low bushy herb having solitary showy yellow flowers, with 30-50 rays, on the tip of each 9" to 14" tall woolly-leaved stem.

The heavy pubescence or floccose wool on the stems and leaves tends to

form an insulation, thus cutting down on the loss of moisture through transpiration in the hot summer months.

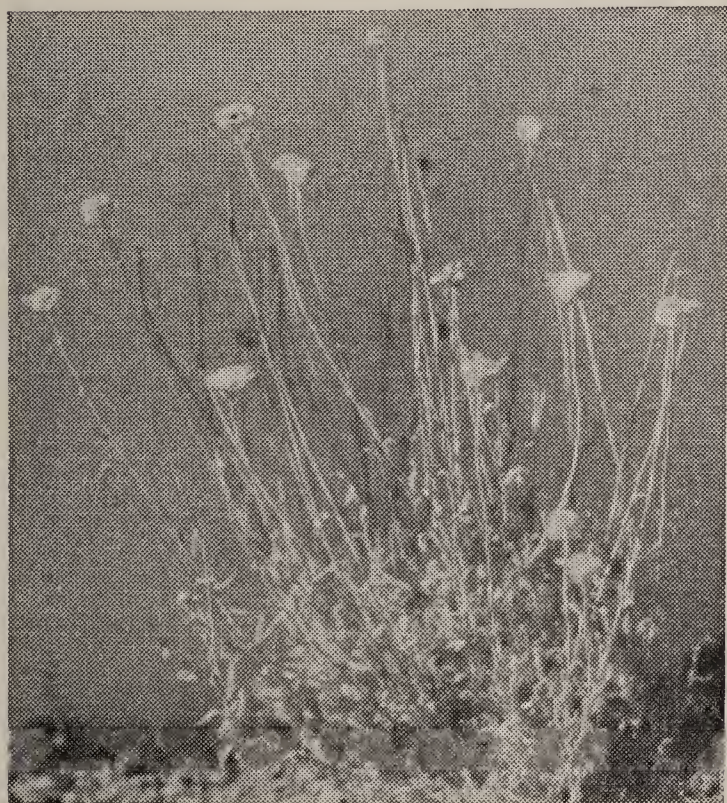
The Desert Marigold thrives in gravelly, well-drained soils of the plains, slopes and mesas at 2,000 to 3,000 feet elevations from southeastern California to western Texas, the State of Chihuahua to southern Utah and Nevada. It is successfully grown as a bedding plant in California and in some of our eastern states. It can be grown in our local desert gardens by scattering the small seed on the ground in the late fall, then raking into the soil and watering.

The large 1½" to 2" wide flower heads are browsed by horses, and cases have been recorded that sheep and goats had been fatally poisoned by eating these plants on overgrazed ranges.

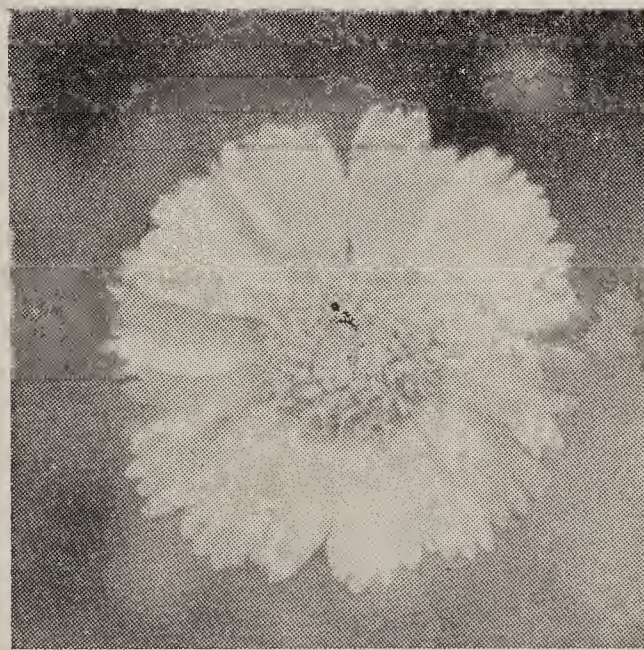
REFERENCES:

Flora of Arizona—Kearney & Peebles
Flowering Plants of California —
Jepson

Desert Wildflowers—Edmund Jaeger
100 Wildflowers—Natt Dodge.

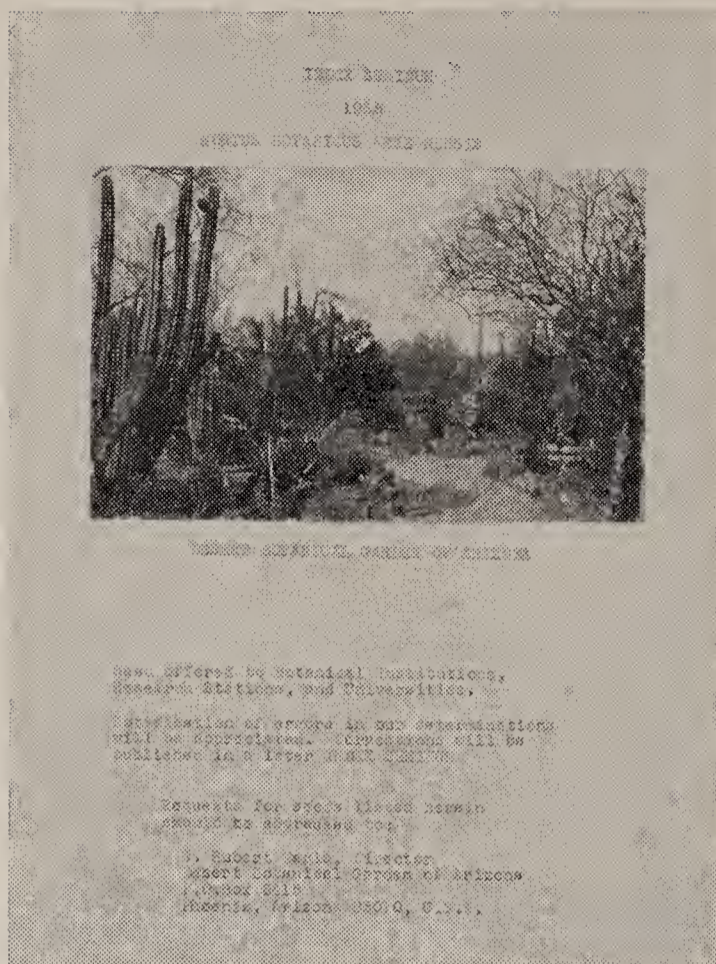


2' tall clustered plant of *Baileya multiradiata*. It may possibly bloom through the summer if it gets additional moisture. The lemon-yellow blossoms remain open for many days.



Close-up of the 2"-wide flower of *Baileya multiradiata*.

SEED LIST



A project that the Garden has been preparing for many years will begin this month with the issuance of a seed list of approximately 73 different species available to botanical gardens and research institutions throughout the world. This list has been compiled under the direction of John H. Weber, our botanist. Seeds collected by the Garden staff members in Arizona, New Mexico, California and Mexico are being offered in this list.

GARDEN ACTIVITIES

JANUARY

Sun.	3rd	LECTURES—Arizona Cacti in Flower	3 & 4
Tues.	5th	CACTOMANIACS meeting	8 P.M.
Wed.	6th	CLASS—Deserts, How Formed and their Plants	3 P.M.
Thurs.	7th	LECTURE—Arizona Cacti in Flower	3 P.M.
Sun.	10th	LECTURES—Arizona Wildflowers	3 & 4
Wed.	13th	CLASS—Desert Succulent Plants	3 P.M.
Thurs.	14th	LECTURE—Arizona Wildflowers	3 P.M.
Sun.	17th	LECTURES—Arizona Trees & Shrubs in Flower	3 & 4
Wed.	20th	CLASS—Culture of Desert Succulent Plants	3 P.M.
Thurs.	21st	LECTURE—Arizona Trees & Shrubs in Flower	3 P.M.
Sun.	24th	LECTURES—Arizona Birds & Animals	3 & 4
Wed.	27th	CLASS—Identification of Desert Trees & Shrubs	3 P.M.
Thurs.	28th	LECTURES—Arizona Birds & Animals	3 P.M.
Sun.	31st	LECTURES—Arizona Scenics	3 & 4

SAGUARO LAND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

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February, 1965

No. 2



Echinopsis multiplex. Best Cactus, 1964 Show. Entered by Mrs. L. Lugibihl, Tempe, Arizona



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W. HUBERT EARLE, Editor
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EIGHTEENTH ANNUAL

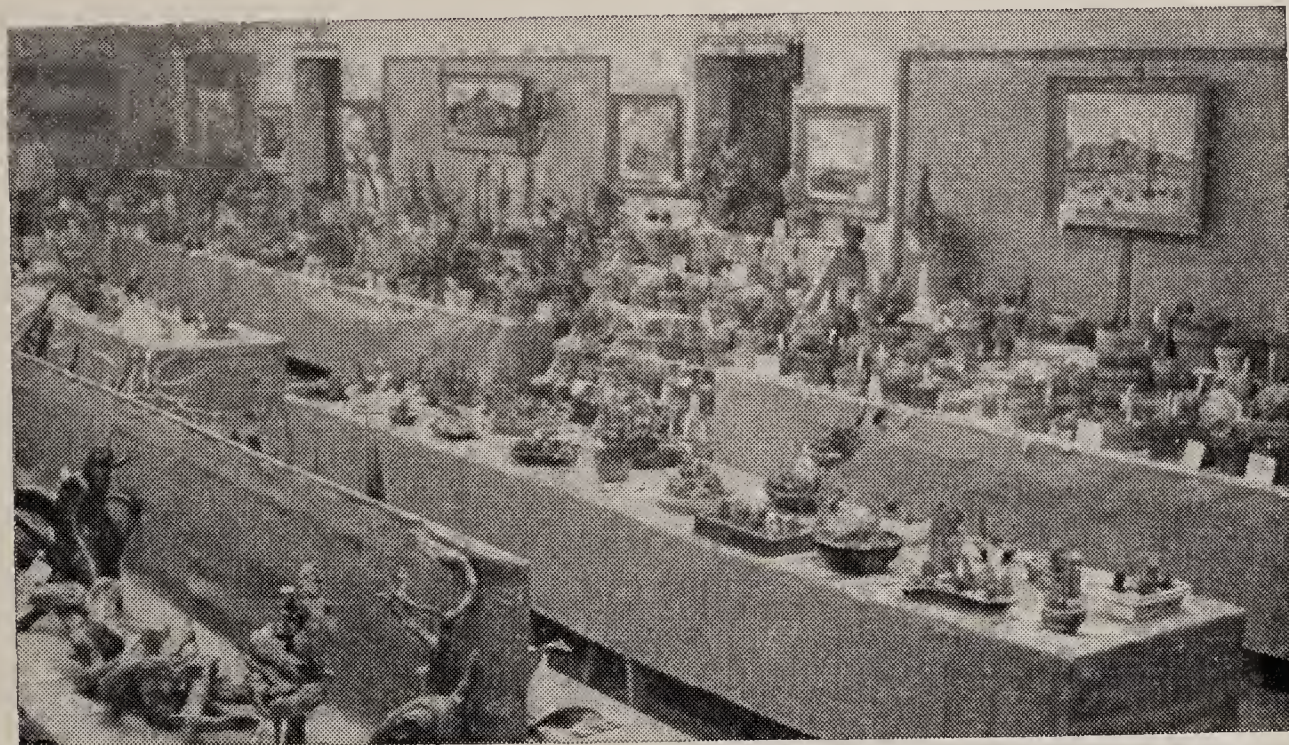
CACTUS SHOW

FEBRUARY 21st TO FEBRUARY 28th, 1965

Sponsored by the Phoenix Gazette and the
Desert Botanical Garden

Webster Auditorium
Papago Park,
Phoenix, Arizona

SHOW OPEN DAILY 9 A.M. TO 5 P.M. — ADMISSION FREE



A portion of the 1964 Cactus Show with tables of Dish Gardens and Arrangements in foreground.

CLASSIFICATIONS

SECTION I CACTI*

Class A. POTTED PLANTS

- | | | | |
|---------|--------------|-----|---------------------|
| Div. 1. | OPUNTIA | 11. | ECHINOCACTUS |
| 2. | CEREUS | 12. | GYMNOCALYCIUM |
| 3. | ECHINOCEREUS | 13. | ASTROPHYTUM |
| 4. | REBUTIA | 14. | THELOCACTUS |
| 5. | CHAMAECEREUS | 15. | ECHINOMASTUS |
| 6. | LOBIVIA | 16. | CORYPHANTHA |
| 7. | ECHINOPSIS | 17. | MAMMILLARIA |
| 8. | ARIOCARPUS | 18. | EPIPHYLLUM |
| 3. | STENOCACTUS | 19. | SEEDLINGS |
| 10. | FEROCACTUS | 20. | ANY OTHER SPECIES** |

Class B. CRESTED PLANTS

- Div. 1. Crested Cacti — own root
2. Crested Cacti — grafted

Class C. MONSTROSE PLANTS

Class D. GRAFTED PLANTS

Class E. COLLECTIONS — 5 species of a genus

SECTION II SUCCULENTS OTHER THAN CACTI*

Class A. POTTED PLANTS

- | | | | |
|---------|-------------|-----|---------------------|
| Div. 1. | AEONIUM | 10. | HAWORTHIA |
| 2. | AGAVE | 11. | KALANCHOE |
| 3. | ALOE | 12. | LITHOPS |
| 4. | BRYOPHYLLUM | 13. | MESEMBRYANTHEMUM |
| 5. | CRASSULA | 14. | PLEIOSPILOS |
| 6. | DUDLEYA | 15. | SEDUM |
| 7. | ECHEVERIA | 16. | STAPELIA |
| 8. | EUPHORBIA | 17. | YUCCA |
| 9. | GASTERIA | 18. | ANY OTHER SPECIES** |

Class B. COLLECTIONS — 5 species of a genus

*Grown by exhibitor at least 3 months

**Additional division will be set up when 3 or more species of a genus are entered.

SECTION III DESERT TREES AND SHRUBS*

- Div. 1. TREES
- 2. SHRUBS
- 3. DESERT BONSAI
- 4. ANY OTHER DESERT PLANTS

SECTION IV ARRANGEMENTS

Class A. **DISH GARDENS** (Planted) Accessories permitted

- Div. 1. CACTI
- 2. OTHER SUCCULENTS
- 3. CACTI & OTHER SUCCULENTS

Class B. **CENTERPIECES** — Accessories permitted

- Div. 1. CACTI
- 2. OTHER SUCCULENTS
- 3. CACTI & OTHER SUCCULENTS
- 4. NATURAL, DRIED DESERT MATERIAL***
- 5. MEXICAN INFLUENCE
- 6. AMERICAN INDIAN INFLUENCE
- 7. ANY OTHER CENTERPIECE

Class C. **ARRANGEMENTS on/or AGAINST THE WALL** —
Accessories permitted

- Div. 1. CACTI
- 2. OTHER SUCCULENTS
- 3. CACTI & OTHER SUCCULENTS
- 4. NATURAL, DRIED DESERT MATERIAL***
- 5. MEXICAN INFLUENCE
- 6. AMERICAN INDIAN INFLUENCE
- 7. ANY OTHER CENTERPIECE

Class D. **CORSAGES**

- Div. 1. SUCCULENTS
- 2. DRIED DESERT MATERIALS

Class E. **BUTTON GARDENS**

Class F. **MINIATURE ARRANGEMENTS** — UNDER 5" HIGH

Class G. **SMALL ARRANGEMENTS** — 5" TO 8" HIGH

Class H. **STRAWBERRY JARS** — Cacti and/or other
succulents

Class J. **PATIO PLANTERS** — Cacti and/or Desert Plants

***No artificial coloring permitted.

SECTION V ARTS — DESERT SUBJECTS

Class A. **BLACK & WHITE PHOTOGRAPHS**

Class B. **COLORED PHOTOGRAPHS**

Class C. **OIL PAINTINGS** (work of the exhibitor)

Class D. **WATER COLOR PAINTINGS** (work of the exhibitor)

Class E. **ANY OTHER MEDIUM** (work of the exhibitor)

Class F. **NATURAL DESERT WOODS** (no carvings)

SECTION VI EDUCATIONAL EXHIBITS

SECTION VI OPEN: NON-COMPETITIVE

The Eighteenth Annual Cactus Show will be held in the Webster Auditorium, Desert Botanical Garden, February 21-February 28 and is open to all persons interested in Succulent Plants, Arrangements, Photography (B.&W. or colored), Paintings (desert subjects) or Desert Woods. No entry fee is charge.

All entries must be received not later than 5 p.m. Saturday, February 20th.

Judging will be held 7-9 P.M. February 20th.

Awards will be given for the most points accumulated in the four large sections, small trophies will be given for outstanding exhibits in the various classes; ribbons for 1st, 2nd, 3rd and honorable mention, if merited.

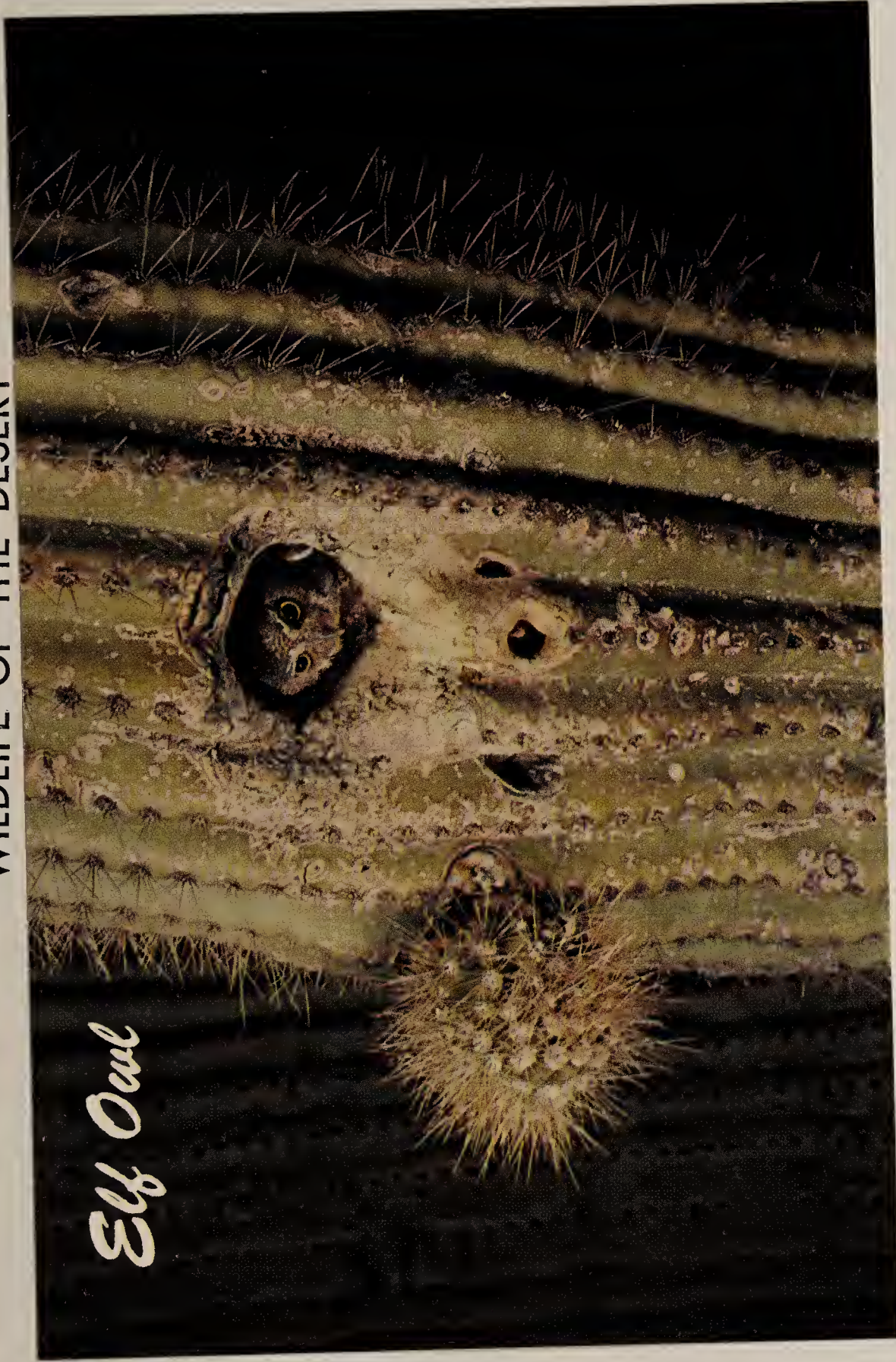
Exhibits can be removed only after 5 P.M. February 28th.

Scale of points is as follows:

CACTI & SUCCULENT SPECIMEN PLANTS		ARRANGEMENTS	
Condition	45	Design	25
Nomenclature	15	Color	20
Rarity	10	Relationship	15
Size or degree of maturity	10	Originality	15
Staging	20	Distinction	15
	<hr/>	Condition	10
	100		<hr/>
			100
MINIATURES		CORSAGES	
Scale	40	Technique	15
Design	30	Design	25
Color Harmony	20	Color	15
Condition	10	Suitable combination of material	15
	<hr/>	Distinction	20
	100	Condition	10
			<hr/>
			100

The "Handbook for Flower Shows" published by the National Council of State Garden Clubs, Inc., will be used as the basis of exhibiting, point scoring and judging of all Arrangements, Dish Gardens, Miniatures, etc. The Standard System of Judging will be used.

The decision of the National Accredited Judges will be final.



The elf owl (*Micrathene whitneyi*) is the tiniest of all owls, 5"-6" tall, about the size of a chunky sparrow. An inhabitant of the saguaro deserts and wooded canyons, it uses woodpecker holes in saguaros for nesting and for daytime hideaways. During winter it moves south, but in spring and summer dusk the lucky "owl watcher" can locate it by its high, rapid call, something like that of a puppy yapping.

LOPHOCEREUS SCHOTTII

CACTACEAE
CACTUS Family

SENITA, SINITA

This cereus was first described by Dr. George Engelmann, St. Louis, Mo., in the Proceedings of American Academy of Science 3:288 1856 as *Cereus schottii*. He also had it carried as a species nova in Cactaceae of the Boundary from Report of the United States & Mexican Boundary Survey under order of Lieut. Col. W. H. Emory, Washington 1859. Dr. Engelmann named this new cereus in honor of his very good friend, Dr. Arthur Schott, who over the years explored the southwest, the plains of Yucatan and the primeval forests of the isthmus.

In 1905 Alwin Berger, Stuttgart, Germany, changed the genus from *Cereus* to *Lophocereus* as he felt this plant gave the appearance of a 'head' on each stem due to the thick matting of hairy spines on the upper portion of each stem.



Clump of *Lophocereus schottii*.
Largest branch is 10' tall.



Offsets produced by an 8-year cutting which had been frozen back.

'Senita' (Indian 'old one') is a fair sized plant having single to hundreds of square-like arising branches up to 15' tall. The older or taller branches have a covering on the upper one-third of the branch of 2"-3" long grey bristles among which will appear numerous light to dark pink nocturnal flowers from each areole during May and June. During latter part of June and through July the Indians gather the edible red fruits which are about 1" in diameter, yet the rodents and birds harvest most of these smooth fruits.

The inner woody portion of these plants is used through Sonora and Lower California for fences and as a fuel.

Lophocereus schottii has a large range for a cactus plant. It is found growing in

the Organ Pipe Cactus National Monument, southern Arizona, southward for about a thousand miles, and also in Baja California in association with the large cerei — Organ Pipe, Saguaro, Cardon and Hecho. As it extends southward along the Gulf of California, its stems tend to become thinner and thus many species have been erected for this plant while they are merely geographical forms due to ecological conditions. The plants are found growing in dense colonies and prefer slight drainage along stream beds. They can withstand quite intense heat yet are frost tender while out of their range. If you are growing them where there is danger of frost, be sure and cover the growing tips with a bag or covering until frost danger is past.

TYPE LOCALITY—In Sonora, toward Magdalena, Mex.

DISTRIBUTION — Southern Arizona,

western Sonora, Mex. and Baja California.



Blossom of *Lophocereus schottii*, actual size.

FIELD NOTES FROM THE ANDES

By PAUL C. HUTCHISON, Expedition Director

University of California Botanical Garden Seventh Expedition to the Andes

(Continued from last issue)

For a week Idrobo and I collected plants on the finca or the nearby Dagua valley, an hour's jeep-ride away. We pressed plants without blotters or corrugates by simply tying them in bundles between sheets of newspaper with liberal amounts of alcohol sprinkled over them. These bundles we delivered to Cali for flying to Bogota, where Dr. Idrobo's assistants completed the drying process. A set of this material will remain in Colombia, and the balance will be sent to Berkeley.

Dagua valley was a blaze of flowers, and in four visits there we succeeded in collecting only a small amount of what was available. We did get living material of all of the cacti, including *Opuntia pittieri*, *O. bella*, *Cephalocereus colombianus*, *Armatocereus humilis* (much

more like *Acanthocereus* than *Armatocereus*), *Melocactus* species (perhaps new). In one small side canyon we took a wild *Agave* which is probably an undescribed species. It grew on nearly vertical rock slopes and Idrobo and I had to rope our way to it and lower the plants and inflorescences by rope. Seed or plants of all of these were sent to Honolulu and to the I. S. I. A fine succulent *Peperomia* was collected, reminiscent of some I have seen in Peru.

Idrobo had eventually to go back to Bogota, after staying twice as long as planned. Collecting was so rich that Wright and I stayed on an extra week and thus cut out plans for a stop of one week in Ecuador. We shipped five large boxes to Honolulu, but up to now we have been so much on the move we have still not heard how these, or the Pana-

manian materials survived.

Lima to Abra Porculla Pass

We proceeded north along the Pan American highway at a rapid pace and made only a few collecting stops to determine the state of flowering of cacti at this time on the western slopes of the Andes. As anticipated, very few were in flower, although some *Haageocereus* had both flowers and fruit. With a side excursion to the north Peruvian port of Payta to collect seaweeds and shells for a day, we were ready to make the ascent of the cordillera over Abra Porculla Pass, the lowest pass across the Peruvian Andes at 2144 meters (about 6500 feet) altitude. The road had deteriorated very much since 1957, as do all interior roads which are unpaved, due to heavy truck traffic; still, we made fairly good time.

* * *

On my birthday, January 3, we reached km. 28 on the Olmos-Marañon "highway," some 21 km. below the sum-



Espostoa lanata from Peru. Photographed in the Garden lathhouse.

mit of Abra Porculla Pass. There, at about 1150 meters, we found that the vegetation was just beginning to flower, but that many of the late-flowering shrubs were also in condition for collecting. At km. 28 there is a small restaurant called "El Salvador" which has a large parking area, a tiny stream running nearby, and sufficient level ground to spread out materials. The owner, Sr. Jose Maria Enriquez, and his family, permitted us to set up camp in their front yard. We slept on the roof of the truck in our specially built tent, ate in the "restaurant" and collected the very rich vegetation of the area for a week, while waiting for the opening of buds on some 10-meter specimens of the cactus *Browningia microsperma*. I needed material of this species for completion of drawings for a revision of the genus. About 100 species of plants were taken in this area, nearly all pressed, and some of them with seed or pickled collections to supplement the pressed ones. I was especially pleased to get seed of a *Banisteriopsis* species (#3387). Most species of this genus are medicinally important, so it will be interesting to see if, in this case, the cultivated plants will prove to have the same chemical content as the wild samples taken for chemical analysis. Two other species of the genus were also found, in flower but without seed.

* * *

On 9 January we crossed the summit at km. 49 and just beyond, at km. 52, we stopped to examine the large population of a cereoid cactus on the dry desertic eastern slopes. This area is a rain-shadow, but near the summit the clouds often drift over, and as a result the cacti were covered with lichens. I took nearly 15 species of lichen from one species of cactus. The columnar cactus here was examined by me in 1957 but not named even to genus as it had no flowers or fruit. Now, with both, I was able to see immediately that it was

a *Browningia*, either a new species, or else the long-lost *Cereus chlorocarpus* H.B.K.

Cereus chlorocarpus was collected in the vicinity of Huancabamba by Aime Bonpland in 1802 when he and Humboldt made the descent to the Marañon river coming from Quito, Ecuador. The species was published with a very brief description as a columnar cactus with green fruit. In the Huancabamba area in 1957 I was unable to determine to what species the name applied, because several of the local cacti had no flowers or fruit, but I suspected that one of these, which in other respects resembled a *Borzicactus*, might be a *Browningia*, and perhaps that it was the same as *Cereus chlorocarpus*. The other plant of the Huancabamba area which might have been *Cereus chlorocarpus* has since been described as a new species of *Borzicactus* (*B. neoroezlii* Ritter) and has colored fruits. That leaves only the *Browningia* to equate to the lost *Cereus chlorocarpus*.

There is no barrier to migration for cacti from Huancabamba, down the gorge of the Río Huancabamba, to the area of the eastern slopes of Abra Porculla Pass, and in fact most of the other cacti of Huancabamba occur in both places (*Borzicactus icosagonus*, *Borzicactus serpens*, *Espostoa lanata*, etc.). At any rate, we now have sufficient material of #3485 to reopen the question of the identity of this lost species and its proper name in current concepts of genera in the cactus family. Either #3485 is the long-lost *Cereus chlorocarpus* and a true *Browningia*, or it is a new species of *Browningia*.

The plants were heavily parasitized by at least two kinds of beetles. The grubs of both ate floral tissues, particularly the receptacle, and as fruit matured, they moved down into the fruit and consumed seed and all. Nearly all fruits eventually blackened and dropped



Pilosocereus columbianus. From Backeberg, "Die Cactaceae".

before seed ripened. One of the beetles might have been the same species as a large weevil I collected on one of the plants, which I observed was eating the stem tissues. The combination of depredation by these insects and the heavy load of epiphytic lichens on all plants gave a very odd aspect to all specimens of #3485 which I examined, and I wondered if the population was on a decline. I saw not one juvenile plant in this area. However the species ranges widely down the Río Huancabamba, where it flowers somewhat later and seems not to be parasitized. There are some odd nearly prostrate forms there which need further study when in flower. Eventually it seems to introgress with *Gymnanthocereus altissimus* Ritter (which is also a *Browningia*); however the two entities, one at higher altitudes, and the other abundant in the Chamaya and Marañon basins, are different and warrant specific status.

(To be continued)

GROWING CACTUS IN THE NORTHWEST

A group of healthy cacti growing in the glass house of Mrs. Alice Witte, Startup, Wash. Photo taken Jan. 18, 1965. The plants have not been watered since early November and yet many buds are beginning to appear. Many of these plants were purchased as small cacti in the boxes "made up" for mailing. Some of these potted cacti were started by Mrs. Witte from seed procured from other growers.



GARDEN ACTIVITIES

FEBRUARY

Tues.	2nd	CACTOMANIACS meeting	8 P.M.
Wed.	3rd	CLASS—Culture of Desert Trees & Shrubs	3 P.M.
Thurs.	4th	LECTURE—Arizona Scenics	3 P.M.
Sun.	7th	LECTURES—Leaf Succulent Plants	3 & 4
Wed.	10th	CLASS—All-day Desert Field Trip	9 A.M.
Thurs.	11th	LECTURE—Leaf Succulent Plants	3 P.M.
Sun.	14th	LECTURES—Arizona Cacti in Flower	3 & 4
Sun.	21st to 28th	18th ANNUAL CACTUS SHOW	9-5 P.M.

SAGUAROUND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol XIX

March, 1965

No. 3



Arrangement of yucca leaves and aloe
by Laura Nixon.



REG-MANNING

SAGUAROLAND BULLETIN

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W. HUBERT EARLE, Editor
Lillian Diven, Associate Editor

Volume XIX

March, 1965

No. 3

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GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

REPORT OF THE 18th ANNUAL CACTUS SHOW

Our Cactus Shows continue to grow each year and the 18th was no exception, with 532 entries by 92 exhibitors, the largest in the history of the Shows. The facilities of the Auditorium are being crowded each year and exhibits are now being displayed in the Patio and Visitors' Building.

We again had good coverage of the Show prior to its opening and all through its 8 days by co-sponsor Phoenix Gazette and their Promotion Mgr. Dick Jones and several of their photographers. Many other newspapers, radio and T.V. stations also gave us appreciated coverage.

Attendance was again quite good with 9,834 visitors and an income of \$4,235. Voluntary admissions netted the Garden \$1,134. These admissions have in the



Attractive and varied exhibits of succulents in one corner of the auditorium. Picture entries on wall.

past four years brought in quite substantial amounts that have been used in Garden improvements. Many plants were donated by Mrs. L. Belford, Mrs. Faith Haft, Mrs. Lela Turner, Neil Van Ness, Mrs. R. Cooper and Bernard Davis, Sr. which were sold to the visitors and netted the garden an additional \$213.20. We certainly thank these members for their extra plants.

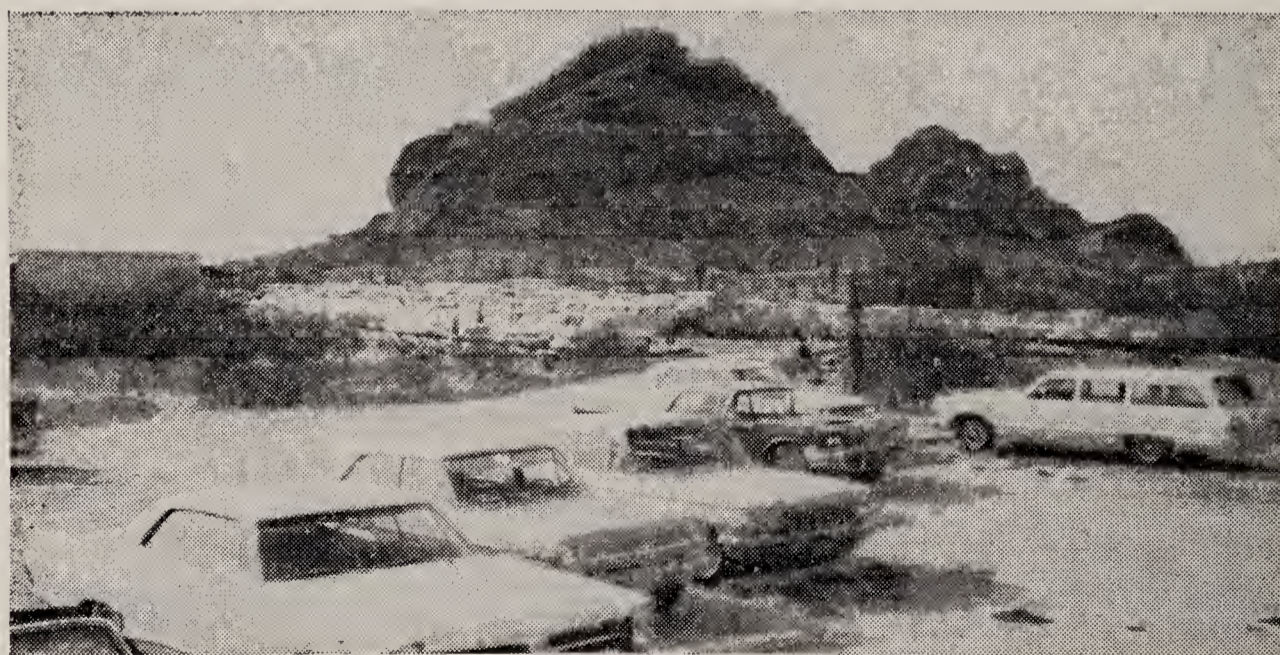
There were many outstanding paintings this year which always add charm and color to the Show. Many unusual Black and White photographs were exhibited in the Visitors' Reception Building. The visitors were quite interested in the large class of cacti seedlings which were well displayed. The Educational exhibits were another eye-catching class and quite informative. Herb Bool of Desert Plants Nursery put in a non-competitive display of Bromeliads and other leaf succulent plants that filled one half of the end of the Auditorium. His displays always show a lot of artistic imagination. The Show Committee of John Hales, Rod McGill, Mrs. A. Holt, Mrs. Lela Turner and Owen Stradling were quite pleased as the calibre of the Show continues to improve.

Our thanks go to Ed and Betty Gay of Tarzana, Calif., who took time from their busy schedule to again come over to Phoenix to judge the Cacti and other Succulents Section. Mrs. A. F. Brown, Mrs. Betty Schimek and Mrs. G. G. Williams, National Garden Club accredited judges, again were kept busy placing awards in the Dish Gardens and Arrangements section. Mr. and Mrs. Salvatore Macri pondered quite a while over the many desert oils and water color paintings and photographs. We are fortunate to have the services of all these fine persons.

Clerks of the Show — John Hales, Rod McGill, Warner Dodd — were assisted by Lyle McGill, June McGill, Mrs. W. Dodd, Mrs. Lillian Diven and Mrs. Thelma McDougall. Supt. of the Show John Weber our Horticulturist, had the Show well "set up" for those inevitable premature exhibitors who began showing up with entries on Thursday.

The Show could not have run so smoothly if it had not been for all the fine volunteer help from our Cactomanic and Class members who are as follows:

Mr. and Mrs. Bert Jinneman, Hiram and Maribel Pratt, Flo and Norman Fickeisen, Laura and Herman Wolf, A Karabinus, Miles Zoller, Mr. and Mrs. Harry Henneberger, John Garceau, Mrs. Aletha Ashley, Mrs. C. K. Hanna, Mrs. Lela Turner, Mrs. R. Gabel, Mr. C. Gambel, Eve and Dugan Lewis, Mrs. Faith Haft, Bernard Davis, Sr., Mrs. Betty Miller, Mrs. Zelia Brady, Beth and Weston Cook, Mr. and Mrs. L. R. Elliott, Mr. and Mrs. William Hunt, Mrs. Z. Poe, Mrs. R. Cooper, Dr. Lake and Peg Gill, Mrs. Laura Nixon, Mrs. W. M. Gregory, Paul and Ruby Neuman, Mrs. W. Day, Mrs. Marion Matson, Mrs. Lillian Mieg, Trudy Mueller, Mr. and Mrs. Van Ness, Warner and Beverly Dodd, Mrs. Una Miller, Mrs. Lillian Henson, Don and son Dave Squires, Bernie Lewin, Mrs. Helen Friedrichs, Mrs. Grace Connolley, Mr. and Mrs. W. B. Huber, and Mrs. J. W. Jones.



Our regular parking lot, in the background, is full and the overflow lot in the foreground is filling up, an indication of the record number of visitors this year



Many entries of well-grown cactus seedlings were popular with visitors to the 1965 Cactus Show.

SWEEPSTAKES WINNERS

CACTI—John Hales, Phoenix.

SUCCULENTS—John Hales and Mrs. Arthur Holt, Phoenix.

ARRANGEMENTS—Mrs. R. I. Turner, Phoenix.

TROPHY WINNERS

1. BEST CACTUS—Mrs. Marion Thomas, Phoenix.
2. BEST SUCCULENT—John Hales, Phoenix.
3. BEST DISH GARDEN—Mrs. Nancy McMahon, Scottsdale.
4. BEST CENTERPIECE—Mrs. R. I. Turner, Phoenix.
5. BEST ARRANGEMENT AGAINST WALL—Mrs. Fred Bernhard, Des Moines, Ia.
6. BEST SUCCULENT CORSAGE—Mrs. Clifford Morris, Dayton, Ohio.
7. BEST MINIATURE ARRANGEMENT—Mrs. Joseph Nuber, Phoenix.
8. BEST JUNIOR EXHIBIT—Shirley McMahon, Scottsdale.
9. BEST BLACK AND WHITE PHOTO—Hobart Pribbenau, Phoenix.
10. BEST WATERCOLOR—Sue B. Pohlman, Phoenix
11. BEST OIL PAINTING—Mrs. Marie Krasnonis, Scottsdale.
12. BEST DESERT WOOD—E. P. Matteson, Phoenix.
13. BEST EDUCATIONAL EXHIBIT—Lyle McGill, Glendale.

RIBBON AWARDS

SECTION I—CACTI

CLASS A. POTTED PLANTS

Div. 1. Opuntia

1st, Clifford M. Schroeder, Tempe. 2nd, Laura A. Wolf, Phoenix. 3rd, Ben Hutt, Scottsdale. 4th, Russ Lewis, Phoenix.

Div. 2. Cereus

1st, Mrs. Laura Nixon, Phoenix.

Div. 3. Echinocereus

1st, Norman Fickeisen, Phoenix. 2nd, Mr. C. C. Pidgeon, Phoenix, 3rd, Brooks Darlington, Scottsdale, 4th, John B. Hales, Phoenix.



Best Cactus in show. *Mammillaria fasciculata* entered by Mrs. Marion Thomas, lower center

Div. 5. Chamaecereus

2nd, Mrs. Richard Enz, Tempe.

Div. 6. Lobivia

1st, Mrs. Laura Nixon.

Div. 7. Echinopsis

1st, Bert Jinneman, Scottsdale. 2nd, Earl L. Pierson, Phoenix. 3rd, Mr C. C. Pidgeon. 3rd, Mrs. Lillian Lugibihl, Tempe.

Div. 8. Ariocarpus

1st, Miles Zoller, Scottsdale. 2nd, Belle Cooper, Phoenix. 3rd, Norman Fickeisen, Phoenix.

Div. 9. Stenocactus

1st, Florence Fickeisen, Phoenix.

Div. 10. Ferocactus

1st, Belle Cooper.

Div. 11. Echinocactus

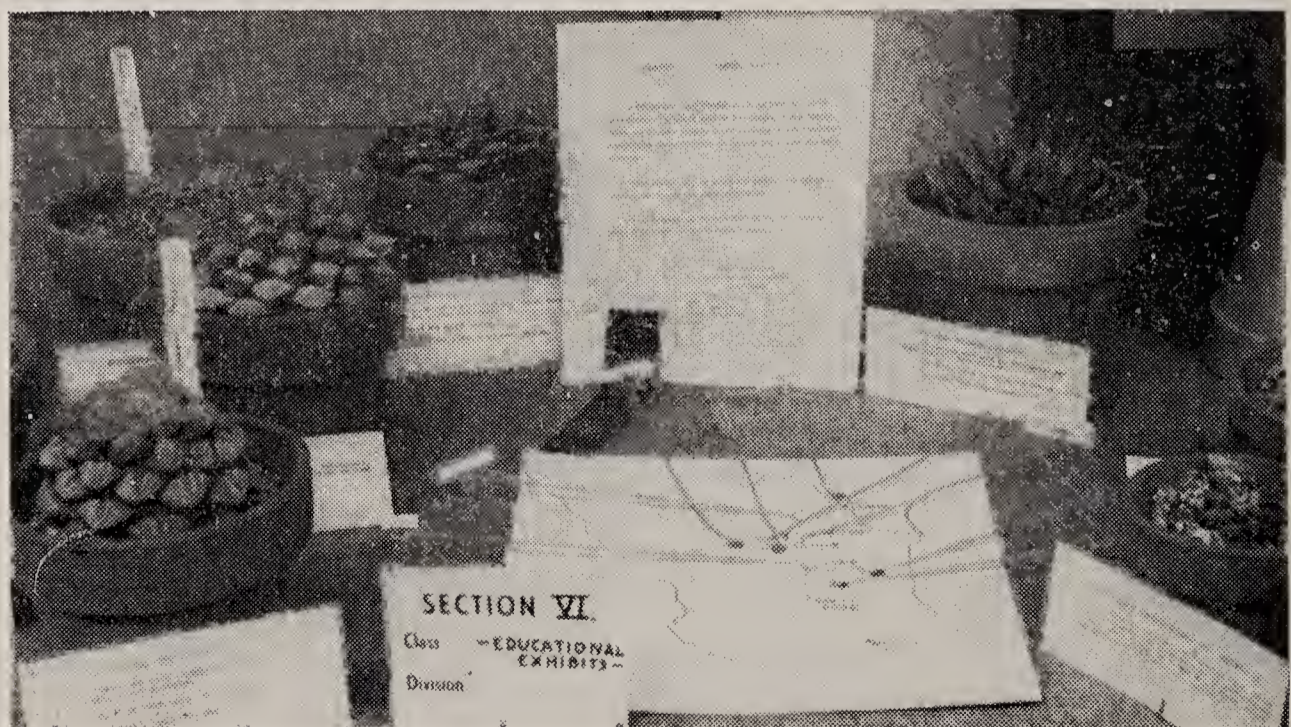
1st, Mr. C. C. Fidgeon.

Div. 12. Gymnocalycium

1st, John B. Hales.

Div. 13. Astrophytum

1st, John B. Hales. 2nd, Miles Zoller. 3rd, Miles Zoller. 4th, John B. Hales.



Educational exhibit of *Ariocarpus* species and their habitats. Entered by Lyle McGill.



Desert branch and yucca pods.
Prize winner by Mrs. Joseph
Nuber.

Div. 14. Thelocactus

1st, Belle Cooper. 2nd, Norman Fickeisen. 3rd, Miles Zoller.

Div. 15. Echinomastus

1st, C. C. Pidgeon. 2nd, John C. Garceau, Phoenix. 3rd, Charles Mieg, Scottsdale.

Div. 16. Coryphantha

1st, L. Bremer, Sun City. 2nd, L. Bremer 3rd, L. Bremer 4th, Mrs. Emma Ames, Phoenix.

Div. 17. Mammillaria

1st, Marion Thomas, Phoenix. 2nd, Miles Zoller. 3rd, Charles Meig. 4th, John B. Hales. 4th Mrs. Lillian Lugibihl.

Div. 19. Seedlings

1st, Norman Fickeisen 2nd, Bernie Lewin, Scottsdale. 3rd, Miles Zoller. 4th, Mary Ketring, Phoenix.

Div. 20. Any Other Species

1st, Charles Mieg. 2nd, John B. Hales. 2nd, John B. Hales. 3rd, John B. Hales. 3rd, John B. Hales. 4th, Charles Mieg.

Div. 21. Pediocactus

1st, 2nd, 3rd, 3rd, Florence Fickeisen.

CLASS B. CRESTED PLANTS

Div. 1. Crested Cacti—own root

1st, John B. Hales. 2nd, Mrs. Laura Nixon.

CLASS C. MONSTROSE PLANTS

1st, John B. Hales. 2nd, Laura A. Wolf. 4th, Laura A. Wolf.

SECTION II SUCCULENTS

OTHER THAN CACTI

CLASS A. POTTED PLANTS

Div. 1. Aeonium

1st, Harry Henneberger, Phoenix. 2nd, Clifford M. Schroeder.

Div. 2. Agave

1st, Mrs. L. V. Matson, Scottsdale. 2nd, Mrs. Arthur Holt, Phoenix. 3rd, Harry Henneberger. 4th, John B. Hales. 4th, Mrs. L. V. Matson.

Div. 3. Aloe

1st, Mrs. L. V. Matson. 2nd, Nancy McMahon. 2nd, Nancy McMahon. 3rd, John B. Hales. 3rd, Mrs. Laura Nixon.



An arrangement of opuntia pads
an a palm spathe. Mrs. Fred
Bernhard.

Div. 4. Bryophyllum

1st, Ben Hutt.

Div. 5. Crassula

1st, 3rd, 4th, Mrs. Arthur Holt.

Div. 6. Dudleya

1st, 2nd, 3rd, Mrs. Arthur Holt.

Div. 7. Echeveria

1st, Mrs. Arthur Holt. 2nd, Bernie Lewin. 3rd, Mrs. Arthur Holt.

Div. 8. Euphorbia

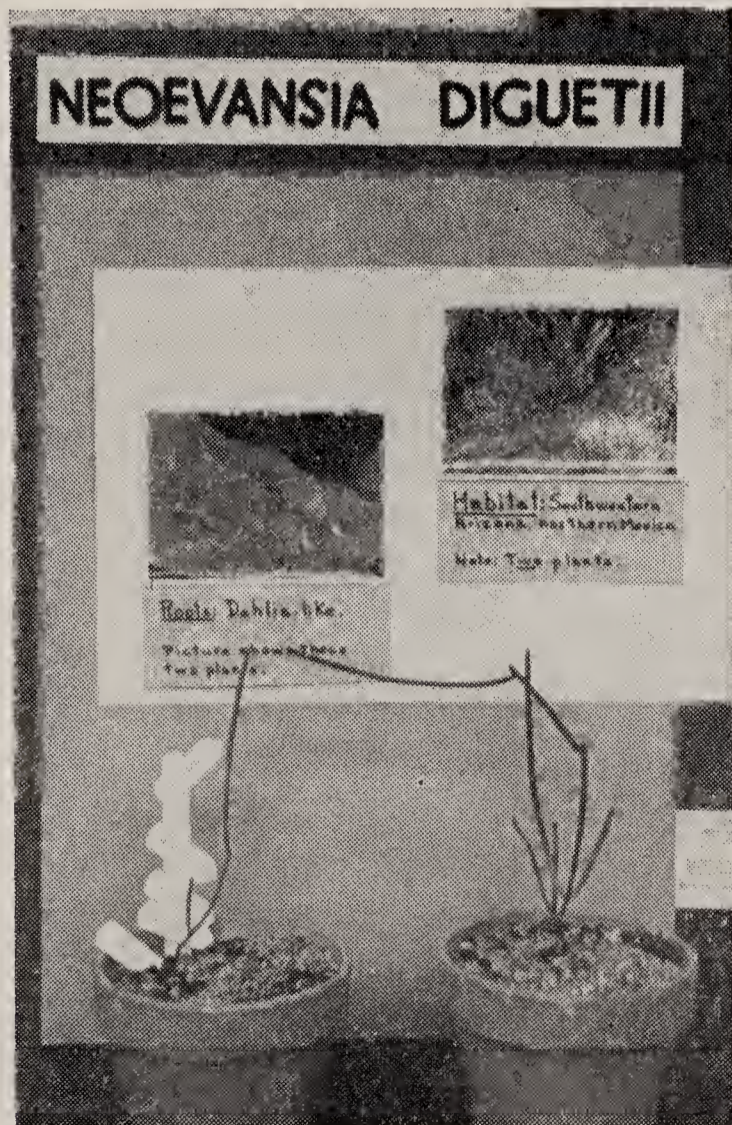
1st, Bert Jinneman. 2nd, Mrs. Arthur Holt. 2nd, John B. Hales. 3rd, Laura Nixon. 4th, Bert Jinneman. 4th, Mrs. Lillian Lugibihl.

Div. 10. Haworthia

1st, John B. Hales. 2nd, 3rd, John B. Hales. 4th, John C. Garceau.

Div. 11. Kalanchoe

1st, Mrs. Arthur Holt. 2nd, Mrs. L. V. Matson. 3rd, Mrs. Emma Ames, Phoenix.



An educational exhibit entered by Florence Fickeisen.



Cactus, aloes and agave in a rock planter, by Nancy McMahon

Div. 15. Sedum

1st, Mrs. Emma Ames.

Div. 16. Stapelia

1st, Mrs. Laura Nixon. 2nd, Mrs. May Brady, Phoenix.

Div. 17. Yucca

2nd, Clifford M. Schroeder. 3rd, Charles Mieg.

Div. 18. Any Other Species

1st, 2nd, John B. Hales. 3rd, 4th, Mrs. Arthur Holt.

Div. 19. Seedlings

1st, John B. Hales.

CLASS B. COLLECTIONS

5 species of a genus.

1st, 2nd, 3rd, John B. Hales. 2nd, Bert Jinneman. 3rd, Faith M. Haft.

SECTION III DESERT TREES AND SHRUBS

Div. 1. Trees

1st, 3rd, John B. Hales.

Div. 2. Shrubs

2nd, Clifford M. Schroeder

Div. 3. Desert Bonsai

1st, Mrs. Robert Craig, Phoenix. 2nd, Mrs. Frank Feffer, Scottsdale.

Div. 5. Seedlings

1st, Charles Mieg.

SECTION IV ARRANGEMENTS

CLASS A. DISH GARDENS

(Planted) Accessories permitted

Div. 1. Cacti

1st, Mrs. Arthur Holt. 2nd, Helen

Friedrichs, 3rd, Nancy McMahan. Honorable Mention, Dr. G. Waterman, Phoenix. Honorable Mention, Laura M. Wolf. 1st, (Junior Class), Scott McMahan, Scottsdale.

Div. 2. Other Succulents

1st, Mrs. Arthur Holt. 2nd, Mrs. Robert Craig. Honorable Mention, Mrs. Myron Holbert, Phoenix. 2nd (Junior Class), Cora Hess. 3rd (Junior Class), Shirley McMahan. Honorable Mention, Helen Friedrichs.

Div. 3. Cacti and Other Succulents.

1st, Nancy McMahan. 2nd., Russell Ker, Tempe. 3rd, Nancy McMahan. Honorable Mention, Helen Friedrichs. Honorable Mention, John Gunner. 1st, (Junior Class) ,Shirley McMahan, of Scottsdale. 2nd (Junior Class), David Squire, Phoenix. 3rd, (Junior Class), David Squire.

CLASS B. CENTERPIECES —

Accessories permitted

Div. 1. Cacti

1st, Mrs. R. I. Turner, Phoenix. 2nd, Mrs. Geo. T. Hasler, Phoenix 3rd, Laura A Wolf.

Div. 2. Other Succulents

1st, Mrs. R. I. Turner. 2nd, Mrs. Laura Nixon.

Div. 3. Cacti and Other Succulents

1st, Mrs. R. I. Turner.

Div. 4. Natural, Dried Desert Material

1st, Monnie Speck. 2nd, Monnie Speck. 3rd Mrs. R. I. Turner.

Div. 5. Mexican Influence

3rd, Nancy McMahan.

Div. 6. American Indian Influence

1st, Monnie Speck. 2nd, Nancy McMahan. 1st (Junior Class), Harold Lee Pierson, Phoenix.

Div. 7. Any Other Centerpiece

1st, Mrs. R. I. Turner. 2nd, Marion Thomas. 3rd, Earl L. Pierson. Honorable Mention, Earl L Pierson. 2nd, (Junior Class), Christopher Peterson. 3rd, (Junior Class), Joseph Peterson.

CLASS C. ARRANGEMENTS ON OR AGAINST THE WALL —

Accessories permitted

Div. 1. Cacti

1st, Mrs. M. Y. Carpenter, Phoenix. 2nd, Nancy McMahan. 3rd, Mrs. R. I. Turner.

Div. 2. Other Succulents

1st Mrs. M. Y. Carpenter. 2nd, Mrs. Myron Holbert. 3rd, Mrs. R. I. Turner. Honorable Mention, Mrs. Laura Nixon.

Div. 3. Cacti & Other Succulents

1st, Mrs. R. I. Turner

Div. 4. Natural, Dried Desert Material

1st, Mrs. Joseph Nuber. 2nd, Mrs. R. I. Turner. 3rd, Mrs. Laura Nixon. Honorable Mention, Mrs. B. Peterson.

Div. 5. Mexican Influence

1st, Mrs. Fred Bernhard, Des Moines, Iowa.



Winning watercolor by Sue Pohlman.



Dish garden of succulents by Mrs. R. I. Turner.

Div. 6. American Indian Influence
1st, Mrs. Robert Craig. 3rd, Mrs. R. I. Turner.

Div. 7. Any Other Arrangement
1st, Mrs. Fred Bernhard.

CLASS D. CORSAGES

Div. 1. Succulents
1st, 2nd, 3rd, and 4 Honorable Mentions, Mrs. Clifford Morris, Dayton, O.

CLASS E. BUTTON GARDENS

1st, 2nd, 3rd, and Honorable Mention, Mrs. R. I. Turner.

CLASS F. MINIATURE ARRANGEMENTS—Under 5" High

1st, Mrs. Robert Craig. 2nd, Mrs. R. I. Turner 3rd, Mrs. Fred Bernhard. 1st (Junior), 2nd (Junior), 3rd (Junior), Honorable Mention (Junior), Shirley McMahan.

CLASS G. SMALL ARRANGEMENTS

5" to 8" High
1st, Mrs. Joseph Nuber. 2nd and 3rd, Mrs. R. I. Turner.

CLASS H. STRAWBERRY JARS —

Cacti and or other succulents
1st, Marie C. Mueller, Phoenix. 2nd, John B. Hales. 3rd, Dr. G. Waterman.

CLASS J. PATIO PLANTERS —

Cacti and or Desert Plants
1st, Harry Henneberger. 2nd, 3rd, Nancy McMahan. Honorable Mention, Dr. G. Waterman. Honorable Mention, Harry Henneberger. Honorable Mention, Brooks Darlington, Scottsdale.

SECTION V. ARTS — DESERT SUBJECTS

CLASS A. BLACK AND WHITE PHOTOGRAPHS

1st Close-up, 2nd Close-up, 3rd Close-up, Agnes Holst, Phoenix.
1st Landscape, 2nd Landscape, 3rd Landscape, Hobart Pribbenau, Phoenix. 4th Landscape, Edward D. Tolver, Scottsdale.
1st Plant, 2nd Plant, 3rd Plant, Mary Williams, Phoenix.

CLASS B. COLORED PHOTOGRAPHS

2nd Kodacolor, Frieda M. Lannoye, Green Bay, Wisc.
1st Kodachrome, 2nd Kodachrome, 3rd Kodachrome, Robert W. Shervem, Scottsdale.

CLASS C. OIL PAINTINGS

(Work of the exhibitor)
1st, Mrs. Marie Krasnonis, Scottsdale. 2nd, Mr. Omer Lewis, Kingman. 3rd, Russell Ker. Honorable Mention, Ruth M. Lau, Phoenix.

CLASS D. WATERCOLOR PAINTINGS

(work of the exhibitor)
1st, Sue B. Pohlman, Phoenix. 2nd, Pauline Smith, Scottsdale. 3rd, Helen Markham, Apache Junction.

CLASS E. ANY OTHER MEDIUM

(work of the exhibitor)
1st, Doris Griswold. 2nd, William Manderfield, Scottsdale. 3rd, Clifford M. Schroeder.

CLASS F. NATURAL DESERT WOOD

(no carvings)
1st, 2nd, 3rd, E. P. Matteson, Phoenix.

SECTION VI. EDUCATIONAL EXHIBITS

1st, Lyle McGill, Glendale. 2nd, Florence Fickeisen.

LEMAIREOCEREUS THURBERI
ORGAN-PIPE CACTUS

CACTACEAE
Cactus Family



Northern form. Fruit being collected by Brooks Darlington

The Organ-Pipe is a small-to-large clustered plant whose arms rise from its base in the manner of the perpendicular pipes of the pipe organ, hence its name. Also, the wind blowing through the plant's long spines makes a mournful sound similar to one of the stops of a pipe organ.

These cacti are on the Arizona prohibited list, and cannot be removed from the desert. Fines up to \$300 can be levied for removing these unusual plants. Fortunately, the greater number of Arizona specimens are within the Organ Pipe Cactus National Monument, located a few miles south of Ajo, Arizona, and adjacent to the U.S.-Mexico border.

The Organ-Pipe blossoms at night, May-June, with 2"-2½" wide white flowers that quickly close at daylight. These flowers are followed in 3-4 weeks by large spiny fruit that is quite saccharine. In many sections of western Sonora, Mexico, the Indians combine

these fruits with those of the prickly pears and make a dark brown tasty candy called "dulce pitahaya," which can often be bought in the local markets.

This plant can be quite confusing in physical appearance, as in its northern range it is a low, spreading plant with 6'-12' upright stems or arms. In the center of its range, just east of Los



Flower and fruit 2/3 size.



Mochis, Sinaloa, it has a definite trunk and tall strict branches up to 40' tall, and looks like a Saguaro or Cardon. Farther south, in its extreme southern range, the plant is low, up to 8' tall, with definite constrictions in its stems, giving the appearance of one large pickle on top of another.

The arms or stems of the Organ-Pipe can be cut off at the point of emergence from the plant, then dusted with sulphur and healed for several weeks before planting. They will begin

to root in a month to 24 months. Do not water until newly-formed roots appear. Mature plants are expensive to buy, so many persons will acquire three or four arms and plant them together, giving the grouping the appearance of a small complete plant.

TYPE LOCALITY:

Canyon near mountain pass of Bachua-chi, Sonora, Mexico.

DISTRIBUTION:

Ajo Mountains, Arizona, western Sonora, and both coasts of Lower California.

CLASS FIELD TRIP



Some of the 43 members of the February 10 Class Field Trip to Butcher Jones Landing at Saguaro Lake. This was the first of two field trips in February, and already the desert flowers were making a good display.

GARDEN ACTIVITIES

MARCH

- 2nd—8 P.M. CACTOMANIACS meeting
- 4th—3 P.M. Lecture, Arizona Cacti in Flower
- 7th—3 & 3 Lectures, Arizona Wildflowers
- 10th—3 P.M. Class, Deserts, How Formed and Their Plants
- 11th—3 P.M. Lecture, Arizona Wildflowers
- 14th—3 & 4 Lectures, Arizona Trees & Shrubs in Flower
- 17th—3 P.M. Class, Desert Succulent Plants
- 18th—3 P.M. Lecture, Arizona Trees & Shrubs in Flower
- 21st—3 & 4 Lectures, Arizona Birds & Animals
- 24th—3 P.M. Class, Culture of Desert Succulent Plants
- 25th—3 P.M. Lecture, Arizona Birds & Animals
- 28th—3 & 4 Lectures, Arizona Scenics
- 31st—3 P.M. Class, Identification of Desert Trees & Shrubs

SAGUARO BOUND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol. XIX

April, 1965

No. 4



Helianthus annuus. See p. 41



REG-MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona. P. O. Box 5415, Phoenix 10. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription \$5.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor
Lillian Diven, Associate Editor

Volume XIX

April, 1965

No. 4

Arizona Cactus and Native Flora Society

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Desert Botanical Garden of Arizona

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Student Horticulturist Jon Grange
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GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

PENIOCEREUS GREGGII

CACTACEAE

ARIZONA QUEEN OF THE NIGHT

REINA DE LA NOCHE

SWEET-POTATO CACTUS

Peniocereus (L. & Gr., *Penio* thread-like filaments in its flower, and *cereus* waxlike flowers) *greggii* (Dr. Josiah Gregg, plant explorer).

In 1884 Dr. George Englemann of St. Louis described this plant from stems and flowers sent to him by Dr. Gregg, who found the plant near Chihuahua, Mexico, and gave it the name of *Cereus greggii*. In 1905, Dr. Alwin Berger of Stuttgart, Germany, set up a new genus, *Peniocereus*, for the plant.

This plant, hard for the novice to find, has narrow gray branches unlike those of other cactus, which blend in with the other dried desert vegetation. It blossoms at night, giving off an exotic perfume that has been copied by several leading perfume manufacturers.

The white blossoms appear about June 15th to the 20th, and a second crop may blossom in the middle of July. These flowers are pollinated by moths, bats, bees and ants, and quickly close as the morning sun appears. Fruits form gradually and mature in September as large



A complete plant of *Peniocereus greggii* with a double tuber of about twenty pounds.



White nocturnal fragrant flowers of *Peniocereus greggii*.



Peniocereus greggii (*Cereus greggii*). Engelmann, showing stem, flower and seedling. Note the swollen root of the seedling which will develop into a large tuber.

orange-red, elongated, edible "berries" that are usually hard to find, as birds, rodents, reptiles and browsing animals relish the sweet pulp of the fruit.

The stems of these plants are semi-

succulent, so the plant has to store its succulence within a large swollen tuber that will weigh from one to sixty-five pounds. The Indians have been known to dig up these tubers, break off small

chunks and fry the chunks on hot rocks. The color of the tuber resembles that of a rutabaga but its pith has an oily appearance. Rodents often dig into the tubers, eating the pith and leaving deep cavities which heal over in the dry desert soil.

In transporting the plant the fragile upright stem may break off but both it and the tuber can be planted. The stem will slowly root, forming a small tuber. The stemless tuber will also slowly send up a new stem and in some instances two stems.

There is a form of this plant, bearing light to dark lavender blossoms found growing in the Organ Mountains of New Mexico and also along its border adjacent to Mexico, having the name of *Peniocereus greggi transmontanus*.

TYPE LOCALITY:
Chihuahua, Mexico

DISTRIBUTION:
Central and southern Arizona, southern New Mexico, southwestern Texas, Chihuahua, Sonora south to Zacatecas, Mexico.



Scarlet red edible fruit of *Peniocereus greggi* with the persistent dried flower.

HELIANTHUS

COMPOSITAE

SUNFLOWER

Everyone can identify a sunflower and knows that it faces the sunrise and slowly turns its head to follow the sun through its course to sunset. Yet there are over sixty species in North America of *Helianthus* (a genus native to the Western Hemisphere), and many other plants resembling this genus although belonging in other genera. The genus is quite variable and many matured hybrids make identification of species very difficult.

Helianthus (Greek *helios* the sun, and *anthos* a flower) *annuus* (L. lasting a

year) is a common plant along our roadways and far into adjacent fields, often covering vast areas with its golden yellow flowers. Five species are found in Arizona at 100'-7,000' elevations, growing in poor or rich soils, bearing profuse numbers of single or clustered flowers with yellow rays and a center disk of either yellow, brown or purple-brown color from late May until late fall.

Helianthus annuus is the state flower of Kansas. Throughout the plains states it is used as a dependable ensilage for



“Russian Sunflowers” ten feet tall with twelve inch heads growing as border plants in Phoenix.

livestock. The seeds have been gathered and eaten by southwest Indians for many years. The Hopis make black and purple dyes from the seeds of this and other species to color baskets, textiles, and their bodies for ceremonial rites.

The cultivated *Helianthus annuus* (Russian Sunflower) is grown extensively in Russia, Egypt, Turkey, Germany, Italy, France, Canada and portions of the northern United States for the seeds and oils. The seeds are eaten by birds, poultry, animals, and people. In many countries the seeds are eaten raw or roasted as we eat peanuts.

Valuable oils are pressed cold or hot from the seeds for cooking, salads, woolen dressing, candle and soap-making. The pressed residue or cake is a valuable concentrated cattle food equal in quality to cotton-seed cake.

The fibers of the Sunflower heads and stems make an excellent paper. Some of the stem fibers compare favorably

with those of silk fibers, but as these qualities have not been industrially developed growers frequently use the dry heads and stems as a dependable fuel for heating and cooking in their homes.

Sunflowers grow easily in many soils but prefer light rich, calcareous or alluvial land with a lot of moisture and full sun. They are tough plants and do not require much culture.

REFERENCES:

- Arizona Flora-Kearney & Peebles
- Standard Cyclopedia of Horticulture-Bailey

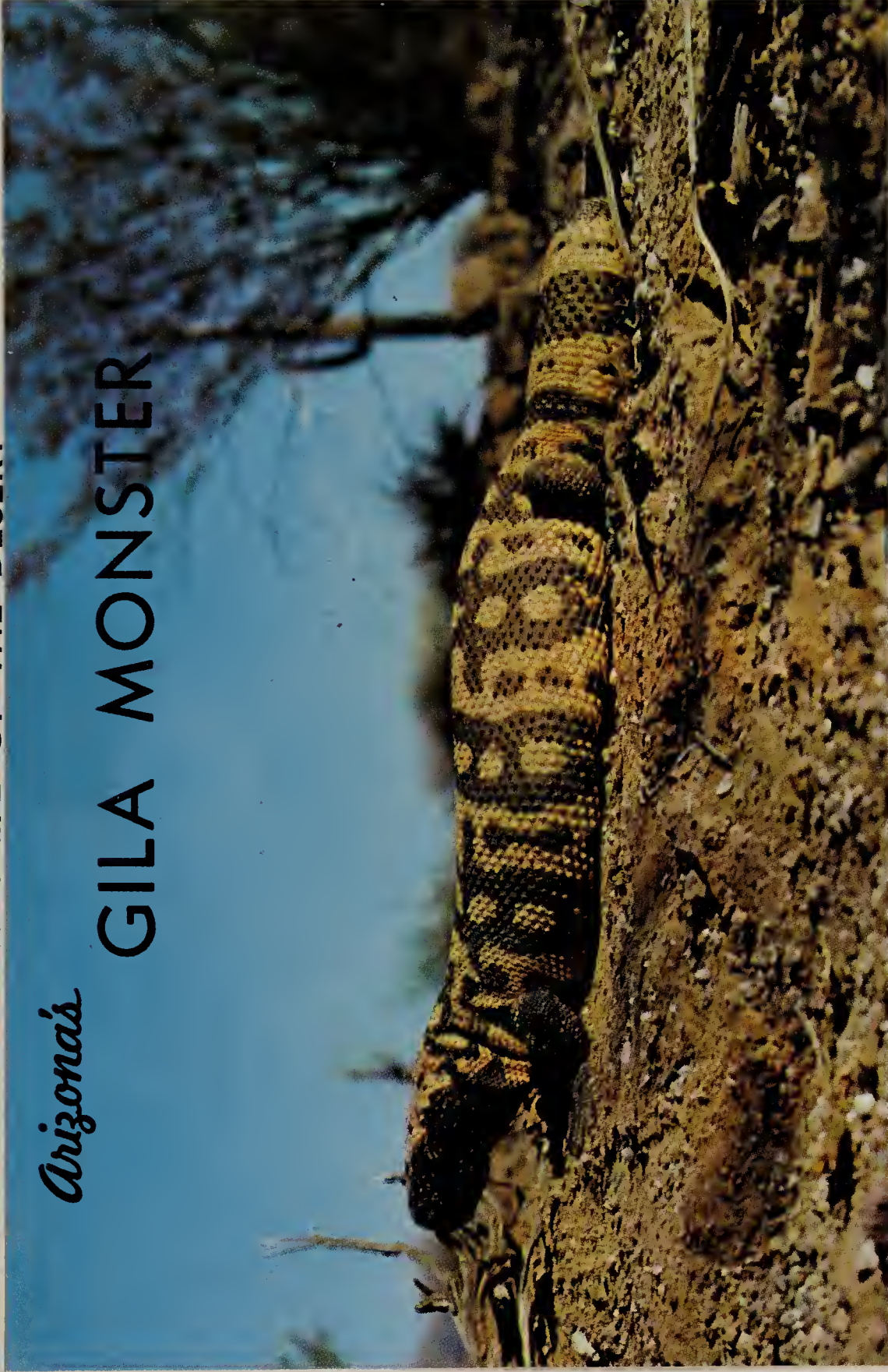


Helianthus annuus—line drawing by Art Douglas. Note the coarse stems and leaves coated with short rough prickly hairs.

WILDLIFE OF THE DESERT

Arizona's

GILA MONSTER



The Gila Monster (*Heloderma suspectum*) is the only poisonous lizard in this country, and is also the largest, reaching 2' in length. Covered with beadlike scales of black and coral (and sometimes white and gray), sluggish in movement, this lizard seems to invite a closeup inspection when seen, but it should be approached with great caution, as it moves rapidly when angered, and its "bulldog grip" bite is often followed by injection of a highly toxic poison.

FIELD NOTES FROM THE ANDES

By PAUL C. HUTCHISON, Expedition Director

University of California Botanical Garden Seventh Expedition to the Andes

(Continued from last issue)

At km. 60, 2080 meters altitude, I was surprised to find a dwarf *Opuntia* with sheathed spines and stems only an inch or so high. It was very abundant everywhere in much-grazed land. This appears to me to be new, but no flowers or fruit were available. We collected living material as #3486, and there should be sufficient to introduce it to cultivation via the I.S.I., eventually. It is especially interesting botanically because none of the other South American *Opuntias* excepting *Opuntia tunicata*, which is presumed to have been introduced, has sheathed spines.

Pucara

Apart from the *Opuntia*, the descent of Pucará (km. 127) at 930 meters altitude, offered nothing in cacti that we had not already found six years ago, but the more propitious season made possible the collecting of many flower-



Opuntia truncata joint from Die Cactaceae, Vol. I, Backeberg.

ing plants of others that I had not previously noticed. We based for nearly two weeks in Pucará, and there Wright had a severe attack of malaria which had apparently been incubating since we left Colombia. The symptoms were so obvious that we suspected immediately what it was and utilized our stock of medicines to bring it under control.

* * *

From the cliff where I collected the *Puya* I saw below me two strange cactus plants unlike anything previously seen in Peru. They were about 15 feet tall and with very spiny 4-angled stems, and odd, elongated nearly scaleless and spineless buds. There were no other plants in the vicinity, so I deduced that this might be the lower edge of the range of the species, and the following day I went further up the canyon hoping to find more plants and perhaps even flowers and seed. About 45 minutes by trail and 200 meters above Pucará, the species was in dense stands in rather dense shrub-forest, in bud, flower and fruit, and I spent much of the day examining the material and taking notes and museum preparations. #3567 seemed to me immediately to be a new genus, unique in the Cactaceae for its remarkable flower. The bud matures at about 6 cm. in length, then splits spically on one or both sides for about 2 cm., and the perianth emerges through this split. On the second night after splitting of the bud, the flowers open, and they remain open partially during the following day. Flowers varied in color from greenish white to reddish purple. Later, when I had opportunity to check copies of recent literature in my notebooks, I equated this collection to *Calmymanthium substerile* Ritter, for which Ritter had given no exact locali-

ties at all. In early April I found it again far to the southeast, above Balsas.

* * *

For much of the remainder of our trip we will be equally remote from the outside world. We hope to be able to get some communications out, but we do not expect to be able to receive any. Even by air it takes a letter from Chachapoyas a week to reach Lima, and we are told that our letters from Lima take as much as two weeks to reach Berkeley. "Such is life in the tropics," is a phrase we have uttered sardonically many times, and of late, sometimes with considerable force.

The Río Chamaya

Cacti are plentiful in this area, which is rich in mesophytic plants. *Ipomaea carnea*, a fine bush morning-glory with large and plentiful pink flowers, occurred in late flower and seed in some spots. The medium-sized tree, *Bougainvillea peruviana*, was plentiful and in early flower in many shades of pink. Later we hoped to get seed of it, for a good tree-*Bougainvillea* has great potential as an ornamental and as grafting stock for this fine subtropical genus of plants. We were to find the same species, in following weeks, very widespread up the canyon of the Río Utcubamba, some occasional individuals with exceedingly dark pink flowers which made us wish that there was a way of getting selected clone cuttings of them out. But the region is too remote for such a possibility, so we will hope to eventually get some seed from which clone selections can later be made.

An interesting find, for me, was an orange-flowered form of *Pereskia humboldtii*, a shrubby cactus with leaves, common further down in the Marañon basin in purple- and in white-flowered forms. The white-flowered one has been named *Pereskia Vargasii*, but it seems insufficiently distinct from typical *P.*



Rauhocereus riosaniensis stem tip
—Die Cactaceae, Vol. I.

humboldtii for recognition as a species. This find of another color form, in the same region, in other respects also nearly identical, supports this conclusion. We took plentiful herbarium material and some seed so as to later check whether the color will come true when plants are cultured with the others we are growing at Berkeley and Honolulu. Taking of this material was not the first time we had to make use of the specially reinforced roof of the truck, nine feet up, on which I stood to collect, take notes, and photograph the specimen of this species which we found overhanging the road.

As we descended the Chamaya basin, cacti became more plentiful and we saw many thousands of plants of *Rauhocereus riosaniensis* var. *jaenensis*, *Monvillea jaenensis*, *Gymnocereus* (equals *Browningia*) *altissimus*, *Opuntia quitensis* in many forms including spineless ones, the *Espositoas*, which were plentiful. *Armatocereus* specimens seemed to be transi-

tional in form to the remarkable and typical Marañon basin species, *A. rauhii*, with its closely packed segmented columnar stems, much like elongated blue-green oranges stacked upright on one another. In one small shaded ecological niche we took the tropical epiphyte, *Epiphyllum phyllanthus*, in flower. *Rhipsalis cassutha* was not uncommon here, and certainly the same as the plants from nearby Jaen which have been described as a separate species, *R. heptagona*. All that *R. heptagona* represents is severely dried-out, hence shrunken, stems of typical *Rhipsalis cassutha*, a fact we have verified at Berkeley where we have living material of the type collection of it, together with topotype material I took in 1957, and many other Peruvian collections of this species, together with representative collections from much of tropical and subtropical America. When dried out or dormant, this species often develops what look like ribs on the stems, sometimes seven of them (hence "heptagona") and sometimes more or less. It is perhaps equally interesting to note that more recently there have been described some unusual *Rhipsalis* from Madagascar collected by Dr. Werner Rauh, with stems abbreviated into nearly globular segments which are hairy and stacked tightly and somewhat irregularly on top of one another. In cultivation at Berkeley this material proved to be nothing more than *Rhipsalis cassutha* "frozen" in a juvenile state. Many of the cylindrical-stemmed *Rhipsalis* are quite hairy when juvenile, but lose this character in transitional stem forms as they mature.

The question of what a member of the cactus family, typically restricted in its natural distribution to the New World, is doing in Madagascar (and elsewhere in the Old World), has caused some interesting debate. Members of the genus *Rhipsalis* are recorded in various parts of Africa and to India, and have been presumed native in these regions by

some. However, all material I have examined from these areas seems to me to be conspecific with *Rhipsalis cassutha*, which is found in nearly all countries of the New World. This considerably weakens the sometimes abstruse attempts at explaining the dispersal and "speciation" of *Rhipsalis* "species," in the Old World.

Apart from a few very odd Legumes taken at the infamous sliding hill called "El Pistolero," we took little other than cacti up to Chamaya, a pueblo in 1957, but now a sizeable village. "El Pistolero" proved to be the only dangerous spot on the entire Olmos-Marañon highway. There, for several hundred yards, one drives with 20-foot banks of loose rock, sand and great boulders hanging over the road. A tractor is constantly on hand to remove the continuous slides by pushing them over the edge into the Río Chamaya, rushing by below. One drives this short stretch in less than a minute, but with some feeling of tension.

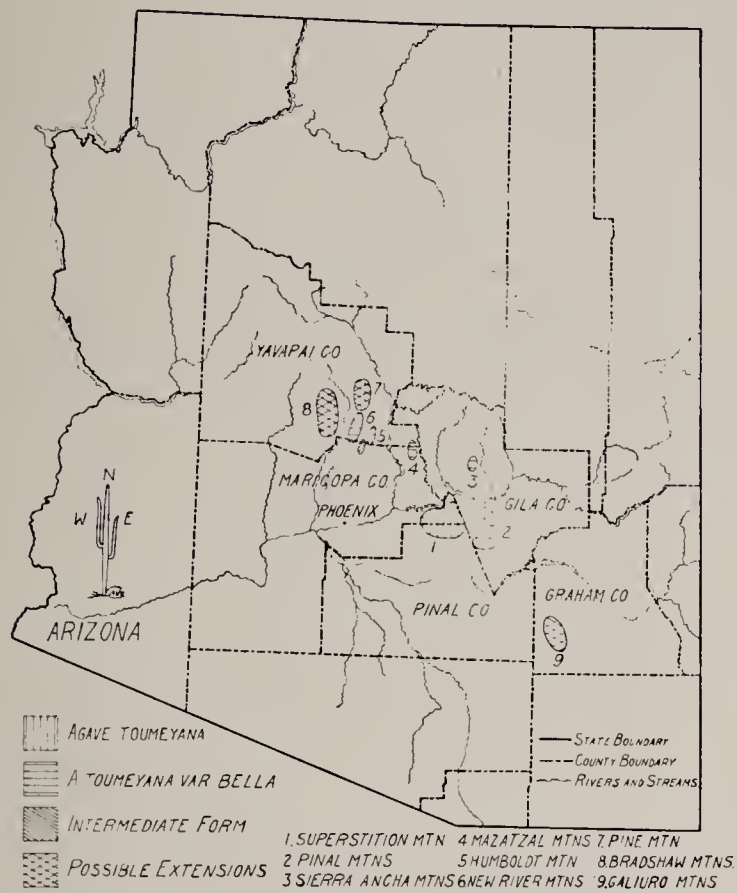
* * *

That night we camped under the cactus forest, quite exhausted, and drifted into sleep as we listened to the strange haunting sounds of new night birds as the moonlight laced down on us through the branches of a gigantic specimen of *Gymnocereus altissimus*. The next morning we hastily collected the rather few plants in flower in this forest, then returned to the road and crossed the Utubamba steel bridge in a few minutes at Milagro, where I had based for several weeks in 1957. Then, it had been the main base of the Army battalion which was constructing the Olmos-Marañon highway and over 1000 soldiers and many civilians lived there. Now we found it to be a ghost town with not more than a dozen or so houses inhabited, and these were falling apart.

(Concluded in next issue.)

Distribution notes on *AGAVE TOUMEYANA* Trel.

By John H. Weber



Distribution map of *Agave toumeyana*, *A. toumeyana* var. *bella* and an intermediate form.

AGAVE TOUMEYANA is limited in its range extension to central Arizona. The type locality is the Pinal Mountains, south and west of Globe, Arizona in southern Gila County. Other published locations are: Fish Creek hill in eastern Maricopa County; the Superstition Mountains in northern Pinal County; and the Mazatzal Mountains, a common boundary between Maricopa and Gila counties. *AGAVE TOUMEYANA* var. *BELLA* Breitung is to be found in several locations; the type locality being Parker Creek canyon in the Sierra Ancha Mountains of Gila County.

The elevational range of this species extends from about 3,000 ft. to 5,500 ft. (900 to 1,650 meters). Since 3,000 ft. seems to be near the lower limit, it creates a discontinuous range with the species being absent from the lower levels between the mountain ranges. Many areas in central Arizona have a similar

elevational range, soil type and floristic composition to that of reported localities of *AGAVE TOUMEYANA*.

Field studies of the last fifteen years by the Desert Botanical Garden have greatly extended the known range of this species. *AGAVE TOUMEYANA* var. *BELLA* is an abundant constituent in the flora of the New River Mountains within ten miles of the Black Canyon Highway and in the area about the headwaters of the north fork of Squaw Creek. These areas lie within Yavapai County some thirty miles north and west of previous published locations. Ranging west from the Mazatzal wilderness area, it jumps the Verde River Canyon, reoccurring on Humboldt Mountain, near Camp Creek on the Bloody Basin road, and then on the New River highlands.

From the Pinal Mountains north to



A clustered *Agave toumeyana* plant with dead flower stalks. Note the 36" yard stick in foreground.

the Sierra Ancha Mountains there is no intermediate form between AGAVE TOUMEYANA and its variety BELLA. From Fish Creek hill west to the New River Mountains there does, however, exist a form intermediate between the typical species at Fish Creek and the variety BELLA to the west. This intermediate form, found at Grapevine near Camp Creek along the Bloody Basin road, has a leaf and flower spike reduced in size from the typical form, yet larger than those of var. BELLA. From the lower elevations of the New River Mountains to the summit of this range there is a continuous reduction in size of the species.

The mesa above the north fork of Squaw Creek is a north-trending one extending about thirty miles at a general elevation of 1,500 meters. It is known that there is a northern extension of the range beyond what is reported here; but how far is yet to be determined. It may well be that this species is also to be found across the Black Canyon Highway and Agua Fria River basin on the east slopes of the Bradshaw Mountains. Reports of this species being in the Galiuro Mountains east of Mammoth, Arizona need to be checked to determine if the plant occurring there is AGAVE TOUMEYANA Trel. or a similar species AGAVE SCHOTTII var. TRELEASEI (Toumey) Kearney & Peebles.

REFERENCES:

Benson & Darrow, The Trees and Shrubs of the Southwestern Deserts.

Breitung, August J., Cactus and Succulent Journal Vol. XXXII No. 3.

Kearney & Peebles, Arizona Flora.



Leaves of (left to right) *Agave toumeyana* var. *bella*, intermediate form, and *A. toumeyana*, adjacent to fifteen inch ruler.

GARDEN ACTIVITIES

APRIL

Thurs.	1st	LECTURE—Arizona Scenics	3 P.M.
Sun.	4th	LECTURES—Leaf Succulent Plants	3 & 4
Tues.	6th	CACTOMANIACS meeting	8 P.M.
Wed.	7th	CLASS—Culture of Desert Trees and Shrubs	3 P.M.
Thurs.	8th	LECTURE—Leaf Succulent Plants	3 P.M.
Sun.	11th	LECTURES—Arizona Cacti in Flower	3 & 4
Wed.	14th	CLASS—All-day Desert Field Trip	9 A.M.
Thurs.	15th	LECTURE—Arizona Cacti in Flower	3 P.M.
Sun.	18th	LECTURES—Arizona Wildflowers	3 & 4
Thurs.	22nd	LECTURE—Arizona Wildflowers	3 P.M.
Sun.	25th	LECTURE—Arizona Trees & Shrubs in Flower	3 & 4
Thurs.	29th	LECTURE—Arizona Trees & Shrubs in Flower	3 P.M.

SAGUAROWAND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol. XIX

May, 1965

No. 5



Cylindropuntia fulgida var. *mammillata*
a smooth-stemmed "jumping cholla."
See p. 59.



REG-MANNING

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W. HUBERT EARLE, Editor
LILLIAN DIVEN, Associate Editor

Volume XIX

May, 1965

No. 5

Arizona Cactus and Native Flora Society

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Miss Eleanor B. Sloan, Dr. Gordon B. Castle

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Desert Botanical Garden of Arizona

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Student Horticulturist W. L. Halvorson
Student Horticulturist Jon Grange
Student Horticulturist James Fabian

GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

MEMBERS' ANNUAL MEETING

Was held Sunday, May 9th, at 3 P.M. in the Webster Auditorium. Mrs. Angela Bool, Secretary, presided and read the minutes of the last meeting.

A heavy return of 'mailed in' votes were tabulated by Mrs. Rose Hinman and Mrs. Helen Friedrichs with incumbent board members John H. Rhuart and Edward L. Burrall being reelected for additional three year terms.

A report of the year's past activities and plans for future projects were given by the director.

30th ANNUAL BOARD MEETING

The Executive and Advisory Board members and their wives met for another annual dinner meeting at the Kiva Club, Westward Ho Hotel, May 10th, with Chairman John H. Eversole presiding.

Minutes of the Members' Annual Meeting, held May 9th, and Board meetings held May 13th and Sept. 23rd were read by Mrs. Angela Bool and approved by the Board members. Dr. Gordon B. Castle, Vice President of Arizona State University, was introduced as a new member of the Advisory Board.

The financial report (page 53) was referred by Treasurer Tom Goodnight to the Director who explained the various categories of income and expenditures. A glance at the report shows another substantial yearly gain added to our building fund for future use.

Mr. Goodnight reported that the firm of Price Waterhouse & Co., certified public accountants, had filed our 1964 tax return and that the garden continues to qualify as a tax-exempt institution.

Mr. Wayne Earley, Supervisor of the Roadside Development Board, Arizona State Highways Dept., has asked the Garden to submit a bid on compiling a list of desert plants suitable for general roadside planting. This list, which would take several years to compile, would be used through a Univac system. Our bid would be about \$12,000 a year. This survey would be conducted by your director, our chief horticulturist, John Weber and one of our members, Dr. L. Gill. The Board rejected submitting a bid as it felt that our many future projects would use up the time of our staff.

A letter was read to the Board from Mr. M. C. Richter, Santa Barbara, Calif., in which he revealed that he has bequeathed his extensive library and paintings, etc., to the Desert Botanical Garden. Mr. Goodnight suggested that our Chairman extend to Mr. Richter a vote of sincere thanks from all of the members.

This private library comprises one of the most complete collections of books relative to desert and succulent plants in this country, and possibly in the world. It has been assembled by Mr. Richter, a book dealer, over many decades and will be a great asset to our Garden for future research and reference by its staff and students.

The Garden expects to draft plans this fall for additional buildings which will include a fireproof building for a library, an addition to the office, and extra workshop rooms, to be erected in the patio south of the Auditorium.

Mrs. Geraldine Eliot moved that the committee of Mr. Goodnight, Mr. C. Mieg and your director be given the authority to enter into a contract with Price Waterhouse & Co. to audit the Garden's books. This was approved by the Board members. This will be the first audit made since the incorporation of the Garden in 1935. It will possibly take all summer to sift through all the old dusty records to get the information needed by the auditors. Our organization has grown tremendously over the recent years and an audit is in order to determine what we have in inventory, assets, etc.

DIRECTOR'S REPORT

The Financial Report, Anticipated Budget and Improvement Program on the following pages are self explanatory and indicate that the past year was quite successful and that the coming year will be filled with activities. Arrangements are being made to add to our staff additional college students for summer work.

The City of Phoenix 'anti-burning' ordinance that prohibits the burning of trash and tree trimmings within the city limits caused the Garden to accumulate a large pile of trimmings over the past winter months. Mr. Cedric Austin, Superintendent of the Phoenix Parks Dept., arranged with City Streets Dept. to have these trimmings removed periodically. His department has also agreed to pick up our trash and garbage twice a week. This new and needed service is greatly appreciated by the Garden.

Overflowing classes, afternoon and evening illustrated lectures and other meetings have caused your director-editor to become delinquent in having the monthly Saguaroland Bulletin printed on time. With the volunteer help of our gracious associate editor, Lillian Diven, we hope to get back on schedule during the summer months. We appreciate your patience and your understanding.

This will be a very busy summer with the completion of and plantings in the Succulent House plus a complete renovation of the Cactus House (aluminum lathhouse erected in 1950). All the old soil (approximately 175 yards) will have to be removed by hand and replaced with a new and better mixture of granite, silt, sand and cottonseed hulls. The present rocks and boulders will be removed and a new outline of paths and beds bordered with black basalt will enhance the appearance of the lath house. All the plants will be removed and then replanted in generic order. The buildings will be opened in September, and we will have a new 'Nature Walk' pamphlet explaining the plantings and the plants along the garden trails. Do stop in at the Garden and watch the progress this coming summer.



Now assembled and ready for the printer is this 36-page pamphlet filled with colored photos from FLOWERING CACTUS. Edited by your editor; printed by Crocker Co., San Francisco; published and circulated by Petley Studios, Phoenix. Cost will be \$1.15 at the Garden. Watch for further details.

ARIZONA CACTUS AND NATIVE FLORA SOCIETY

Sponsoring the

DESERT BOTANICAL GARDEN FINANCIAL REPORT MAY 1st, 1964 — APRIL 30th, 1965

INCOME

		Comparison with 1963-64
Retail Sales	\$38,938.88	\$34,911.78
Seeds and Plants	1,212.99	1,668.64
Contributions	400.78	370.09
Voluntary Admissions	12,056.10	10,733.27
Memberships	3,844.50	3,263.00
Wholesale (books)	1,279.29	1,300.72
Endowment (Webster trust)	11,300.00	10,700.00
	<u>\$69,032.54</u>	<u>\$62,947.50</u>

EXPENDITURES

Purchase for Resale	\$19,480.86	\$20,015.93
General Expense	5,691.57	4,618.20
Buildings and Improvements	1,844.89	2,395.78
Fleet-car, truck, tractor	992.29	869.85
Utilities	1,878.73	1,793.64
Insurance	3,303.37	2,500.56
Taxes	1,474.34	1,146.04
Salaries	24,052.59	20,722.00
	<u>\$58,718.65</u>	<u>\$54,061.42</u>

ASSETS

Accounts receivable	\$ 205.17	\$ 163.85
Inventory	7,806.89	9,201.49
Deposit—Ariz. Indust. Comm.....	96.00	96.00
Cash—Valley Natl. Bank	2,237.65	1,912.21
Valley Natl. Bank (Build.)	16,977.07	11,024.35
1st Federal Savings	2,229.94	1,716.28
Change in cash reg. & coin changers.....	84.00	84.00
	<u>\$29,636.72</u>	<u>\$24,198.18</u>

LIABILITIES

State withholding tax	\$ 10.48	\$ 8.92
Accounts payable	497.18	0.00
	<u>\$ 507.66</u>	<u>\$ 8.92</u>
	<u>\$29,192.06</u>	<u>\$24,189.26</u>

ATTENDANCE of 98,646 persons contributed \$12,056.10 or .122 per person.
SALES of \$38,938.88 divided by 98,646 persons averaged .408 per person.

ANTICIPATED BUDGET 1965-1966

INCOME	EXPENDITURES
Retail Sales\$39,000	Purchases for resale\$20,000
Sale of seeds, etc. 1,200	General operating 5,000
Contributions 1,000	Bldg. & Improvements 2,000
Voluntary Admissions 12,500	Fleet operation 1,000
Memberships 3,800	Utilities 1,800
Wholesale of books 1,000	Insurance 3,500
Endowment 10,700	Sales Tax 1,500
.....	Salaries 25,000
\$69,200	\$59,800

* * * * *

Memberships—712 (1964-1965)	Attendance—100,555 (1964-1965)
688 (1963-1964)	89,093 (1963-1964)

* * * * *

The following groups met at the Garden:

62 Elementary School classes.....	2883
11 High School classes	381
8 University classes	178
18 Desert Plant classes.....	984
68 Illustrated lectures	2771
8 Cactomaniac meetings	496
6 Convention groups	478
6 Civic clubs	190
7 Garden clubs	156
2 Desert Institute	76
26 Girl Scouts, etc.	539
36 Boy Scouts, etc.	482

Lectures were given to the following groups away from the Garden:

2 Landscape Assoc.	60
2 Church groups	91
5 Garden clubs	106
3 High School classes	95
2 Cactus Clubs	138
3 University classes	76
10 Civic clubs	402
2 Conventions	113
9 Field trips	261
2 Friends of the Library.....	110
6 Mobile Home Courts	457
1 Radio Show, 1 TV Show	

1965-1966 IMPROVEMENT PROGRAM

- Complete planting of new Leaf-Succulent Lathhouse
- Re-arrange beds and plants in Cactus Lathhouse
- Build Plant Nursery
- Add carport to director's dwelling
- Add "shelter" to warehouse for truck and tractor
- Draw up plans for future library building
- Landscape entrance from Parkway
- Grade trails for "desert-drive" in north section of Garden.

WILDLIFE OF THE DESERT



The Javelina, or Collared Peccary (*Pecari angulatus*), reaches only 30" in length and 50 pounds in weight, but its formidable teeth and tusks make it an animal to respect. It is native to the southern parts of Arizona, New Mexico and Texas, and Sonora, Mexico. Favorite food is the prickly pear cactus, which it eats roots, pads, spines and all.

FIELD NOTES FROM THE ANDES

By Paul C. Hutchison, Expedition Director
University of California Botanical Garden Seventh Expedition to
the Andes
(Conclusion)

From Milagro the road turns downstream (north) and cuts away from the river, to swing back shortly as the mountains move in from both sides towards the river. The Utcubamba, just below Milagro, joins the Marañon, as had the Río Chamaya not far below Chamaya. Another great river from the northwest also comes into the Marañon in this region, and in places the combined and swollen Marañon now seemed to be as much as a half kilometer across. Suddenly the valley, which had been many miles across, narrows, and the river swings easterly, narrows, and begins to flow more rapidly. Soon the roar of it was heard, even though we were more than a kilometer away, and we knew that we were approaching the great rapids called Pongo de Rentema. It was scorching hot and dry, yet the vegetation seemed to be changing, for as I had observed in collecting above Rentema in 1957, this area is probably one of the most remarkable areas of suddenly transitional flora that I know of in Peru. Many of the plants of the Pongo de Rentema area are narrowly endemic there, but the flora is little known. In a distance of less than 10 kilometers as one descends this gorge, the flora changes from richly mesophytic to xerophytic, then again mesophytic and very abruptly, into tropical jungle.

We stopped at the type locality of my recently described species, *Borzicactus madisoniorum* but could not find it. Later we spent more time there and concluded that the many goat trails were an indication that this species, which I published last November, must have been eaten out by the goats in the years since I discovered it in 1957. At the type locality it now appears to be extinct.

9 September 1964, Chiclayo, Peru on the northern coast. We are now en route to the interior of northern Peru for the last time, and we expect to return to Lima about mid-October to make shipments and re-equip for the last and longest trip of the expedition, into southeastern Peru. So many events have transpired, so much ground has been covered, and so many plans have been changed due to anticipated problems that these notes have fallen far behind, and so I am abandoning the chronological sequence, for now, in order to bring everyone up to date with the current status of this expedition.

* * *

The Expedition has been joined by many individuals from time to time. Collections have now been taken with Dr. Oscar Tovar of the staff of the Museum of Natural History in Lima; Wolfgang Krahn, a young German cactus collector passing through Peru; David E. Bennett, an orchid collector of Lima; Klaus von Bismarck, another orchid collector and manager of a large hacienda in northern Peru; Dr. Richard M. Straw of Los Angeles State College. Others have already been reported for Panama and Colombia.

* * *

Of the original expedition objectives for northern Peru all have been completed except for the following: The crossing of the Río Marañon to Bolivar proved not possible, for the road is not in that far yet; we managed to cross the Río Marañon further upstream at Chagual, but had insufficient gas to proceed to Bulbibuyo and were told that none was available along this route; the trip to Jaen and north has been postponed until now, but we expect to undertake it within the next eight days or so;

Chota and Cutervo in highland Dept. Cajamarca have not yet been visited, but on our present trip we anticipate going to this region as we come out, for the last time, from the Cordillera Calla Calla. The objectives in central Peru have been fulfilled with the completion, last month, of the long trip from Lima to Pucallpa in the Amazon basin. The objectives in southern Peru will be attacked in the final phase of this Expedition, beginning about mid-October, with a trip via Cuzco to southeastern Peru, toward Puerto de Maldonado in Dept. Madré de Diós, and to the region of Sandia and the great Cordillera Apolobamba in Dept. Puno. We will return by way of Aréquipa and collect the southern coastal valleys as we proceed back to Lima. We hope to ship all collections and the truck and equipment about December 15. I expect to be delayed in Lima longer preparing the large collection of established orchid plants at the Bennetts' home for shipment. If there is money enough left I may undertake the flight to Santiago, Chile, and from there to Angel, to pick up a number of superior color forms of *Lapageria rosea* which have been propagated for this purpose. I believe they can only be introduced to the U. S. by hand-delivery, as we did with two superior clones ("White Cloud" and "Dr. Bullock") in 1951.

* * *

Choice of collection sites, in an expedition of this sort, is governed by objectives. My personal objective in coming to Peru was to seek understanding of the species of Peruvian cacti. From a study of them, from past experience here, and from a cursory knowledge of the Peruvian flora, I deduced certain patterns in the geographical distribution of species here, which led me to suspect that a number of areas of the eastern slopes of the Andes might have high endemism. I reasoned that if this proved to be so for the cacti, it would be like-



Borzicactus madisoniorum from C. & J.

ly to be so for some of the associated flora, and that therefore I would find in such areas new species of both cacti and of associated plants.

The great excitement with which I wrote the first lines of these "Field Notes" on the fourth of February of this year, and left you all dangling as to what I meant, (by "the most fabulous day of discovery of my life") has relation to the preceding paragraph. On the preceding day we had made a first scouting trip up the gorge of the Río Utcubamba from a forested zone into a xerophytic zone. It was rough going but even though I drove I kept spotting exciting plants every four or five kilometers. A new *Echeveria*; six new, highly ornamental succulent *Peperomias* and four new cactus species. If this pattern held I suspected that we had indeed found a remarkable zone of narrow endemism, for in a few hours of the third of February I found more new species



2½" long flower of *Seticereus icosagonius* (*Borzicactus aurivillus*)

than I've previously taken in fifteen years of serious botanical collecting.

The finding of a new species, and recognition of it on the spot as such, is a thrill to the professional taxonomist like no other. It is especially more so if you have previously said to yourself, I'm going to find new species there—as you put your finger on the map, and then you do find them there. I'll probably spend a good deal of the rest of my life, in this case, pursuing the logic, if it was logic, which led to the conclusion that the Río Utcubamba gorge would contain a large number of endemic species. The same partially intuitive reasoning led to the selection of the other major collecting sites, and these, too, seem to contain endemic species and many of them new.

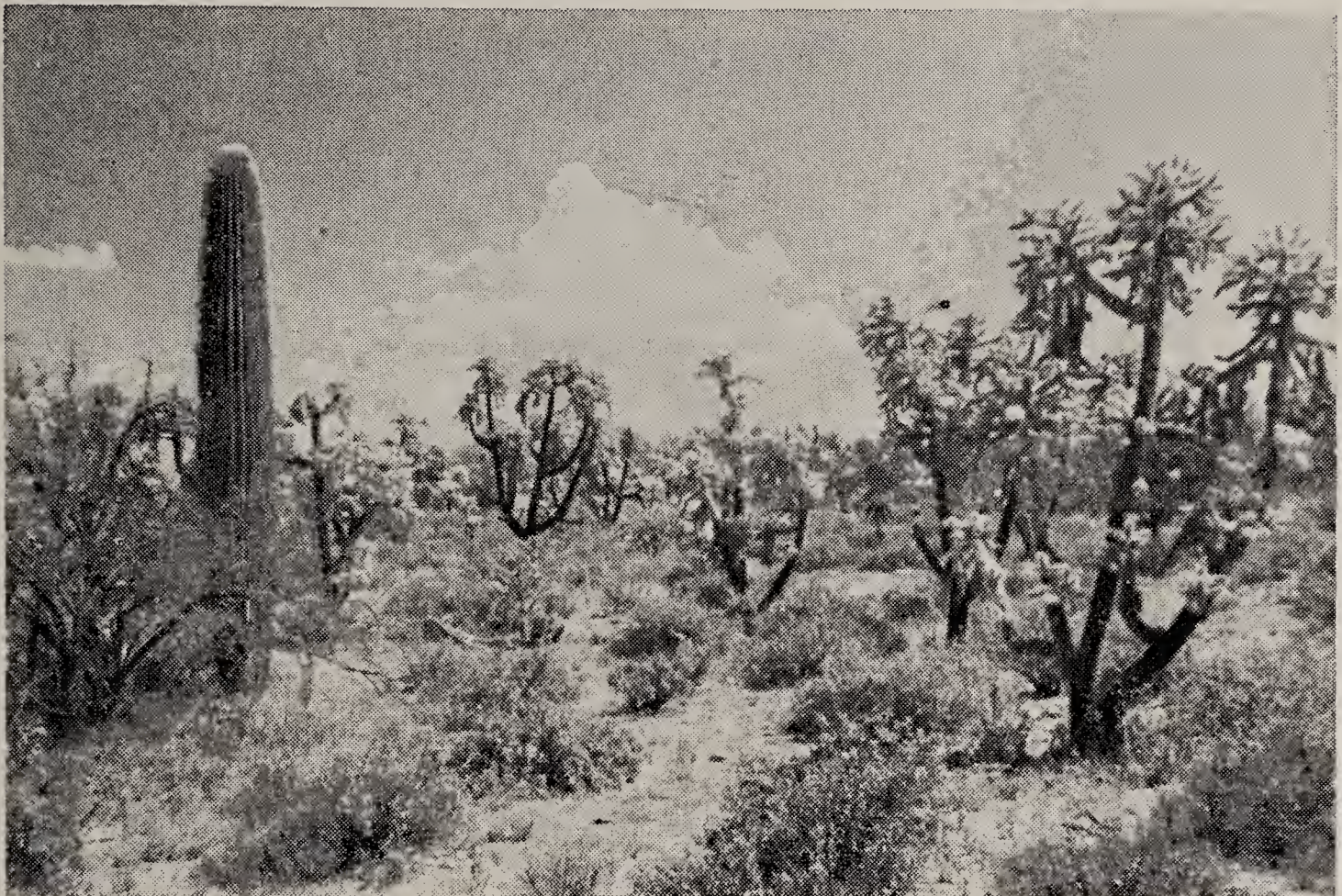
I haven't much faith in most concepts of 'intuitive reasoning,' believing rather that the thinking mechanism in humans often works like a calculator

whether the individual is aware of the entire process or not. Successful 'guesses' in science are probably not so much intuitive as they are a gleaning by the mind, perhaps often subconsciously, from a large array of apparently unorganized but related facts. I believe we often do this without knowing we've done it and without analysis of how or on what basis. Science has a tremendous array of facts about speciation and much of this information sinks into the unconscious mind in the process of getting a scientific education. Some people are able to draw on this inner reservoir of material more easily than others. Personally, I don't find it too easy. I find a card-catalog system of referral easier than digging something up from the catacombs of the brain.

Even if previously consumed knowledge is not readily recalled, it's there in the head, and apparently active, in some persons at least. The stimulus of seeing a certain kind of topography on a map, in relation to others surrounding the area, and some correlation between this and other similar areas in which you know the flora partially—this is what led me to have a hunch that the xerophytic zone of the upper Río Utcubamba had high endemism. Now we have, in addition to my hunch, the material to study which specialists can work on to see if, in their respective groups of plants, there are indeed a number of new species. If so, the results of this Expedition will carry for me a considerably larger connotation than mere additions to this most poorly-known Peruvian flora.

To non-scientific readers the above probably sounds abstruse. To others receiving these first-draft notes, conditioned as they are by varying degrees of exhaustion, it will probably appear that I might need a long rest. Probably you're both correct.

CHAIN-FRUIT CHOLLA



A dense stand of *Cylindropuntia fulgida* 10'-12' tall growing between Florence and Tucson, Arizona.

This striking tree cholla, the tallest in Arizona, is found growing from 1000' to 4,500' elevation and extends from the Bill Williams River in western Arizona to Thatcher, eastern Arizona, in dense stands through south central Arizona southward through Sonora to Sinaloa, Mexico.

It is another cholla referred to as a 'jumping cholla' because when you accidentally come in contact with its sharp spines the resultant pain causes you to quickly jump away from the plant. Your first reaction is that the plant jumped at you, but it has no propulsion properties.

An outstanding identifying character of this plant is that its persistent fruits proliferate from year to year and form long chains of fruits beneath the spiny branches. These smooth fruits are eaten by browsing animals and rodents. They have an acrid and sticky taste and are

inedible to persons unless in an emergency. Their moisture content is quite high and might suffice for emergency liquid.

The inconspicuous flowers of this species appears from early May to late June or early July depending upon the elevation. They are from 1"-1½" in diameter with light pink to lavender petals, streaked in the center, flattened into a rotate pattern.

When the large candelabralike plants, up to 15' tall, found northeast of Tucson and south of Florence have died, they are chopped down and trucked into adjacent towns. There they are stripped of their spiny bark, cleaned and scrubbed and cut up to be made into lamps, table tops, ash trays and innumerable other novelties. The wood of these plants has a pattern not found in other woods. Scrap branches of the dried wood makes a brief hot fire for cooking and campfires.

A variety of this plant, having very few spines and smooth pronounced nipples along the stems, is found growing amongst the species and is referred to as *Cylindropuntia fulgida* var. *mammillata*. It grows up to about 4'-6' tall and also has the smooth chain fruit. The lack of spines makes this plant vulnerable to browsing animals who will eat its flesh off to the inside core of the branches. If the plant is browsed continuously it will finally die.

These plants will root readily from any of the stems and even the fruit will root and form a plant.

TYPE LOCALITY — Western Sonora, Mexico.

DISTRIBUTION — Southern Arizona, western Sonora, northern Sinaloa, Mexico.



Cylindropuntia fulgida var. *mammillata* forma *monstrosa* found growing in Arizona and commonly called BOXING GLOVE CACTUS.



The 11th Biennial Convention of the Cactus & Succulent Society meets at the Garden May 3-5 and at Tucson May 6-8. Conventioneers at San Diego 1963 are shown above with Bob Taylor inspecting his garden. Phoenix conventioneers will have the opportunity to visit Scottsdale gardens of Charlie and Lillian Mieg and also that of Brooks and Lillian Darlington.

SAGUARO LAND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol XIX

June-July, 1965

No. 6



A salient characteristic of Cresote Bush (*Larrea tridentata*) is the wide spacing of the plants. See page 68.



REG-MANNING

SAGUAROLAND BULLETIN

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W. HUBERT EARLE, Editor
LILLIAN DIVEN, Associate Editor

Volume XIX

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Arizona Cactus and Native Flora Society

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GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

An Australian Tree for Desert Gardens

Pittosporum phillyraeoides D. C.

Weeping Pittosporum

B' John H. Weber, Horticulturist



Flowering branch of *Pittosporum phillyraeoides*, showing cream-colored campanulate flowers.

This is a small evergreen tree that is drought and heat resistant. The Weeping Pittosporum with graceful pendulous branches has long been used as an ornamental in Arizona, but is infrequently seen. Rate of growth is slow with a maximum height of about thirty feet and a crown twelve to fifteen feet wide. The willow-like leaves are in an alternate position, being linear-lanceolate in shape and with entire margins. These are glabrous and of a leathery texture, measuring up to 3.50 inches in length and 0.25 inches in width. Tips of the leaves are recurved. Flowering

begins in July and continues through October into November. This comes as a profusion of fragrant yellow flowers which are bell-shaped and less than 0.50 inches in length. This species is often dioecious, bearing flowers only of one sex. The seed capsule is oval and compressed, about 0.75 inches in diameter, with a yellow to orange color and a granular texture. Seed is red in color and has a resinous coat of a sticky viscous matter.

Weeping Pittosporum has proven hardy at the Garden down to 17° F. in a dry condition. It will grow and survive in areas receiving less than seven inches of rainfall with little or no supplemental water. As a small tree, it requires staking until trunk caliper is sufficient to support the crown. Occasional light pruning may be needed as well as some protection from grazing animals and rodents. Propagation is easily achieved by using fresh seed or cuttings of half ripened wood.



Split-open fruits of *P. phillyraeoides*. The pith-covered seeds cling together

Pittosporum Phillyraeoides is native to the interior sections of Queensland, New South Wales, Victoria, South Australia, and Western Australia. It is well adapted to conditions existing in southern Arizona and California and should be utilized as an ornamental tree to a much greater extent than it has been in the past.

REFERENCES:

Bailey, L. H.—The Standard Cyclo-
pedia of Horticulture.

DeBeuzeville, W. A. — W. Australian
Trees for Australian Planting.

Lord, Ernest E.—Shrubs and Trees for
Australian Gardens.



An unusual *Agave americana* with nine flowering stalks 4'-12' tall which blossomed this summer at Sunnyslope, Ariz. This species usually sends up only one flower stalk 20'-30' tall before it dies, as do most of the century plants.



Fruits that follow the flowering of
Pittosporum phillyraeoides.

CYLINDROPUNTIA LEPTOCAULIS

CACTACEAE
(Cactus Family)

DESERT CHRISTMAS CACTUS

Cylindr- (shaped like a cylinder) *opuntia* (a town in Greece where is grown many cactus-like plants), *leptocaulis* (slender-stemmed) is a small shrubby plant of about two to three feet in height and possibly three feet wide when found growing in the open desert. Many of these plants can be found growing up to twelve feet tall amongst the branches of Palo Verde, Mesquite and Ironwood trees using these trees for support.

The stems of the Desert Christmas Cactus are small and slender, usually about $\frac{1}{4}$ inch in diameter, 6"-12" long. The base of the plant becomes woody and spineless while the upper or younger stems bear long 1"-2" solitary gray spines covered, the first year, with straw colored sheaths.



A typical branch of *Cylindropuntia leptocaulis* showing the fragile stems and long, sheathed spines.



Fruit-bearing branch of *Cylindropuntia leptocaulis*. The attractive scarlet fruits lend a dash of color in centerpiece arrangements.

The green to yellow flowers are one-half to three quarters of an inch in diameter, wheel-shaped, and appear during April and May. These flowers are followed by globe-shaped green fruits covered with many glochids or barbed hairs. In the late fall these fruits begin to show a red coloration and by the middle of December are scarlet red. This display of red fruits has caused the common name of Desert Christmas Cactus to be affixed to the plant.

The red fruits are edible to birds and rodents. The Pima and Maricopa Indians also gather the fruits and cook them into a jam; the glochids disappear in the cooking process.

The Desert Christmas Cactus, like many of the pencil chollas, lose many of their slender stems during transplanting but new stems will fill in within a year or two. The woody stems of the plant do not lend to propagation by cuttings. It is best to have additional root for reestablishment.

Care has to be taken in using these plants in a desert planting as they are very susceptible and sometime a host to the cottony Cochinal bugs. They should be sprayed with about three ap-

plications, spaced at about a week apart, of either Volck or Malathion in the early morning or late afternoon as the hot sun may cause damage to your plants with wet spray on their pads or stems.

This cholla is found in heavy alluvial soils of plains and mesas at 200-3000' elevations from eastern Mohave and Yuma counties of Arizona to southern New Mexico, southern Texas and south to northern Mexico.

GIRL SCOUTS AT WORK



Girl Scouts doing their good turn by picking seeds of *Plantago insularis* (commonly known as Indian Wheat) in the Garden last May. This seed is to be used in experimental work at the University of Ohio by Dr. L. G. Klickoff, one of our members.

WILDLIFE OF THE DESERT



Every visitor to the Southwest wants to see the Roadrunner (*Geococcyx Californianus*), and no wonder — a two-foot-long cuckoo that runs along the ground, raises its long, manoeuvrable tail and shaggy crest, and makes a loud clatter by rolling its mandibles together is certainly a comical sight.

An introductory investigation of the germination rate and the toxicity of *Larrea tridentata*

By William L. Halvorson

INTRODUCTION

The name of this plant is at the present time in an unstable state. The accepted name seems to be *Larrea tridentata* (Sesse & Moc. ex. DC.) Coville, Contr. U. S. Nat. Herb. 4: 75, 1893 (Shreve and Wiggins, 1964; Vines, 1960). Some authors, however, are doubtful that this North American plant is worthy of specific rank. These include Benson and Darrow, 1954, and Kearney and Peebles, 1960. If this is true, the species name *divaricata* (based on the South American plant) has priority, and what is now called *tridentata* would become a subspecies or a variety. Because of this uncertainty, which undoubtedly should be worked out through sound research methods, the author will refer to this plant simply as *Larrea* throughout the remainder of the paper.

The synonymy based on the name *Larrea tridentata* (Sesse & Moc. ex DC.) Coville is:

Zygophyllum tridentatum Sesse & Moc. ex DC. Prod. 1: 706, 1824.

Larrea mexicana Moic. Pl. Nouv. Amer. 71, 1839.

Larrea glutinosa (Engelm. in Wizlitz. Mem. North. Mex. 93, 1848.

Covillea tridentata (DC.) Vail Bull. Torrey Club 26: 302, 1899.

**Neoschroetera tridentata* (DC.) Briq.

**Covillea glutinosa* (Engelm.) Rydb.

Larrea is a much-branched shrub which may reach a height of 11 feet under optimum conditions. The leaves are evergreen, thick, glutinous, and strong-scented. After rains, particularly, they emit a musty resinous odor.

This is said to be the basis for the Mexican name *hediondilla*, "little stinker." The leaves are divided into leaflets which are oblong to obovate and united at the base. These leaflets are normally 5-10 mm in length, but on at least one specimen I have collected they are 15-20 mm long. The stems turn brown after one year's growth and very conspicuous nodal ridges occur on them which are noticeable after many years' growth. Flowers are axillary and solitary with yellow petals that are twisted somewhat to give the appearance of an electric fan blade. The fruit is a 5-celled capsule covered with white hairs which range up to 2-3 mm in length. The plant flowers throughout the year when sufficient moisture is available, but most profusely in April and May. Shortly after a period of abundant flowering, the plants are covered with the small white fruits to the extent that they look as if they were covered lightly with snow.

The chromosome count of *Larrea* has been determined by Covas (1949). He has reported that there is a $2n = 52$ and also a polyploid $2n = 104$.

Many members of the animal kingdom have been found to be associated with the creosote bush. Among these are leaf-hoppers (*Convelinus nigricollis* Ball and *C. torridus* Ball) (Ball, 1932), woodrats, and jackrabbits (Jaeger, 1948). A very common occurrence on the bushes is a walnut-sized gall produced by the creosote gall midge (*Asphondylia*).

This plant grows in abundance throughout the North American deserts. In

* The publications for these entries could not be found.

fact, it has come to be called an indicator of the lower Sonoran Life Zone. Many studies have been carried out trying to answer the question of why this species grows so well in, and how it has become adapted to, the hot, arid desert regions. It has been found that *Larrea* does not accumulate water, as do the succulent plants of the desert, nor is the relative leaf surface reduced from that of a mesophytic plant (Ashby, 1932). The internal structure of the leaf, in fact, does not show a xeromorphic nature. It is not difficult to find large intercellular spaces; the cuticle is not as thick as might be expected on a desert plant; and stomata, far from being reduced or specially protected, are decidedly numerous and mesomorphic (Ashby, 1932), being present in both the upper and lower epidermis (Figure 1).

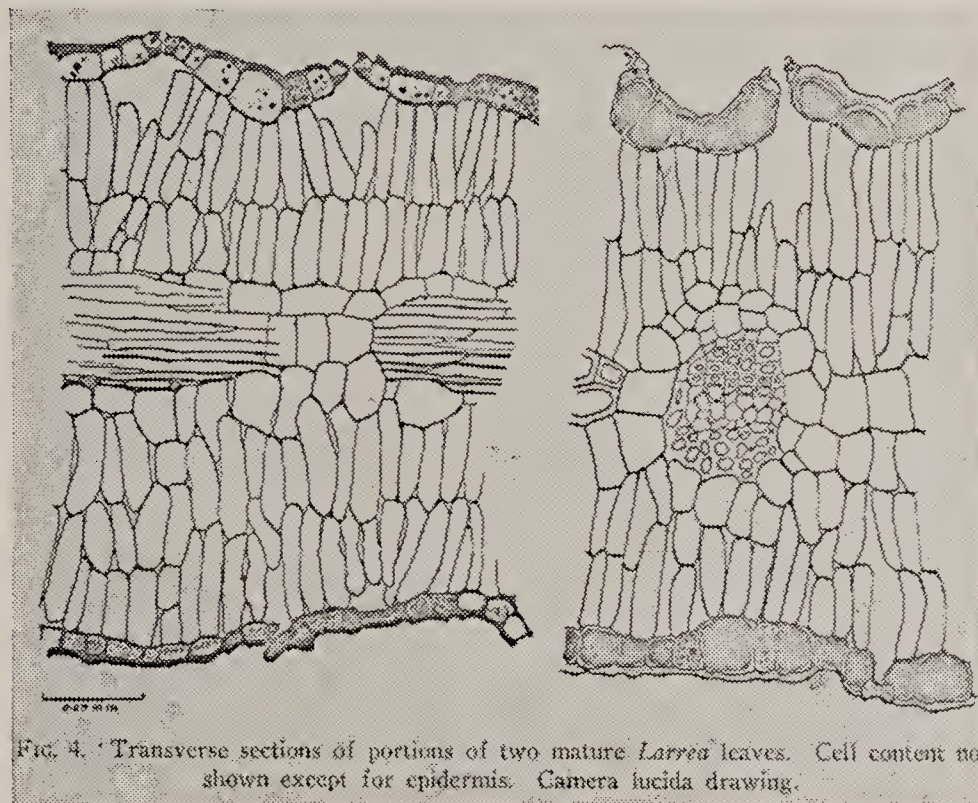


Figure 1.

From Runyon, 1934

Furthermore, *Larrea* bushes are never completely defoliate. Under extreme conditions the leaves will turn brown and curl but will not drop until water promotes new leaf formation.

It has been suggested that the chemical make-up of the leaves and the production of resin aid the plant in retaining water. Through study, however, it was found that nordihydroguaiaretic acid (a major constituent of *Larrea*) content and resin content are statistically higher in plants having access to abundant moisture than in plants having access to less moisture. Since both nordihydroguaiaretic acid and resin seem to be highest in plants having access to the most moisture, there is no reason to believe that either constituent is formed in the plant as a response to drought conditions (Duisberg, 1952).

If it is true, as it appears to be, that the leaves afford no help in the retention of water, what keeps this plant from being killed by the extreme heat of desert summers? One very important characteristic along this line is the extensiveness of the root system of a creosote bush. Roots spread out just under the surface of the ground, but another system grows down deep into the ground, sometimes 3-4 times the height of the above-ground portions. With this very well developed system of roots, the plant has access to larger amounts of water than one would normally expect. Another factor which is beneficial to these plants occurs in the

arrangement of leaf development. Leaves of *Larrea can, and do*, go through a period of dormancy when they are immature and drought conditions occur. When rains come and water enters the plant, this dormancy is broken and these leaves continue to grow until mature. Buds also appear to grow in a similar manner. It may be significant that the leaves of these plants do not wilt. A solid material inside the epidermal cells maintains rigid form in spite of the tendency of the cells to contract due to water loss. This may prevent the injury to internal cells usually accompanying drying out (Runyon, 1934).

This plant, which can thrive on abundant water, and survive on extreme lack of water (for two years and more), has one more very pronounced characteristic feature. This is a feature which even an untrained observer can pick out by just driving along a highway through the southwest. The very apparent spacing throughout an extensive population has been noticed and reported by many, but few have taken the time to find out why. Went (1942 and 1948) suspected that this spacing was due to a toxic effect. Specifically, that a substance is secreted by the roots which prevents development of young seedlings in the immediate vicinity. There is some doubt, however, that this spacing is due mainly to a toxic effect because young plants have been observed growing under the canopy of older plants (Dalton, 1962). I also have noticed this occurring not uncommonly around the Phoenix area. Also it appears as if this spacing is more consistent in areas where the soil type has a certain degree of homogeneity. In those areas where the soil type is heterogeneous or the underlying caliche layer is irregular in depth, the spacing between plants becomes less patternized. In 1903, the idea of one plant's substances being toxic to another got its start with Pickering. Since that time many workers have reported on investigations dealing with this phenomenon. These people have substantially proved that certain plant substances exhibit an adverse effect on the growing ability of certain other plants (mostly under laboratory conditions); however, it is felt by this author that no one previous to Dalton, in 1962, has given any sound evidence for or against *Larrea's* ability to inhibit its own seedlings' development.

This investigation was undertaken to attempt to add evidence to the quest for an answer to this problem by setting up controlled laboratory experiments, of a slightly different design from Dalton's, to arrive at further sound statistical data.

METHOD AND MATERIALS

In this study, interest was concentrated in two areas: the toxic effect of creosote bush root extract on seedlings and small plants, and germination rate of seed.

Seed Germination

Experimentation was conducted to determine the germination rate exhibited by two different ages of seeds under two different methods of testing. Twenty-five seeds of a sample collected in January, 1965, were planted in a 18" x 18" x 3" redwood flat. Twenty-five seeds of an additional sample, collected in June of 1961, were also planted in one of the redwood flats. The seeds were planted shallowly and watered lightly each day, except for Sundays, to keep the soil moist.

To determine the effectiveness of methods of germination, twenty-five seeds each of the young (4 months) and the old seed (4 years) were placed in petri dishes surrounded by wet paper towelling (Crown Duo-Fold by Crown Zellerbach). This paper towelling was kept moist at all times.

(Continued in Next Issue)

ABRONIA VILLOSA

NYCTAGINACEA Four-o'clock Family SAND VERBENA



Abronia (Gr., *abros*, 'delicate'), *villosa* (L. 'hairy') belongs to the Nyctaginaceae or Four-o'clock Family. It is erroneously referred to as 'Sand Verbena' because of its verbena-like flowers but it is not a true verbena.

These low, prostrate annual plants germinate from December to February in the sandy banks and the open dry-appearing stream beds. Their whitish, succulent roots with many rootlets quickly grow downwards seeking moisture in the deep sand. Since the plants are annuals they cannot be successfully transplanted.

Blossoms are quite numerous in compact heads of pink, lavender or purple emitting a most pleasant fragrance especially at nighttime. The cut flowers will remain open for several days and will fill a room with a delicate fragrance.

The trailing six-inch to twelve-inch stems and leaves are rather semi-succu-

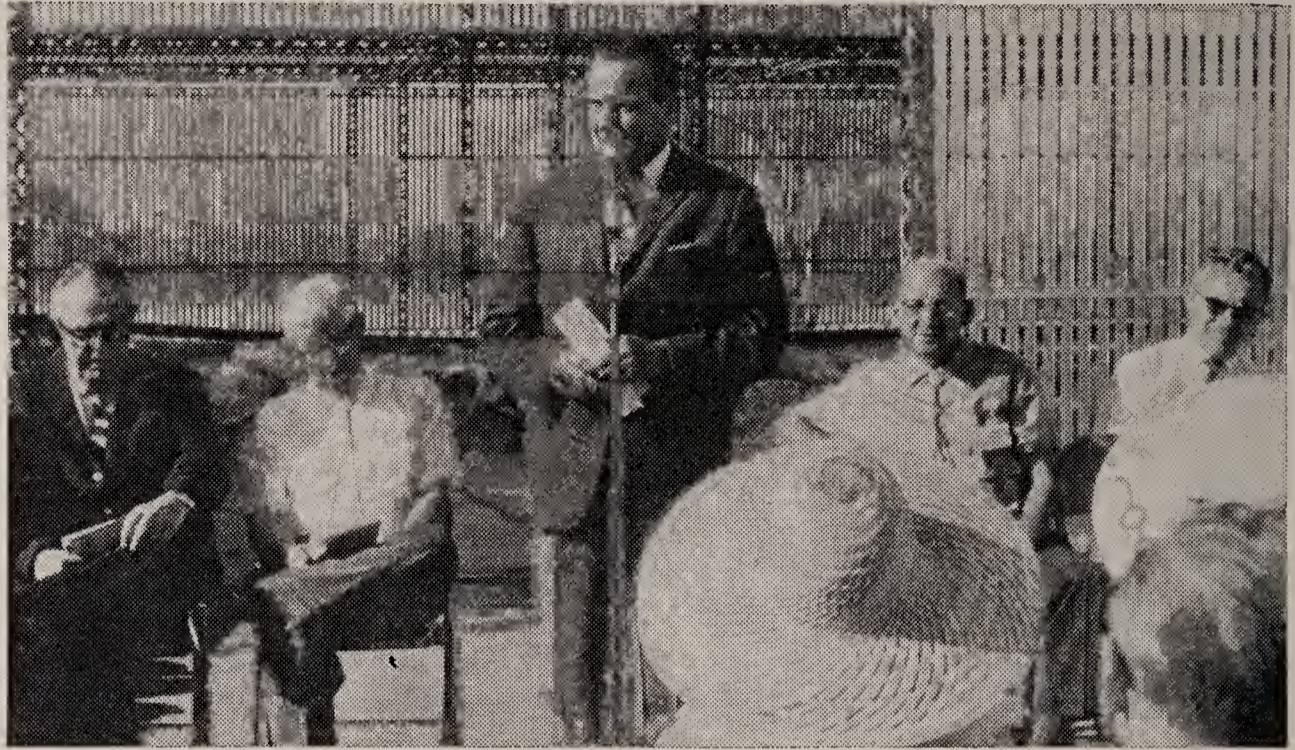
lent and are covered with fine hairs which tend to cut down on loss of moisture due to transportation during hot days. The interesting fruit is globe-shaped with five wings and bears a small brown round seed.

The plants will continue to blossom from spring until late fall if watered weekly through the summer. Natural rainfall will not be sufficient for them to continue much past May.

The Desert Verbena is found in Mohave, Maricopa, Pima and Yuma counties of Arizona below 1500'. It is also found in southern California and Sonora, Mexico.

Seeds can be gathered off the plants all through their blooming period or you can remove, with a flat shovel, about one inch of the topsoil from under the plants in which the seeds will be deposited. Scatter this soil in the area where you want the plants to grow, water in December and continue weekly after germination.

11th BIENNIAL CONVENTION OF THE CACTUS & SUCCULENT SOCIETY OF AMERICA, INC. May 3-8th



A portion of the successful convention was the dedication of the Garden's new 5000 sq. ft. aluminum-lath Succulent Leaf House by His Honor Milton Graham, Mayor of Phoenix. Also pictured is Board Chairman John H. Eversole, Board Member Reg Manning, your editor and Rev. Gerald Wright. Board Members Mildred May and James Cahill also participated.

Mr. Wesley Bolin, Arizona Secretary of State welcomed the 250 conventioners at the opening evening banquet at the Sands Hotel.

Below is shown five busses loaded with eager-eyed cactophiles touring the famed Apache Trail, part of which can be seen off in the distance.

The group left the following day to conclude their convention in Tucson. It was the largest convention to date and Arizona would certainly enjoy having them visit us again in the near future.



SAGUAROWLAND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol. XIX

Aug.-Sept., 1965

No. 7



The usual and attractive flowers of the desert milkweed *Asclepias subulata*. See Page 81.



SAGUAROLAND BULLETIN

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W. HUBERT EARLE, Editor
LILLIAN DIVEN, Associate Editor

Volume XIX

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GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

SEDUM



A full-sized plant of *Sedum stelliforme* which never grows more than a few inches tall.

SEDUM STELLIFORME is another species found in Arizona, yet is seldom noticed because of its insignificant size. It is limited to the extreme eastern and southeastern portions of the state at elevations above 7,000 ft. (2150m.).

This species is a small succulent perennial with a fleshy rootstock. The slender stems are branched above and measure from 5 to 12 cm. in length. Subterete leaves extend up the stem to the inflorescence. Leaves are smooth, linear to lanceolate in shape with blunt tips, and measure up to 9 mm. in length.

The inflorescence is a terminal cyme with spreading branches. Parts of the flower number five or six; the blunt sepals being linear to oblong and to 3 mm. in length. Bracts are 4 mm. long and suboblong in shape. The white petals are oblong with acute or acuminate apices. Petals will reach 4 mm. and the stamens will equal this length. Seeds are ovoid, pointed at one end, and

measure 0.5 mm. long and 0.3 mm. wide. These are borne in slender carpels of 5 mm. length. Flowering commences in July and extends to September.

SEDUM STELLIFORME in Arizona is found at elevations ranging from 7,000 to 9,500 ft. in Apache, Graham, and Cochise counties. From the type locality in the Huachuca mountains, it ranges north into the White mountains, and extends east into west central New Mexico. It is also reported from the Sierra Madre in Chihuahua, Mexico.

As with other high mountain succulents, cultivation of this species has proved difficult in low desert areas. Only when it has been grown indoors during the hot summer months has any success been achieved. Partial shade and a coarse organic substrate are required to provide optimum growth.

REFERENCES:

- Froderstrom, H., The Genus Sedum.
Kearney and Peebles, Arizona Flora.

An introductory investigation of the germination rate and the toxicity of *Larrea tridentata*

By William L. Halvorson

(continued from last issue)

Toxicity

For this portion of the study, 120 small plants ranging in size from 1½" to 3½" in height were collected from a fresh road cut north of Phoenix on the road from U. S. Highway 69 to Lake Pleasant. These plants were grown under greenhouse conditions for three weeks, after which time the best were transplanted into flats with an arrangement shown in Figure 2.

Control	Half Strength	Full Strength
16 plants	16 plants	16 plants
16 plants	16 plants	16 plants

Figure 2.

After one week, having made sure that the plants were not harmed by the transplanting process, the actual experiment was started. The intention was to test the probability that the roots of creosote bush secrete a substance toxic to smaller plants of the same species which are trying to get established under them. For this purpose large plants, over 3' in height, were dug up and their roots cut off. Forty grams of these roots were then cut into small sections and the water soluble substances were extracted with 200 ml. of distilled water using the low speed on the Waring Blendor. This mixture was then strained through cheesecloth until the visible pieces of root were removed. The mixture that resulted from this was then divided so that there were two 40-ml. samples and two 20-ml. samples. To the 20-ml. samples, 20 ml. of distilled water was added to make these effectively half the strength of the other samples. These were then applied to the plants by pouring each application into a cylindrical tube which was positioned in the center of each flat. These tubes were open at each end; one end of the tube was buried in the soil and the other end was covered with aluminum foil except at the time of the application. This experiment was started on April 6, 1965, and the treatments were made at weekly intervals with the last one being made on May 7, 1965. The data were collected on May 13.

Full strength applications were also made on seedlings, which were obtained in the germination study, in conjunction with the above treatments.

RESULTS AND DISCUSSION

Seed Germination

	New Seeds	Old Seeds																														
In Flats	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">When Noticed</th> </tr> </thead> <tbody> <tr><td>1. 3-28</td><td style="text-align: right;">5:00 P.M.</td></tr> <tr><td>2. 3-28</td><td style="text-align: right;">5:00 P.M.</td></tr> <tr><td>3. 3-28</td><td style="text-align: right;">5:00 P.M.</td></tr> <tr><td>4. 3-29</td><td style="text-align: right;">8:00 A.M.</td></tr> <tr><td>5. 3-30</td><td style="text-align: right;">11:00 A.M.</td></tr> <tr><td colspan="2" style="text-align: center;">No other seeds germinated.</td></tr> </tbody> </table>	When Noticed		1. 3-28	5:00 P.M.	2. 3-28	5:00 P.M.	3. 3-28	5:00 P.M.	4. 3-29	8:00 A.M.	5. 3-30	11:00 A.M.	No other seeds germinated.		<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">When Noticed</th> </tr> </thead> <tbody> <tr><td>1. 3-25</td><td style="text-align: right;">11:00 A.M.</td></tr> <tr><td>2. 3-26</td><td style="text-align: right;">5:00 P.M.</td></tr> <tr><td>3. 3-26</td><td style="text-align: right;">5:00 P.M.</td></tr> <tr><td>4. 3-28</td><td style="text-align: right;">5:00 P.M.</td></tr> <tr><td>5. 3-29</td><td style="text-align: right;">8:00 A.M.</td></tr> <tr><td>6. 3-30</td><td style="text-align: right;">11:00 A.M.</td></tr> <tr><td colspan="2" style="text-align: center;">No other seeds germinated.</td></tr> </tbody> </table>	When Noticed		1. 3-25	11:00 A.M.	2. 3-26	5:00 P.M.	3. 3-26	5:00 P.M.	4. 3-28	5:00 P.M.	5. 3-29	8:00 A.M.	6. 3-30	11:00 A.M.	No other seeds germinated.	
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There are three significant facts available from this study: 1) the older seeds germinated faster than the new seeds, 2) the percent of germination was greater for the old seed than for the new seed, and 3) use of a petri dish appears to be ineffective for germination of *Larrea* seeds. The viability of *Larrea* seeds is great considering their size and covering. The seed coat is very thin and soft. For this small sample ($n = 25$), the old seed germinated at a faster rate and with a higher final percentage (24% vs. 20%) than did the fresh seed, but this difference was not significant.

	Germination	Non-germination	Total
Old seed	6	19	25
New seed	5	20	25
Total	11	39	50

$\chi^2 = 0.011655$, therefore 0.975 greater than P greater than 0.90.

In fact, from this Chi square value, it would be safe to assume that given a sufficiently large sample the respective percentages of germination would be equal. Thus it is concluded that seeds four years old have the same percent of viability as those seeds four months old. Further study should be concentrated in this area with larger samples, and many more samples (i.e. more variety in the ages of seed). Also it appears that there is some factor available to the seeds which occurs in the soil, but not in the petri dishes. It would be advisable to study more specifically the requirements for seed germination and find out why the seeds would not germinate in these dishes.

Toxicity

Growth rate of these plants was measured in the following manner: the number of leaves on each plant was recorded immediately preceding the first treatment; the number of leaves was then recorded following the last treatment. These figures were then calculated into a decimal figure such that any number above 1.00 indicates an increase in leaf production, a number of exactly 1.00 indicates neither an increase nor a decrease in the number of leaves per plant, and a number less than 1.00 indicates a decrease in the number of leaves per plant. (Chart 1.)

Although sample sizes of 32 were used, twenty plants from all plants in flats died. Due to an environmental stress that these plants were under for some time in the greenhouse (caused by the painting of the roof, which resulted in too much shade) and the fact that there was no pattern to those that died (which would be expected from applying the treatments to the center of the flats), these plants were removed from the data sheet. As a further check, a preliminary analysis was conducted which showed that there was no significant difference between analysis with the dead plants or without them.

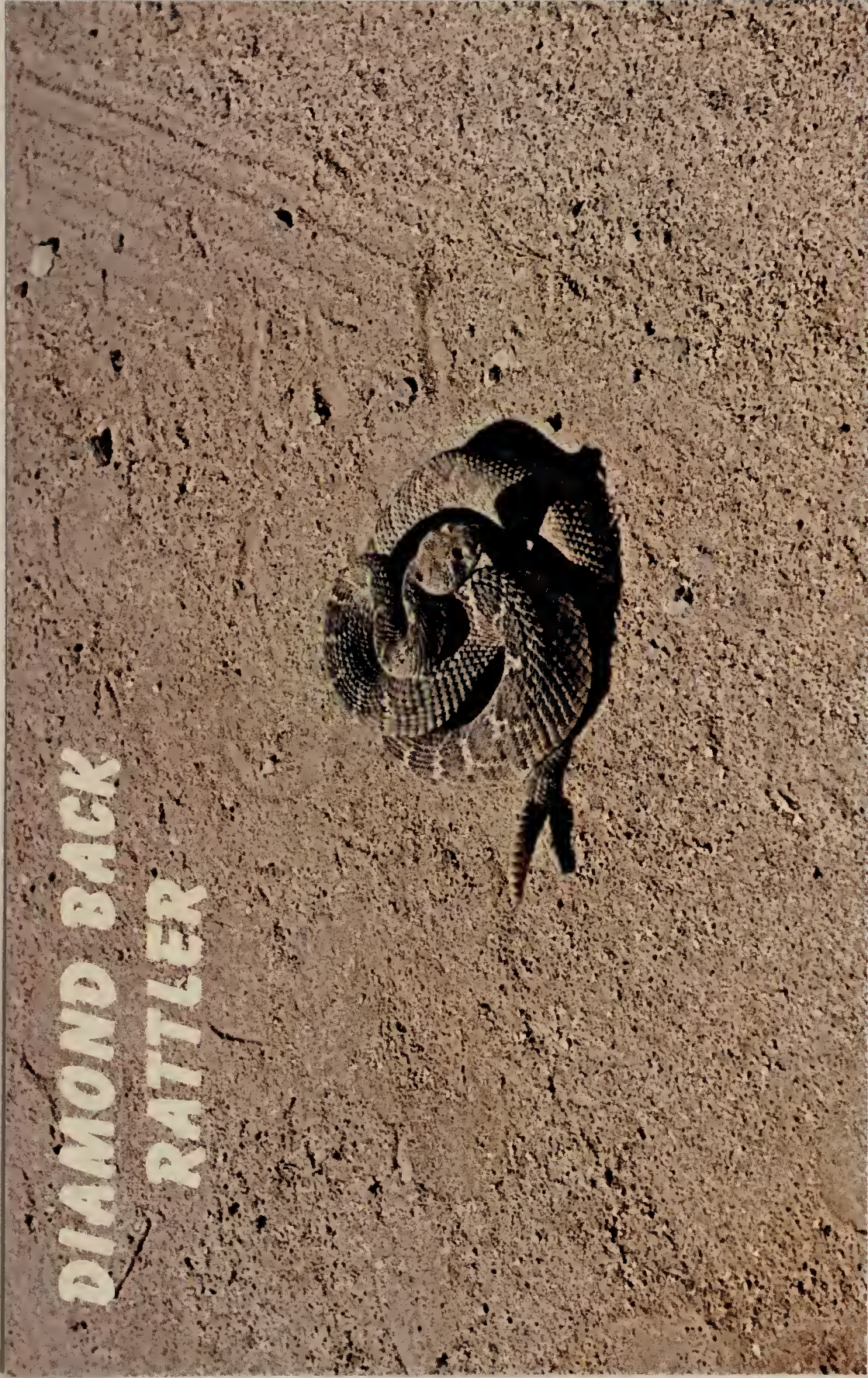
	Control	½ strength	full strength
1.	1.18	1.10	1.21
2.	1.51	1.16	0.63
3.	1.25	0.30	0.31
4.	0.49	1.08	1.04
5.	0.67	1.03	0.75
6.	1.10	0.93	1.12
7.	1.19	1.30	1.71
8.	1.07	1.05	1.06
9.	0.96	1.13	0.45
10.	1.22	0.60	0.38
11.	1.05	1.75	0.92
12.	0.95	1.29	0.74
13.	0.96	1.54	1.00
14.	1.28	1.31	1.13
15.	0.92	1.14	0.36
16.	0.40	0.64	0.93
17.	0.76	1.00	0.29
18.	1.19	1.15	1.08
19.	1.32	1.00	0.50
20.	1.08	1.41	0.53
21.	0.97	1.41	1.13
22.	0.30	0.90	
23.	1.05	1.01	
24.	0.59	0.83	
25.	1.24	1.10	
26.	1.27	1.23	
27.		0.56	
28.		0.97	
29.		0.09	

Chart 1.

(Continued in Next Issue)

WILDLIFE OF THE DESERT

DIAMOND BACK
RATTLER



Old Western fiction to the contrary, the Diamondback (*Crotalus atrox*) is not a serious daily menace to life in the arid west. This snake is by no means common. It is nocturnal in summer, diurnal in spring and fall, and hibernates from December through February.

BUSH CHOLLA
PENCIL CHOLLA

Cylindropuntia (si - lin' - dro-pun'-sha) (cylindro-cylindrical, *opuntia* - name of a town in Greece where some cactus-like plants were said to have grown; *arbuscula* (ar-bus'-ku-la) - like a small tree) is a dense much-branched shrub up to six feet tall.

Its short woody trunk, four to six inches in diameter, becomes quite scaly and black in age whereas the younger branches are green and smooth. The joints or terminal branches are two to three inches long and a quarter of an inch in diameter, quite smooth, with indistinct tubercles and will detach themselves quite easily at the slightest touch.

Areoles are spaced about a quarter of an inch apart and are round and large, each bearing a cluster of short stiff yellowish glochids a sixteenth of an inch long which are more obnoxious than most of the other cholla glochids.

The spines are usually one to an areole but sometimes two and are at right angles to the stem. The one and half inch spines are covered with loose straw-colored sheaths that fall off in age.

The rotate flowers about one to one and half inches in diameter are terminal, appearing in early May with petals that are yellow to green faintly tinged with red.

Fruits are pear-shaped, juicy, smooth, one to one and a half inches long, usually one seeded, green tinged with red at maturity the following year, often prolific. Areoles on the fruits are elongated, spineless but bearing minute glochids.

C. arbuscula is found in central southern Arizona, and northern Sonora, Mexico, growing in sandy washes and heavy soils of the desert valleys and plains at nine hundred to four thousand feet elevation.

The fruits, either green or mature, are eaten by cattle, deer and javelinas but are bitter for human consumption. The woody trunk, which is nearly solid, is used for the making of novelties and makes a good fast hot campfire.

Propagation can be made by either planting the small ends of the fruits in the ground; or branches can be sawed off a plant, dusted with sulphur and allowed to dry for a week and then planted, but keep water from them until roots appear; or a plant can be dug up and moved. The latter two procedures cause a substantial loss of joints during transportation because of the plant's fragile stems.

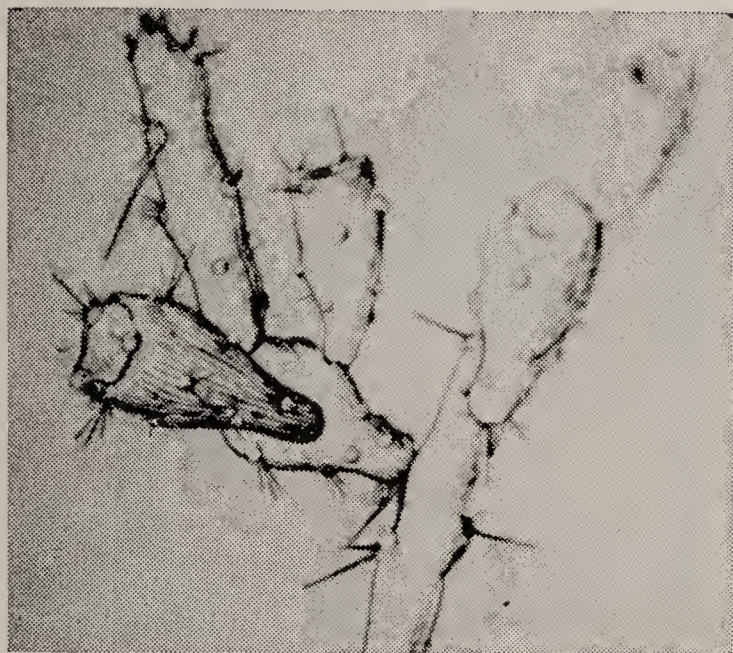


Cylindropuntia arbuscula, 4½' tall. Notice the black trunk.

Mature plants will recover in a year or two after moving and are excellent for desert gardens because of their small-tree appearance. For best results they should be replanted ten to fifteen feet apart.

References - ARIZONA CACTI-L. Benson
CACTI - J. Borg

CACTI OF THE SOUTHWEST-
W. H. Earle



Branch of *C. arbuscula*. Stem and fruits growing from lower-right fruit.

ASCLEPIAS SUBULATA

ASCLEPIADACEAE Milkweed Family

AJOMETE, LECHNOS MILKWEED, SILKWEED

Asclepias (Greek name for Aesculapius, the father of medicine), *subulata* (Latin, "awl-shaped," referring to the leaves) and *Asclepias albicans* are the most xerophytic of the eighty or more known species, mostly North American.

A. subulata is quite often mistaken for one of the rushes because of its grey-green, leafless, rush-like 3-5 foot tall stems that arise from a perennial root.

Greenish yellow flowers that rival many of the Orchids in their complexity of structure and adjustment for pollination appear from April to October and sometimes December on the tips of thin stems.

Fruits are usually a pair of smooth elongated follicles (sometimes one of the

follicles will abort) one half inch in diameter and three to four inches long. At maturity the follicles split lengthwise revealing and releasing the brown seeds that have a crown of fine bristles or hair which help the seeds to become airborne and thus are distributed over a wide area by the winds.

A. subulata is abundant on dry slopes, mesas and plains under three thousand feet elevation in Mohave, Gila, Maricopa, Pinal and Yuma counties of Arizona. It is also found in southeastern California and northwestern Mexico.

The sap of this species was analyzed during the last war and found to contain a fair amount of rubber latex, up to six percent of the dry weight of the stems.



A shrub of *Asclepias subulata* 3½' tall and 4' wide, showing its leafless, rush-like stems.

It is reported that the Pima Indians used the milky juice of this plant as a laxative and the Indians in Mexico used it as an emetic and purgative. The fluffy seeds can be used as a stuffing for pillows similar to the use of Kapok.

Cattle, deer and sheep very seldom browse this plant, possibly because of its poisonous properties.

Propagation is quite difficult from seed yet the plants are quite common in the low deserts. Best means of propagation is by division of the perennial root stock. Plants can be grown in full sun with very little watering. Many of the Milkweeds of the state, especially *Asclepias tuberosa*, "Butterfly Bush" that grows at elevations above four thousand feet, can be grown in our desert plantings with supplemental waterings. Seeds of many species in other parts of the country can be purchased from 'Native Plant' dealers.

References:

ARIZONA FLORA - Kearney & Peebles
 DESERT WILD FLOWERS - Edmund C. Jaeger

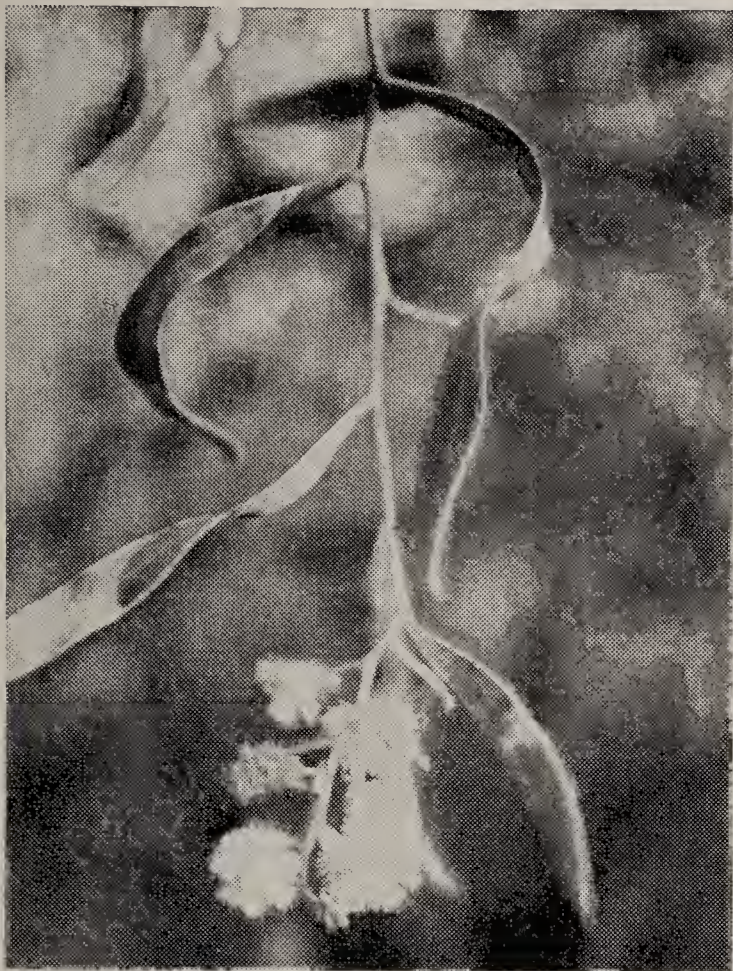


4½" long twin follicles of *Asclepias subulata*.

STANDARD CYCLOPEDIA OF HORTICULTURE - L. H. Bailey
 HEALING HERBS OF THE UPPER RIO GRANDE - L.S.M. Curtin

Two Australian Acacias for Desert Gardens

ACACIA SALICINA — Coobah, Native Willow



Leaves and flowers of *Acacia salicina*. 2/3 normal size.

This Australian Acacia is a small to medium sized tree from ten to forty feet (3-12 meters) in height. Slender pendulous branches make up a spreading crown. The true leaves are soon deciduous and the leaf function is carried on by the phyllodes, which are flattened petioles that resemble leaves. These phyllodes are oblong to lanceolate in shape, measuring two to five inches (5 to 12.5 cm.) in length and one quarter to one-half inch (6 to 12 mm.) in width. While flowering is somewhat scanty at any given time, it continues over a long period. A small raceme of three or fewer capitate heads make up the flowering spray. Each head has about twenty flowers. The woody legumes are dehiscent, splitting open to expose shiny black seeds attached by bright red funicles or basal stalks.

Aug.-Sept., 1965

This species is found throughout Australia in dry regions along water courses and adjacent areas. A pale foliage shade tree, it can be used in windbreaks, screening hedges, or as single specimen trees. It is an important plant for honey and browse purposes in its native environment. Like many other Acacias, it has tough dark wood that will take a high polish.

ACACIA SALICINA has proved hardy in southern Arizona at temperatures from 17° F. to 118° F. Growth rate is moderate under drought conditions if occasional water is applied during the summer months. Protection from rabbits and browsing animals must be provided.



Seven-year-old *Acacia salicina*, 10' tall, growing in the Garden.

ACACIA ANEURA—Mulga

ACACIA ANEURA is a drought resistant shrub or small tree attaining a maximum height of twenty feet (6 meters). The gray-green phyllodes are long-linear to near terete, very narrow and finely hairy. These are rigid and measure one and a half to three inches long with an oblique point. Flowering is not a regular occurrence, but when conditions are right there is a profusion of yellow spicate heads, each being over a half inch long. The dark wood is durable and is used for polished items.

The Mulga is found where rainfall is less than eight inches in Queensland, New South Wales, South Australia, and Western Australia. It has use in the desert landscape as a specimen tree employed singly or in groupings.

ACACIA ANEURA has not suffered damage at temperatures down to 17° F. and as high as 118° F. on the grounds of the Botanical Garden. This species is very susceptible to rabbit damage and it must be protected until it is well established and above the reach of browsing animals. Supplemental watering seems not to be necessary in central and southern Arizona during normal rainfall years.

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Young *Acacia aneura* growing in the Garden.



Branch of *Acacia aneura*, showing the ascending pattern of its leaves.

SAGUAROUND

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol. XIX

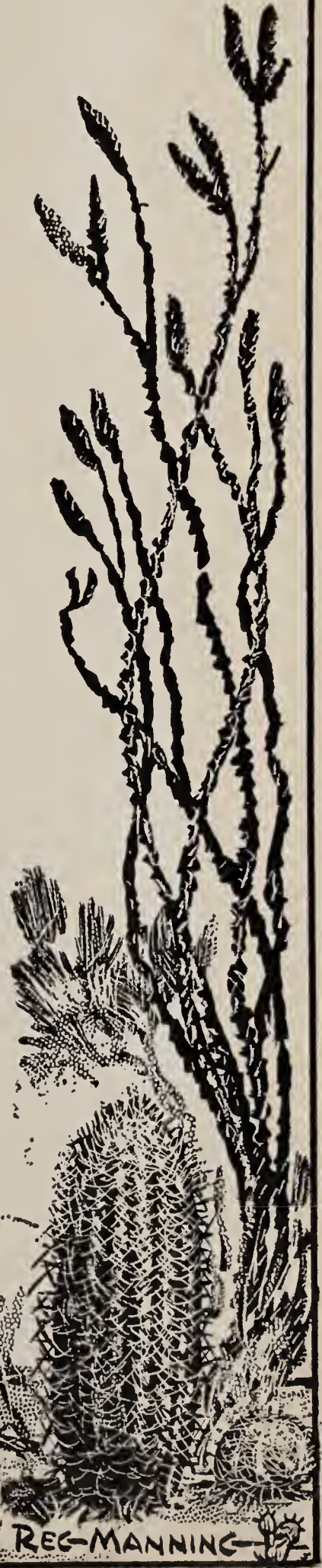
October, 1965

No. 8



Desert Botanical Garden photo

A six year old, eighteen foot tall *Prosopis alba* tree. See page 87.



REG-MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona. P. O. Box 5415, Phoenix 10. Saguarioland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription \$5.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor
LILLIAN DIVEN, Associate Editor

Volume XIX

October, 1965

No. 8

Arizona Cactus and Native Flora Society

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Including Week-ends and Holidays

An Argentine Mesquite for Arizona Gardens

PROSOPIS ALBA Griseb.

While the Mesquite is a very common element in the Arizona flora, it is represented by only two species, one of which has two varieties. In contrast, Argentina has more than thirty species in an area ten times that of Arizona. Arizona's two native trees have not been extensively used in landscaping except where existing large trees have been included in the plan.

A six-year-old specimen of PROSOPIS ALBA has become the most handsome tree growing at the Desert Botanical Garden. It has proved to be faster-growing and less subject to blow-down than PROSOPIS CHILENSIS, which is another South American Mesquite of merit, currently in use as an ornamental. While the foliage is very attractive, the large spines of Algarrobo Blanco may limit its desirability in some situations.

PROSOPIS ALBA in form is a tall tree and may attain the height of ten meters (32.5 ft.). It is heavily armed with divergent twin spines that are axillary in position. These are long and robust, being solitary at times rather than twinned. The leaves are large and extend beyond the flowering racemes. There are one to three pairs of pinnae with numerous leaflets numbering 23 to 28 pairs per pinna and measuring 20 mm. in length and 1 to 1.5 mm. in width. Borne on a spicate raceme, the flowers have petals that are pubescent to the apex. The legume is yellow in color, 20 cm. or more in length, and 12 to 15 mm. in width. It is indehiscent and the endocarp has solid longitudinal segments. There are numerous flattened oval-shaped seeds that are tan in color. These measure 7mm. by 5 mm.

In Argentina Algarrobo Blanco is found in the provinces of Buenos Aires, Entre Rios, Chaco, and from Cordoba

ALGARROBO BLANCO

to Salta in the west. It is a species that normally occupies sites having deep fertile soil and underground water. Some of the many uses of this very valuable tree are: wood, charcoal, paving blocks, forage, shade, food, tanning, alcohol, and honey.

PROSOPIS ALBA has withstood a low temperature of 17 degrees F. at the Garden without damage. It retains its leaves throughout the winter, losing them just before new growth commences in the spring. With adequate water, it will also withstand temperatures up to 120 degrees F. In deep soil it makes rapid growth and in four or five years will make an excellent shade tree. We recommend this tree very highly for southern Arizona and California.

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D.B.G. photo

3" leaves and 1/2" leaflets of
Prosopis alba.

An introductory investigation of the germination rate and the toxicity of *Larrea tridentata*

By William L. Halvorson
(Continued from last issue)

The data compiled in Chart 1 were analyzed according to a Completely Randomized Design of Analysis of Variance. This resulted in a nonsignificant "F" value. The 95% confidence limits are further evidence that there is no significant difference among treatments.

Analysis of Variance			
Source	Degree of Freedom		
Total	75	9.0792	
Treatments	2	0.5982	0.2991
Error	73	8.4810	0.1162

F = 2.574; P greater than .05.

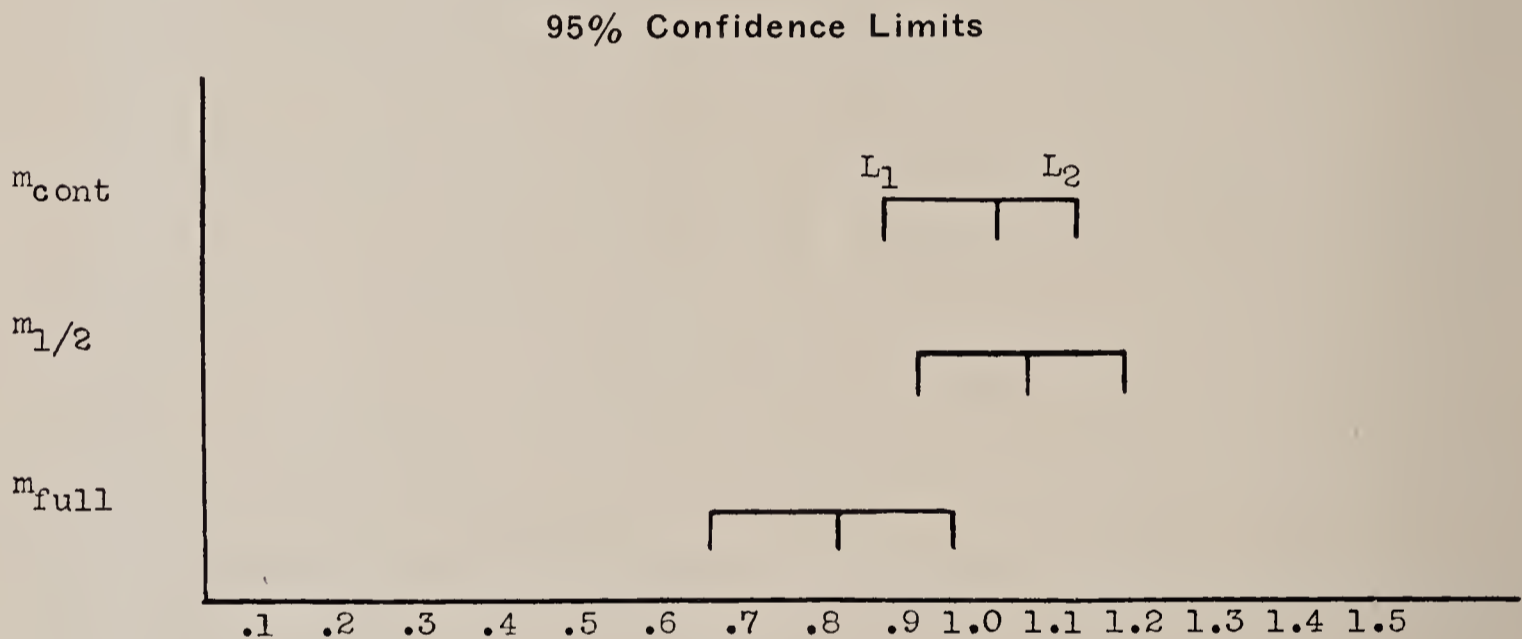


Figure 3.

The results of this data analysis lead to the conclusion that the treatment is ineffective. This experiment leads to the same conclusions that Dalton reached; that is, extracts from *Larrea* roots have no significant effect on the growth and development of young plants (*Larrea*). It would appear then that Went's thoughts concerning this area are unfounded and that there is another environmental factor which is causing this spacing of plants. It appears to me that experimentation should now be taken outside. Through an extensive system of plots set out in the natural habitat, a better understanding of what is really happening could be achieved. Only after a general idea is obtained can experimentation be brought back into the laboratory and the specifics of this phenomenon be investigated with any meaning.

SUMMARY

Larrea tridentata (Sess & Moc. ex DC.) Coville, grows extensively throughout the Southwestern United States and northern Mexico. Because of this fact many people have written about it, but most of these writings deal only super-

ficially with the plant itself. Few people have studied this plant for purely scientific reasons; these few, however, have given us some very interesting and odd facts. This species seems to be misplaced, because most of its characteristics are like those of a mesophytic plant and not those of a xerophytic plant. This study was undertaken to try to add some evidence to that which has already been obtained to further our knowledge of this plant and its surroundings.

Germination rates were studied of seed four months old and of seed four years old. For small samples, germination rate was approximately 10-11 days for the majority of the seeds. The old seed germinated a day or two ahead of the new seeds in some cases. Percentage of germination was 24% for the old seed and 20% for the young seed. This opens an area where study is needed to determine what gives *Larrea* seeds their long viability, for it is surely not the hardness of the seed coat.

The effect of *Larrea* root extract applied to young plants of the same species was also studied. It was found that when treatments of full strength and half strength were compared with a control over a five-week period, no significant difference was found in the development of the smaller plants. Because of the fact that Dalton (1962) reached the same conclusion through different methods, it appears that a new approach should be taken to find the answer to why *Larrea* plants are so evenly spaced in their desert habitat.

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(A Bibliography of 78 items may be obtained by addressing the author in care of the Desert Botanical Garden.)

PHORADENDRON CALIFORNICUM DESERT MISTLETOE

Phoradendron (*phora*—burden, *dendron*—tree, *californicum*—of California), is a parasitic, practically leafless plant found growing in dense clusters which hang in festoons upon the branches of the leguminous trees (Palo Verde, Mesquite, Catsclaw, Ironwood) and sometimes also on the Creosote and Buckthorn bushes.

The thin, brownish-green spike-tipped stems show very little chlorophyll, and bear scale-like tawny brown leaves.

The small yellow-green dioecious (separate sexes) flowers appear in March and are sunk in the joints of the spikes. The staminate (male) flowers emit a fragrant apple blossom-like scent in the evenings which can be detected at a distance, and which attracts bees and other insects.

The fruits or berries are about a quarter of an inch in diameter, green, juicy and ripening to a coral-pink from November to April. These are relished by the desert birds (Thrashers, Quail, Pyrrhuloxia, Phainopepla, and others) who are reported to be the distributors of these parasitic seeds to the limbs of other trees.

Most of the seeds are fertile, and as they germinate their roots penetrate the bark of the trees. Many of the host trees are quite vigorous and show a great resistance to the mistletoe seedlings. The Ironwood tree will exude a gummy substance at the point of the seedling's entry into the bark. This exudation will harden and drop off, carrying the mistletoe seedling to the ground.

Mistletoe will sap the energy of its host tree and, if abundant, may kill off the branches and eventually the entire tree.

The Pima Indians are known to boil an entire fruit-bearing cluster and then strip off the berries for food. The Papago

LORANTHACEAE Mistletoe Family

Indians dry the fruit in the sun, then store it away for winter use.

Phoradendron macrophyllum is the most conspicuous of our higher elevation mistletoes, having large leaves and large white berries. It parasitizes the Cottonwoods and Sycamores.

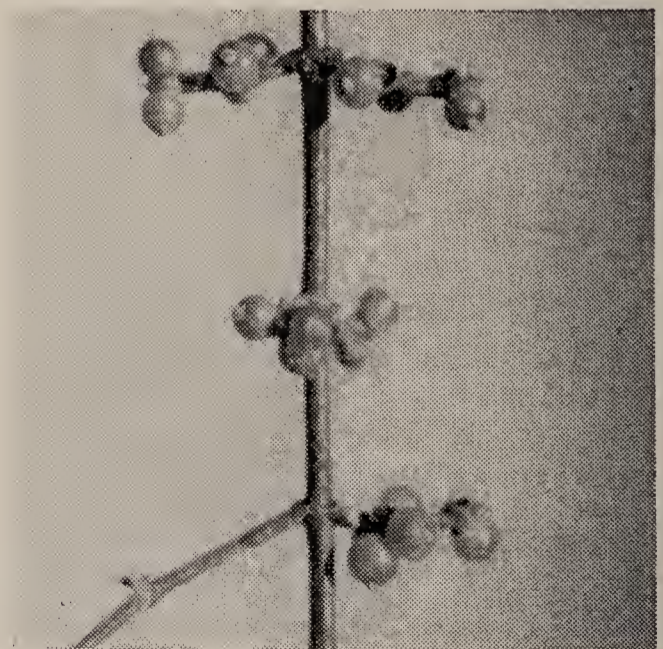
Phoradendron californicum is found at elevations below four thousand feet, and is common in our semi-desert through southern and western parts of Arizona, southern Nevada and Utah, eastern California deserts and northwestern Mexico.

These mistletoe clusters do attract many curious persons who are not familiar with our deserts, and who are often delightfully surprised to see Pyrrhuloxia, Verdins or Gnatcatchers fly from their nests concealed in the mistletoe clumps.

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Natt N. Dodge, FLOWERS OF THE SOUTHWEST DESERTS



D.B.G. photo

Berries of *Phoradendron californicum*.

WILDLIFE OF THE DESERT



The Tennessee State University

red bill.

WATER FOR SURVIVAL

by Ray D. Jackson and C. H. M. van Bavel, Research Physicists,
U. S. Water Conservation Laboratory, U. S. Dept. of Agriculture, Tempe, Arizona

EDITOR'S NOTE: The "survival still" developed by Drs. Jackson and van Bavel has caused excited comment in newspapers and magazines here in America and also abroad. Knowledge of this highly effective and beautifully simple device is a "must" for those who travel in the desert and semi-dry parts of the Southwest, and for this reason the BULLETIN is reprinting the original paper describing the still in detail.

People stranded in desert areas are frequently without a source of water. This report describes a simple device called a "survival still" that utilizes a plastic sheet and sunlight to distill drinkable water from soil and fleshy plants such as cacti. The plastic sheet can be folded and carried in a pack or pocket. The still consists of a bowl-shaped hole in the soil about 40 inches in diameter and about 20 inches deep which is covered with a plastic film formed and held in the shape of a cone by a rock placed in the center. Sunlight passes through the plastic and is absorbed by the soil and plant material, resulting in evaporation of water, followed by condensation on the cooler plastic. The water drops form on the under side of the plastic, run to the point of the cone, and drop into a container placed directly under the rock.

The survival still is intended only for emergencies. One still constructed in a moist clay soil or in a damp sandy beach will yield 3 pints of water per day. A still constructed in much drier soil such as that usually found in the desert may yield about one-half pint per day, but if it contains cut pieces of fleshy plants such as cactus, it will yield about three pints of water per day. Three pints of water per day may not be enough to enable a person to survive indefinitely. It will, however, prolong survival and thereby increase his chances of being

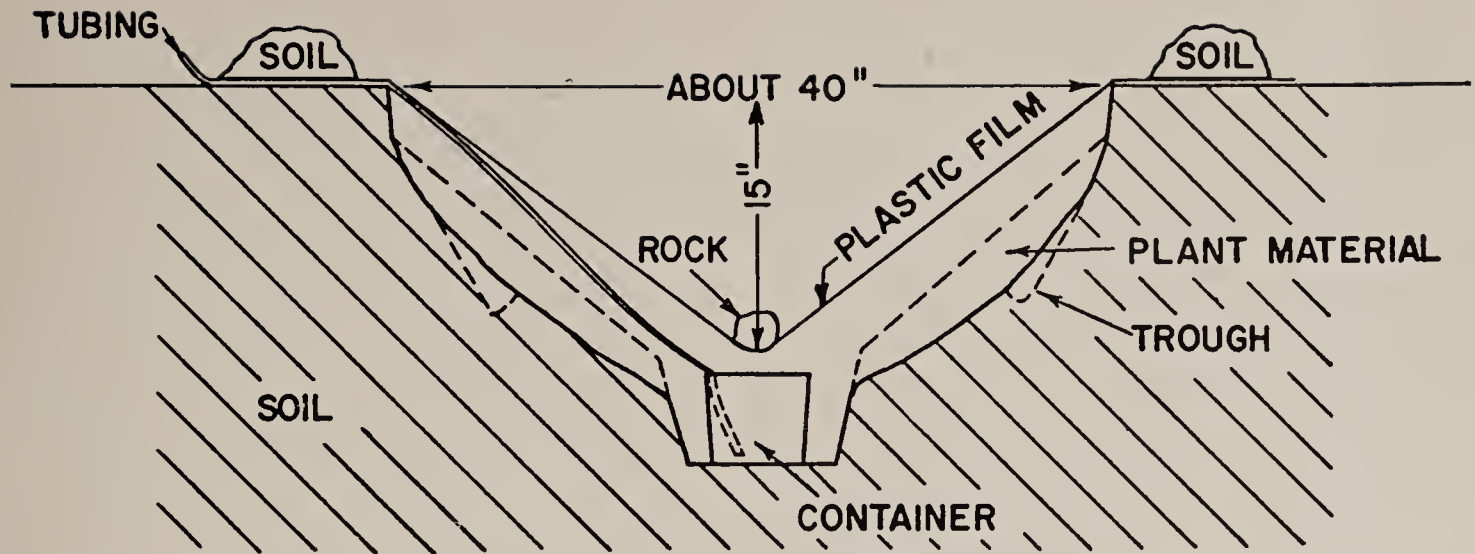
alive when found. With two or more stills per person in areas where fleshy plants, sea water, or brackish water are available, a person can have an adequate water supply. In situations where the soil is extremely dry and no fleshy plants are available, little, if any, water will be obtained from the soil. In these situations, the still can be used to purify polluted water such as body wastes.

Details of the technique are given in the following sections.

PARTS

The essential parts of the survival still are a piece of plastic film about six feet square and a container or any waterproof material from which a container can be fashioned. A 4-quart bucket is convenient but a container can be made from plastic film or other waterproof material. A convenient, but not essential, part is a piece of plastic tubing about one-fourth inch in diameter and four to six feet long. The tubing can be fastened to the bottom of the container and water removed for drinking without disturbing the plastic.

Almost any clear plastic film will work. However, some will work better than others. The plastic film should be clear, strong, and "wetable." Being "wetable" is important. This means that water drops that form on the under side of the plastic will cling to the plastic as they run down to the container. If a plastic is



U.S.D.A. drawing

Cross-section of the desert solar still pit used to obtain distilled water from desert soil or desert succulent plants.

“non-wettable” the drops will form, but many will drop off before reaching the container. The difference between “non-wettable” and “wettable” plastic is similar to the difference between a newly waxed automobile and one that hasn’t been waxed for some time. When water is put on freshly waxed (or “non-wettable”) automobiles, the drops are large and don’t spread out and run off rapidly.

DuPont’s “Tedlar” plastic film 0.0001 inch (1 mil) thick (number 100 BG-30) is clear, strong, and sufficiently wettable for this purpose. (Trade names and company names, when included, are for the convenience of the reader and do not indicate preferential indorsement of a particular product or company over others.)

CONSTRUCTION

Refer to the diagram of the survival still (page 93). Dig a bowl-shaped hole in the soil about 40 inches in diameter and about 20 inches deep. If a shovel is not available, a flat rock or a stick can be used to loosen the soil, and the soil can be removed by hand. Additional excavation may be required in the center of the hole to accommodate the container. If the container is to be a plastic or canvas sheet, this additional excavation

can be shaped to give support to the container. If polluted water, such as body wastes, is to be purified, a small trough can be dug around the side of the hole about half way down from the top (see diagram). This trough is to insure that the soil wetted by the polluted water is exposed to the sunlight (see section **PRECAUTIONS**). Without the trough the water may run down around or in the container. If plant material such as cactus is to be used, cut the plant into pieces and line the sides of the hole with the pieces.

Next place the plastic film over the hole and put a little soil on the edge to hold it in place. Take a rock about the size of your fist and place in the center of the plastic. Push down on the rock until it is about 15 inches below the soil surface. The plastic will now be in the shape of a cone. Put soil on the plastic around the rim to hold it securely in place and to prevent water vapor losses. Straighten the plastic so it forms a neat cone. The plastic cone must have an angle of about 30 degrees in order for the water drops to run down to the container.

LOCATING THE STILL

Location of the still depends upon whether or not cacti are available. If

cacti are available or if polluted water is to be purified, the still can be constructed in any convenient spot where it will receive direct sunlight throughout the day. Ease of digging the hole would be the main consideration here.

If the soil is to be the only source of water, some sites will be better than others. In this case, locate the still in a stream bed or a depression where rain-water collects. The more water that soaked into the soil during and after the last rain, the better the yields will be. Generally, a clay soil is better than a sand because it holds more water longer. After prolonged periods without rain, the yield from soil alone may be small.

Although a clay soil holds more water



U.S.D.A. photo

Co-discoverer Dr. Ray Jackson removing water from desert solar still.

than a sand, a wet sand will work very well. Along a sea coast where fresh water is not available, a still can be constructed above the high water level. If a site is not available on the beach, a still can be constructed on higher ground and the soil soaked with sea water periodically. After a few days the salt accumulation on the soil surface may reduce yields. If so, a new hole can be dug a few feet away. In an inland area where brackish or polluted water is available, the same principle can be used.

PLANT MATERIALS

Cacti contain considerable amounts of water even after prolonged periods of drought. Barrel, saguaro, prickly pear or other cactus can be cut in pieces and placed around the sides of the hole under the plastic. Water can be obtained from most fleshy plants, but the yields from woody, small leafed plants such as creosote bush will be small. (We suggest using prickly pear. Barrel and saguaro arms should be used only when nothing else is available. EDITOR)

YIELDS

It takes about one hour for the air under the plastic to become saturated and water collection to begin. Under good conditions one pint of water can be expected in six hours. Three pints of water per day can be obtained from a still constructed in a damp, clay soil or a damp sandy beach. From a dry desert soil, the yield may be one-half pint or less. From the same desert soil with cacti in the hole, three pints per day can be obtained. Generally, the yield will be two pints during daylight hours and one pint at night. On cloudy days the yield will be reduced because sunlight is necessary for the still to operate. Higher yields will be obtained in summer than in winter.

PRECAUTIONS

When using polluted water make sure that none is spilled near the rim where the plastic film touches the soil, otherwise there is a chance of contamination. Make sure none comes in contact with the container.

When cacti are used, make sure that the cut pieces do not touch the plastic, otherwise the water may taste slightly of the cactus.

Do not disturb the plastic sheet unless it is absolutely necessary. If a tube is not available to drink directly from the container, lift the plastic and remove the container as few times as possible. It takes from one-half hour to one hour for the air to become resaturated and the collection of water to begin again after the plastic has been disturbed.



Cut-up sections of prickly pear can be placed in the solar still and then covered with plastic film.



D.B.G. photo

A Palo Verde tree bearing large clusters of desert mistletoe (*Phoradendron californicum*). See page 90.

BRANCHED PENCIL CHOLLA



Spiny fruits on a 14" branch of *Cylindropuntia ramosissima*.

Cylindro (cylindrical) **opuntia** (name of a town in Greece) **ramosissima** (much branched) is a shrubby very much branched cholla usually about three to four feet tall, but plants up to eight feet have been found growing in moist areas under the shelter of tall trees. The cylindrical branches are semi-succulent and otherwise woody, crisscrossing each other to make a dense shrub.

A distinguishing character of this cholla is the diamond-shaped plates that cover the outer surface of the stems, each plate bearing an areole in a notch at its apex. Stems are one half inch in diameter and two to five inches long.

One and sometimes two spines, one and one half to two inches long, appear from the areoles at right angles to the stem. A light tan to reddish sheath is on

the young spines but in years drops off leaving a gray colored spine. Spines are sometimes absent in new stems and on **var. denudata**. Each areole has minute barbed glochids which are an irritating character of all the opuntias.

Small one half inch rotate green terminal flowers, sometimes tinged in red, appear during March and April. Fruit is dry, ovate, one inch in diameter, but covered with one half inch weak spines making it appear as a burr, which helps to identify the species.

This plant prefers alluvial soils of the desert and the washes from ninety to three thousand foot elevation in Yuma, Mohave, western Yavapai, western Pima counties of Arizona, southern Nevada, southeastern California and northwestern Sonora, Mexico.

Propagation can be made from the young stems. The older stems are quite woody and not succulent enough to produce roots.

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CACTI OF THE SOUTHWEST- W. Hubert Earle

 CACTOMANIACS MEETINGS

The Cactomaniacs are members of the Garden who are especially interested in the desert and its plants. Meetings at 8 p.m. on the first Tuesday of each month, October through May.

October 5—Arizona Fauna, slides by Dr. Lake Gill

November 2—"Glen Canyon," a Sierra Club film

December 7—Show of slides by various members

SAGUARO

BULLETIN

DESERT BOTANICAL GARDEN OF ARIZONA

Vol. XIX

November, 1965

No. 9



Desert Botanical Garden photo

Brittle stem and leaves of *Encelia farinosa*, Brittle-bush. See p. 105



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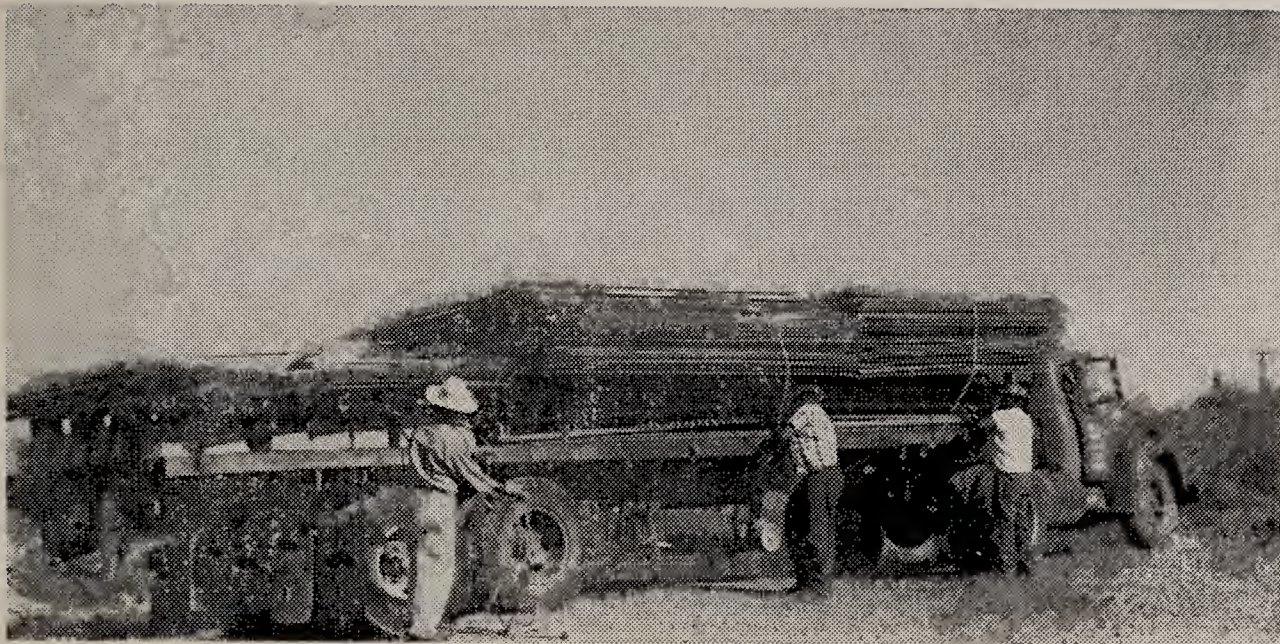
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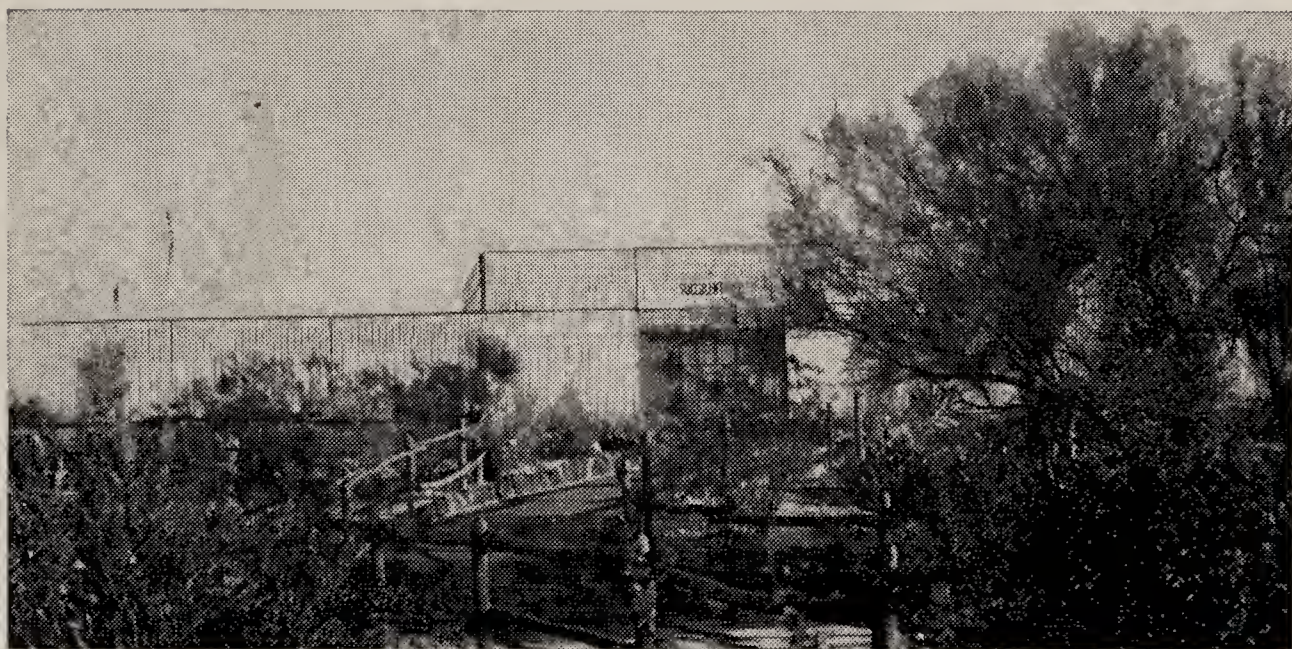
GARDEN OPEN DAILY 9 A.M.—5 P.M.
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THE NEW LEAF SUCCULENT HOUSE

From start . . .



. . . to finish

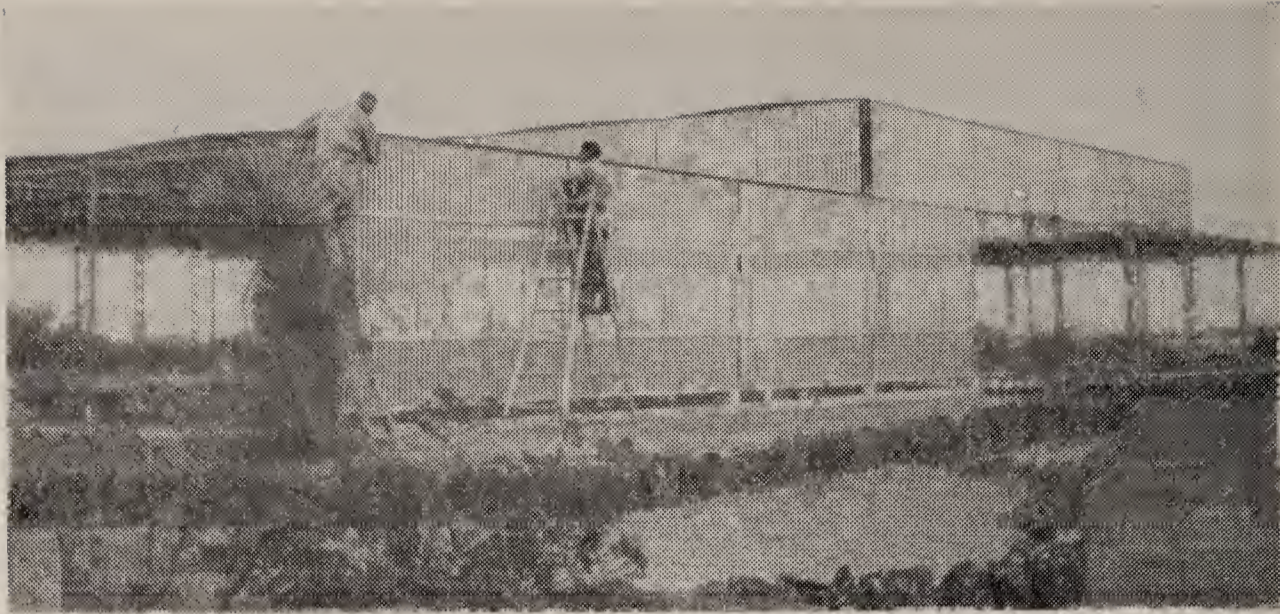


DBG photo

From long bundles of aluminum lath on a flat-bed truck to the spacious lath house now open in the Garden has taken three years of work. Here is what happened . . .

In the spring of 1963 we had one aluminum lath house, 6000 sq. ft. in size, in which the more tender cactus and leaf succulents were displayed. Erected in 1950, it was a newly developed type of lath house. We "pioneered" it, and later this same type was adopted by other botanical gardens and by nurserymen. This lath house served us well, but after thirteen years it was just too small for our increasingly large collections.

At this point we learned of a forthcoming receiver's sale of nursery equipment, including a 4900 sq. ft. lath house similar to our own. We purchased it for \$2000, and then spent an additional \$1100 to change its shape for our purposes, increase the



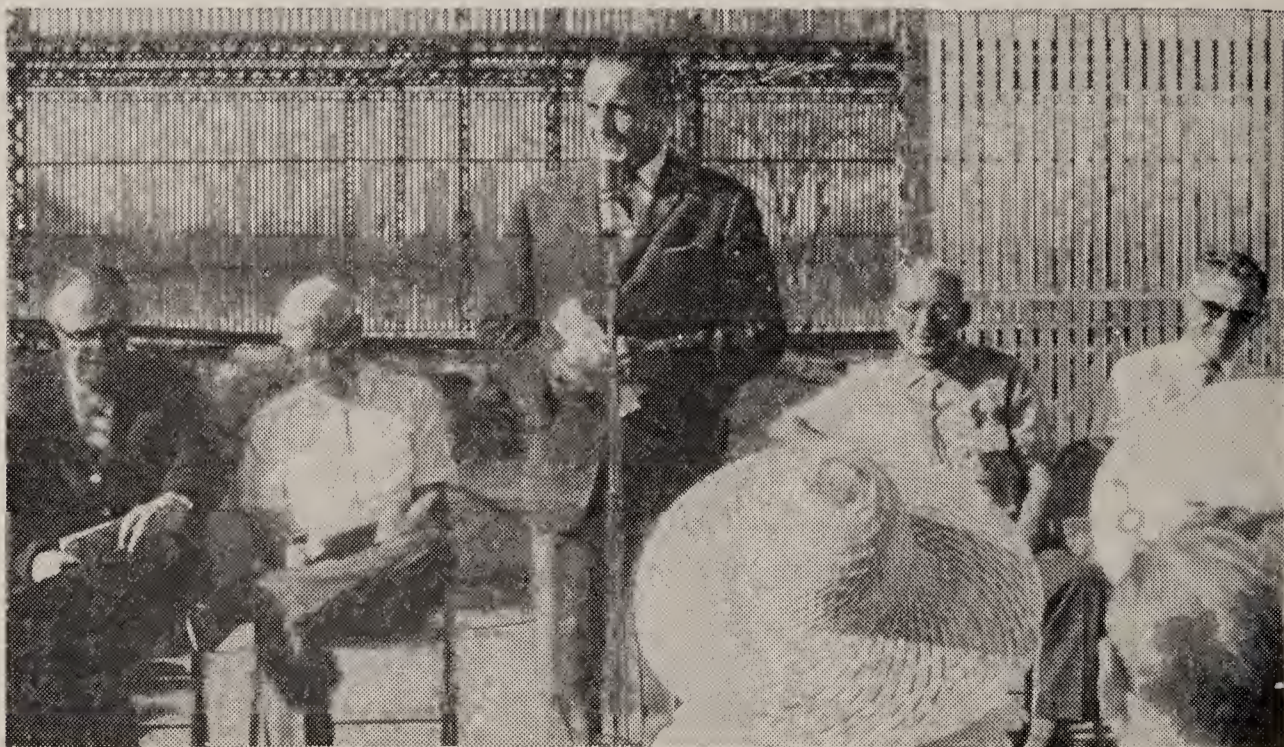
area slightly, and add two sides (the structure had been open-ended). Now, for a total expenditure of \$3100, we had acquired a 5000 sq. ft. lath house that would have cost \$12,500 new.

We decided to erect it a short distance east of the older lath house, and use it exclusively for leaf succulents, leaving the first solely for cactus. This would triple the leaf succulent space and leave more room for cactus when the leaf succulents were moved out.

In early 1964 the concrete footings were poured and the steel uprights and girders of the frame were set in place. That summer and fall the aluminum lath was assembled in panels and erected by staff members, most of the work being done by John Weber and William Hendrix. Meanwhile, stonefaced planting beds were constructed, those on the outside of the lath house being built by our student workers, and the more intricate white stonework inside by Roy Bell.

The assembling of the lath house and the stone work were completed by the end of 1964, as were new black asphalt paths both inside and outside the lath house.

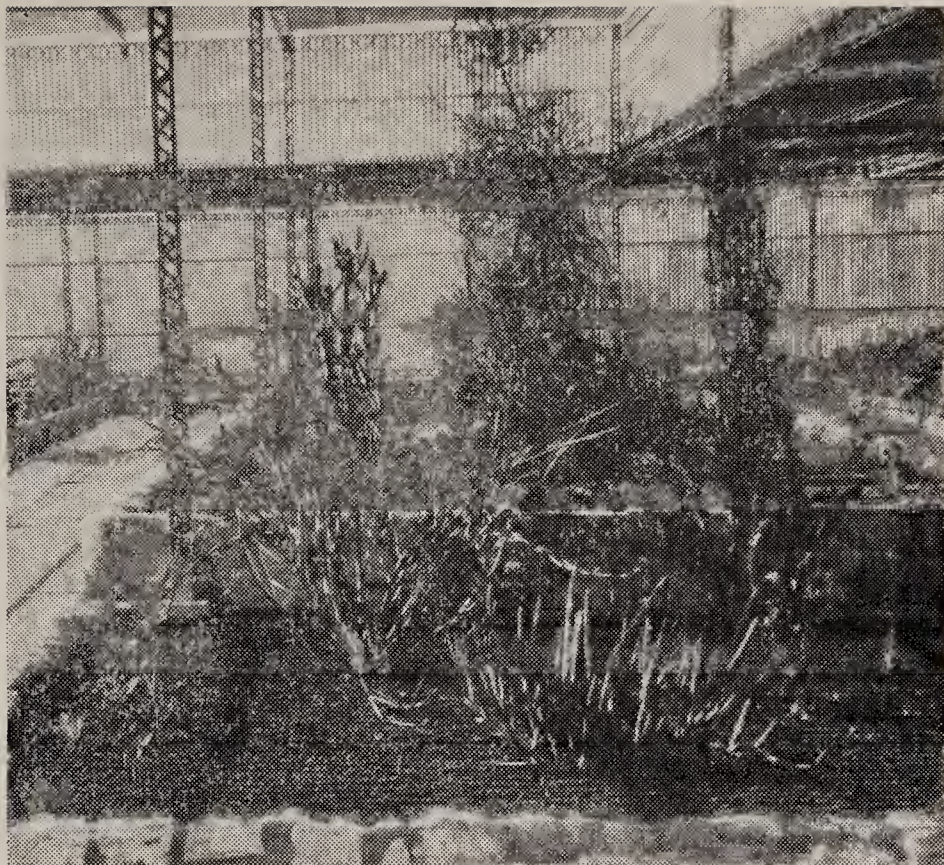
The task of landscaping, moving and replanting the large number of plants destined for the new lath house was considerable, and could not be done in the spring, with the approach of our desert summer heat which might harm the newly-



Clarence Fuhrer photo

transplanted succulents.

In May of 1965 the Garden was host to the 11th Biennial Convention of the Cactus and Succulent Society of America, and during the convention a highlight was the official dedication of our new Leaf Succulent Lath House by His Honor, Mayor Milton Graham of Phoenix. In the photograph (bottom of page 100) are also pictured Board Chairman John H. Eversole, Board Member Reg Manning, your editor and Rev. Gerald Wright. Board Members Mildred May and James Cahill also participated.

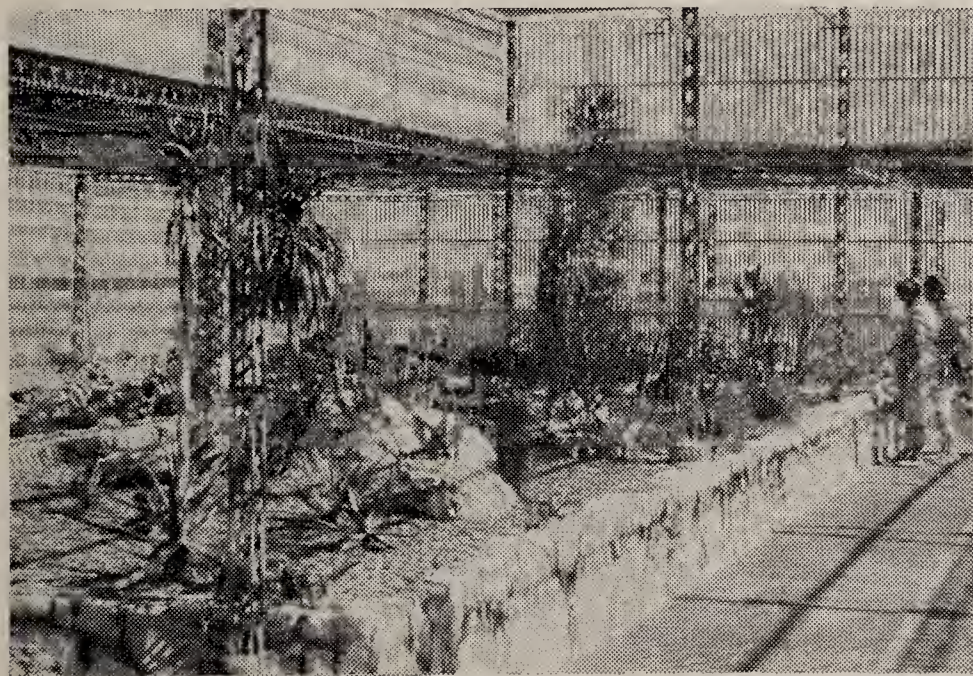


Needless to say, the dedication in the presence of so many of the Garden's good friends was an exceptionally memorable event.

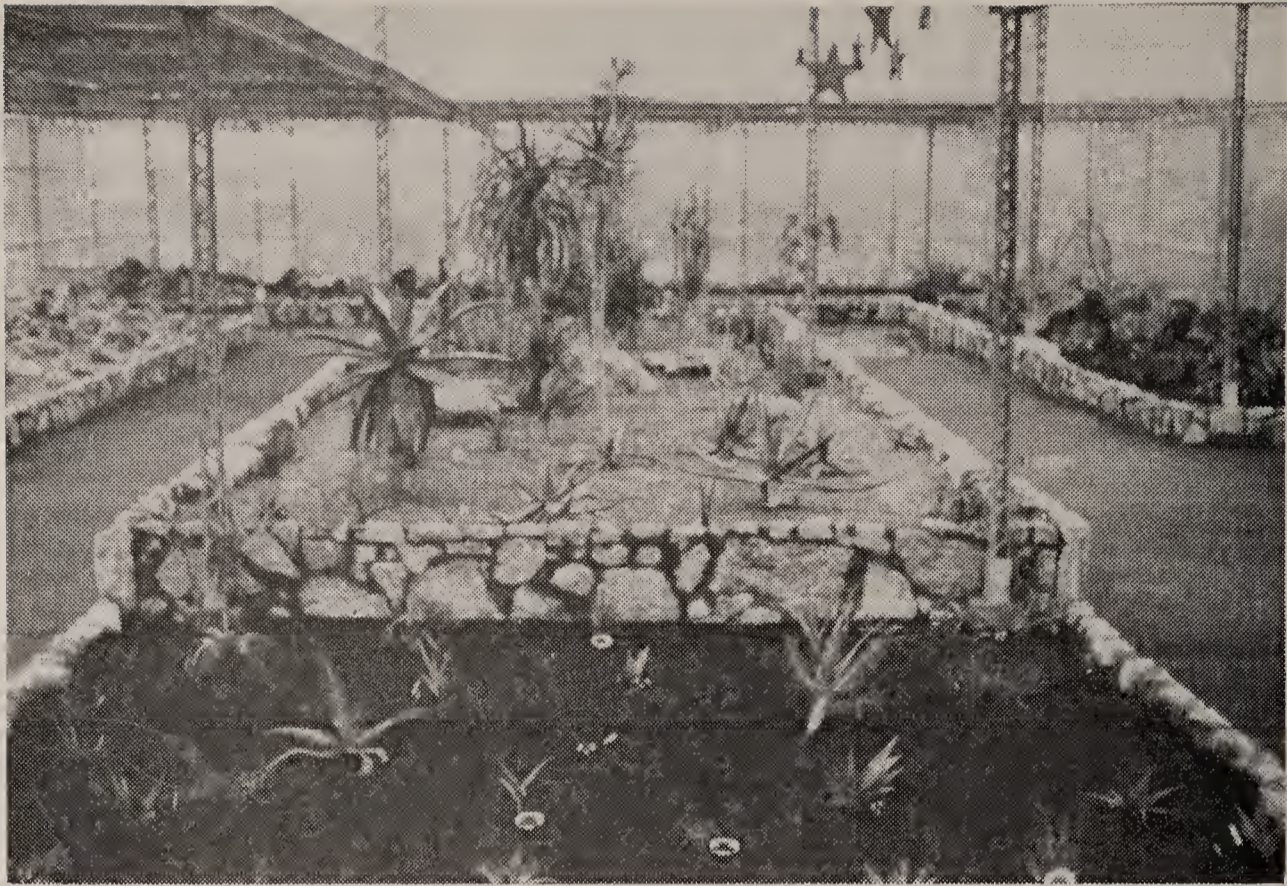
When the summer heat abated, the landscaping of the lath house was begun by John Weber, and, after two months of careful work, the planting was completed and the building opened to the public on November 1, 1965. Meanwhile, in the older building, planting beds were rebuilt and the cactus rearranged and replanted.

Visitors to the Leaf Succulent House will find 830 different species, all arranged according to family, in a 50' by 100' building with a stepped roof, 12' high in the center section and 8' high elsewhere. The planting beds in the center and along the sides are from one to three feet high and are filled with a special planting mixture made up of one-third decomposed granite, one-third sand and silt, and one-third cottonseed hulls.

The temperature range in the lath house is narrower than outdoors, the low in winter being six to eight degrees higher than outside, and the high in summer being comparably lower.



The fascinating shapes and colors of the leaf succulents are set off by a variety of Arizona rocks. The white stone, for example, that the center planting beds are constructed of, is a calcareous and silica stone from the Bloody Basin area, sixty miles north of the Garden. The large red jasper boulders come from the Black Canyon area, fifty miles north, and the colorful red

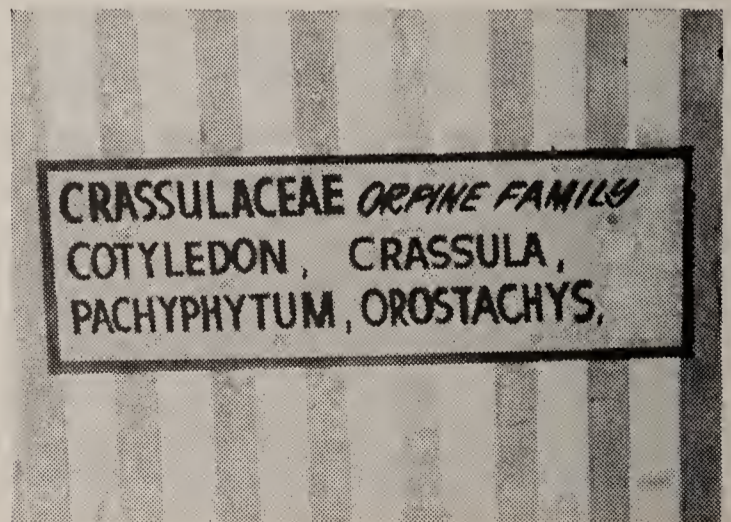
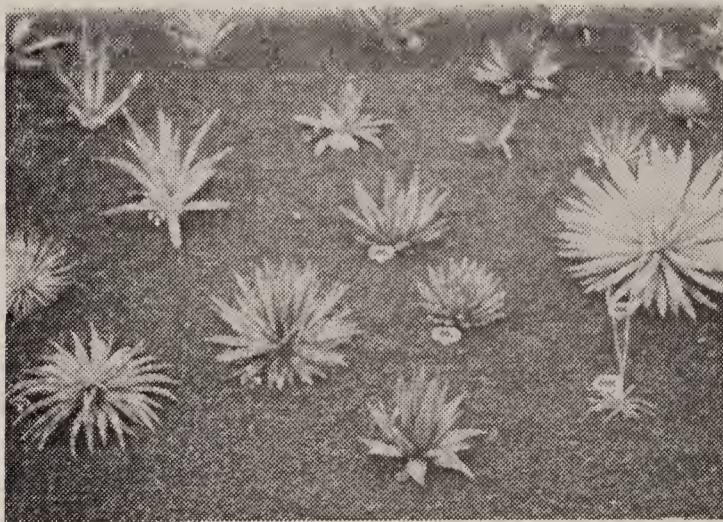


sandstone in the beds, as well as the black basalt (also known as “malpais”) come from Northern Arizona. The surfaces of the beds are covered with volcanic cinder mulch, both black and red, from an area near Flagstaff.

Besides the beds, there are also individual elevated display cases for miniature plants and for succulents like the African Lithops which must be protected from our summer rains.

The Garden has experimented with a number of methods of labelling plants, the aim being to have all plants labelled accurately and legibly without detracting from the appearance of individual plants or groups. In two photographs below you will see our final selection of sign styles. Large signs, fastened to the lath walls, identify plant family groups. The smaller labels, seen in the photograph of a section of the agave bed, are made of plastic tape embossed with large letters and mounted on heavy-weight rigid white plastic.

The new Leaf Succulent Lath House will enable the Garden to display its plant collections more effectively for visitors and students. We hope all the Garden’s Members will visit it and enjoy it soon.

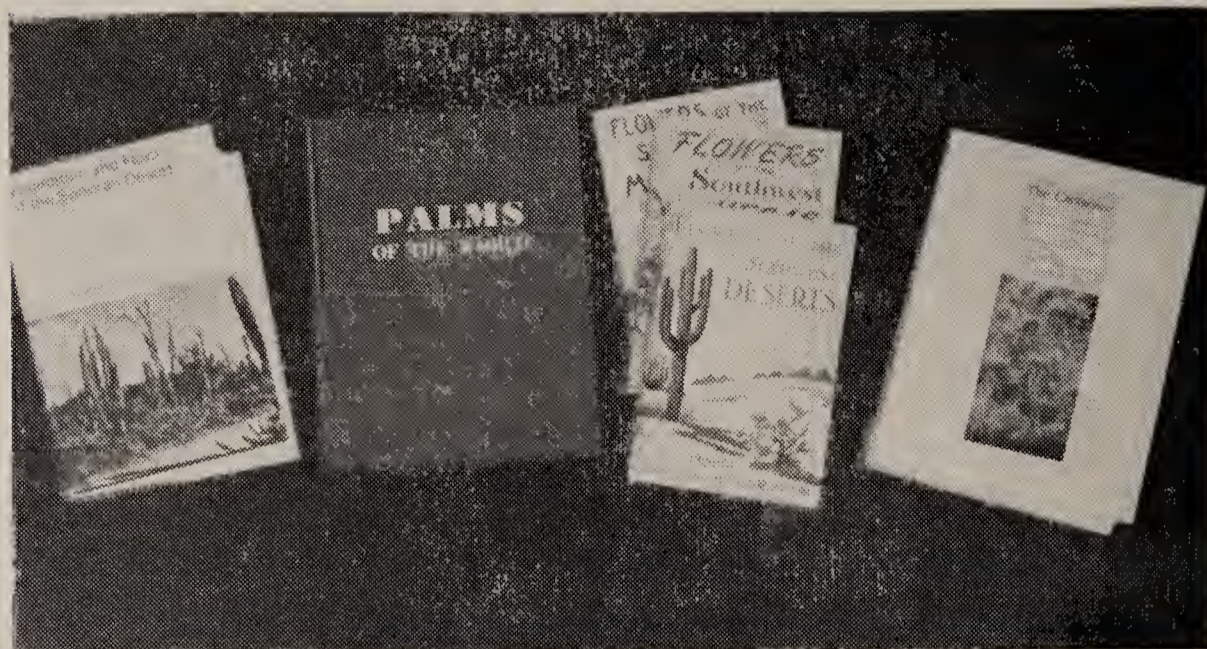


WILDLIFE OF THE DESERT



The Desert Horned "Toad" (*Phrynosoma platyrhinos*) is, of course, a lizard and not a toad, but its flat, round shape explains the mistaken label. A large adult may be the size of one's hand, but the babies are no more than the size of a quarter.

RECENT BOOKS



New books and reprints of older ones frequently cross the Editor's desk, some of them additions to our library, others acquired for sale in our bookshop. The following are among the recent books that may interest our Members. All are in our library, and those marked (*) are also for sale in our bookshop.

***VEGETATION AND FLORA OF THE SONORAN DESERT**, by F. Shreve & I. L. Wiggins, Stanford University Press, \$22.50; 2 vols., 1740 pp., illus. The outstanding up-to-date work on the Sonoran Desert. Incomparable.

DIE CACTACEAE, by Curt Backeberg. Fischer Verlag. 6 vols., 4041 pp., illus. In German. English translation should be published in 1966. Not all botanists accept Backeberg's "splitting" of species, a concept more popular in Europe than elsewhere, but this work is the most up-to-date and comprehensive since World War II.

***THE CACTACEAE**, by N. L. Britton & J. N. Rose. Dover Publications, \$20.00; 2 vols., 559 pp., illus. One of the classic works in the field, which has been out of print and is now reissued. The source for all present-day works, still of great value to the serious student.

***PALMS AND CYCADS**, by William Hertrich, Huntington Botanical Gardens, \$5.00; 142 pp., illus. A good general book,

with information on cultivation, by the Curator Emeritus of the Huntington Gardens.

PALMS OF THE WORLD, by James C. McCurrach. Harper & Bros., 325 pp., 400 illus. Exceptionally well illustrated and intelligently designed for the palm-growing specialist. Sound discussions on cultivation.

BROMELIADS IN CULTIVATION, by Bob and Catherine Wilson. Hurricane House. Vol. I, 129 pp., illus. Written for amateur growers, profusely illustrated with color photos. All aspects of cultivation discussed.

A GLOSSARY OF BOTANIC TERMS, by B. Daydon Jackson. Hafner, 481 pp. Revised a number of times since original publication in 1909, this is where the "unfindable" term can be found.

AND DON'T FORGET —

***FLOWERS OF THE SOUTHWESTERN DESERTS** (Dodge), **FLOWERS OF THE SOUTHWESTERN MESAS** (Patraw), **FLOWERS OF THE SOUTHWESTERN MOUNTAINS** (Arnberger), Southwestern Monuments Assn.; \$1.00 each, 112 pp. each, illus. These three small books have proved their usefulness. Ideally, they should live in the car with your road maps when you drive anywhere in the Southwest.

ENCELIA FARINOSA

COMPOSITAE
Sunflower Family

BRITTLE-BUSH INCENSE-BUSH, INCIENSO



Flower stalk of *Encelia farinosa*.
(*Desert Wild Flowers*, E. C. Jaeger)

Encelia farinosa (*Encelia* — Christopher Encel, botanical writer; *farinosa* — mealy) is a low, compact, branching, 3' shrub, with ovate to oblong smooth or toothed leaves. Its green leaves give the plant a striking appearance in winter, but as summer weather approaches the leaves take on a silvery flannel-like coating that prevents loss of moisture through transpiration.

This is an abundant shrub, growing on dry, rocky slopes in Mohave, Graham, Gila, Maricopa, Pinal, Pima and Yuma Counties of Arizona, as well as

in the Colorado and Mohave Deserts of California, and Sonora, Mexico.

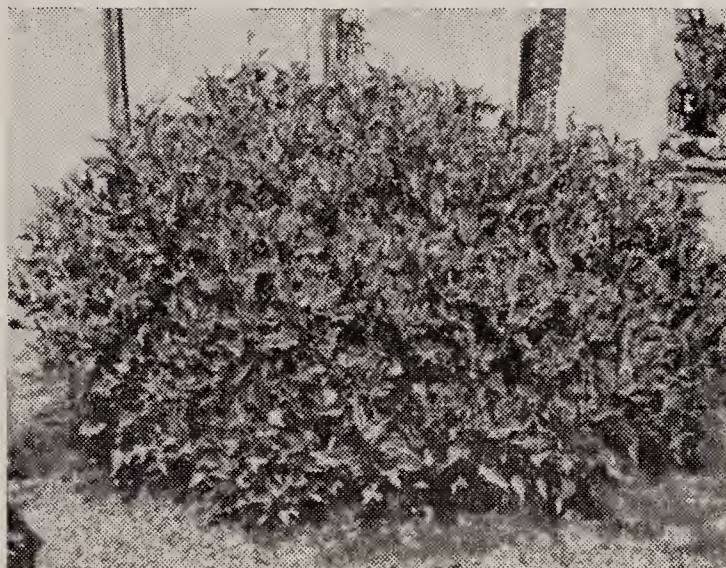
The solitary or paniced flower stalks rise above the top of the plant and bear lemon-chrome disk flowers about 2-2½" in diameter from November to May. They make a very attractive show of color among the bare rocks.

During periods of drought the leaves will dry up and eventually drop off, revealing the fat brownish-gray stems that store moisture until more is available for production of leaves. These stems are quite brittle. They also exude golden-yellow crystals which are gathered by Indians for use as incense. The Indians have chewed the resinous crystals and have also warmed and melted them to apply to the body for relief of aches and pains.

The plants are occasionally browsed by cattle, and often by bighorn sheep.

REFERENCES:

Kearney & Peebles, ARIZONA FLORA
Jaeger, E. C., DESERT WILD FLOWERS



DBG photo

A symmetrical six-year-old plant.
Three feet tall and six feet wide.

SILVER CHOLLA



DBG photo

Cylindropuntia echinocarpa, a 2'6" plant, silvery and bushy.

Cylindropuntia echinocarpa (echino — hedgehog, carpa — fruit) is a low densely branched cholla, about two to three, but occasionally four, feet in height, with a heavy head of silvery-spined branches that glitter in the sunlight.

The short woody trunk is spiny when young, but smooth in age. Stems or joints are turgid, about 3"-4" long, with numerous inch-long spines that are yellow when young and turn silver-grayish with age. Yellowish flowers, 1½" in diameter, with reddish streaks on the petals, appear in April and May. The short turbinate fruit is dry, quite spiny, bears very few seeds, and these seeds seldom germinate. Like most of the chollas, this plant depends upon vegetative reproduction by the rooting of the cholla joints which fall to the ground.

Many times a low, bushy "golden cholla" is observed growing along with the Silver Cholla, but it is merely a color form of the latter, and is most in evidence in the southern range of the plant. The range of *C. echinocarpa* extends from Nevada and Utah through Arizona and California along the Colorado River watershed to Baja California in Mexico.

Type location of *C. echinocarpa* is at the mouth of the Bill Williams River above Parker, Arizona. It can be found growing on dry mesas and along desert washes at 1000'-3000' elevation.

This cholla has no known value to either man or beast.

REFERENCES:

Benson, L., ARIZONA CACTI

Earle, W. H., CACTI OF THE SOUTHWEST



DBG photo

Terminal stem of *C. echinocarpa* topped with a spine-covered fruit.

An Australian Tree for Desert Gardens
BRACHYCHITON POPULNEUM R. Br. Fam. STERCULIACEAE
KURRAJONG
"Bottle Tree"



DBG photo

A twelve-foot tall tree of *Brachy-chiton populneum*.

BRACHYCHITON POPULNEUM is a large upright tree with a tapering trunk rising from a broad base. Normally it is deep-rooted, reaching groundwater level. The crown is dense and heavy and the tree reaches an overall height of twenty to sixty feet.

Leaves of the Kurrajong are ovate to ovate-lanceolate in shape, but the leaf margin will vary from entire to deeply lobed. These finger-like lobes will number three or five. The glossy light green leaves are long-petioled and quake in

the slightest breeze. Flowers are bell-shaped and borne in profusion in small axillary panicles. The calyx is broadly campanulate and the petals are absent. Calyx segments are white to cream spotted with brown. Diameter of the flower is about three fourths of an inch. The pod is a woody follicle near-ovoid and boat-shaped. The stalk is one to two inches long and the pod attains a length of three inches. A split along one side of the follicle exposes the bristly seed. These seeds are imbedded in a honeycomb structure with numerous bristles.

BRACHYCHITON POPULNEUM is tender to low temperatures when young. A mature tree, however, has withstood 17 degree F. at the Desert Botanical Garden without damage. It will withstand high temperatures and has proved



DBG photo

A few of the variously-shaped leaves found on *B. populneum*.

quite drought-resistant. Suitable growth can be attained in a variety of soil types ranging from deep sandy loam to shallow rocky soil overlying bedrock. Fresh seed germinates with no pretreatment being necessary. Seedlings and young trees need protection from browsing animals.

The Kurrajong is native to inland regions of Queensland, northeastern and eastern Victoria, and New South Wales, Australia. It is extensively utilized in Florida, California, and Arizona as a street and garden tree, but is seldom encountered in a desert garden. This species is a stock item in many nurseries where it is sold as "bottletree". and a more frequent application of it should be made in the desert landscape.

REFERENCES:

Bailey, L. H. . . The Standard Cyclo-
pedia of Horticulture.

Lord, Ernest E. . . Shrubs and Trees
for Australian Gardens.

. . . Australian Plants Vol. I, No.
9, pp. 2-8.



DBG photo

B. populneum seed pods, often used
by florists in dry arrangements.

GARDEN ACTIVITIES

NOVEMBER

Tues.	2nd	CACTOMANIACS meeting	8 P.M.
Wed.	3rd	CLASS—Deserts, how formed, and their plants	3 P.M.
Thurs.	4th	ILLUSTRATED LECTURE—Arizona Cacti in Flower	3 P.M.
Sun.	7th	ILLUSTRATED LECTURES—Arizona Cacti in Flower	3 & 4
Wed.	10th	CLASS—Desert Succulent Plants	3 P.M.
Thurs.	11th	ILLUSTRATED LECTURE—Arizona Wildflowers	3 P.M.
Sun.	14th	ILLUSTRATED LECTURES—Arizona Wildflowers	3 & 4
Wed.	17th	CLASS—Culture of Succulent Plants	3 P.M.
Thurs.	18th	ILLUSTRATED LECTURE—Arizona Wildflowers	3 P.M.
Sun.	21st	ILLUSTRATED LECTURES—Arizona Wildflowers	3 & 4
Wed.	24th	CLASS—Identification of Trees & Shrubs	3 P.M.
Thurs.	25th	ILLUSTRATED LECTURE—Arizona Birds & Animals	3 P.M.
Sun.	28th	ILLUSTRATED LECTURES—Arizona Birds & Animals	3 & 4

SAGUAROWLAND

BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

Vol. XIX

December, 1965

No. 10



Desert Botanical Garden photo

Cylindropuntia acanthocarpa. This plant is characteristically low and spreading.



REG-MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona. P. O. Box 5415, Phoenix 10. Saguarioland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription \$5.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor
LILLIAN DIVEN, Associate Editor

Volume XIX

December, 1965

No. 10

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GARDEN OPEN DAILY 9 A.M.—5 P.M.
Including Week-ends and Holidays

OUR OLD-NEW CACTUS HOUSE

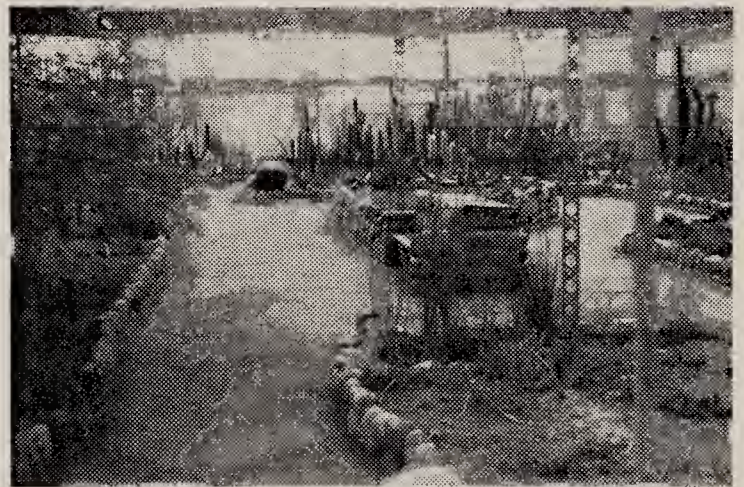
Our new Leaf Succulent Lath House, described in the last issue, gave us the opportunity to refurbish the original house for its new role. The removal of leaf succulents to their new home meant that we had fifty per cent more space in which to display the tender varieties of catus. This was a welcome chance to do a number of things we had wanted to do for some time. First of all, we demolished all the old planting beds, removed all the soil, and excavated fifteen inches deeper. The extra area was backfilled with the same soil mixture used in the Leaf Succulent House — a mixture of silt, sand, decomposed granite and cottonseed hulls. We changed the conformation of the planting beds, and now there is no place where one is, standing on the path, more than ten feet from any plant.

The cactus are now rearranged, phylogenetically. There are new signs, and each plant has been relabelled to aid botanists, students and visitors. During the relabelling, each plant was checked in our Accessions Book, and the currently acceptable botanical name determined.

All the paths in the Cactus House have been resurfaced with asphalt, and all beds have been edged with black lava rocks, Arizona "malpais".

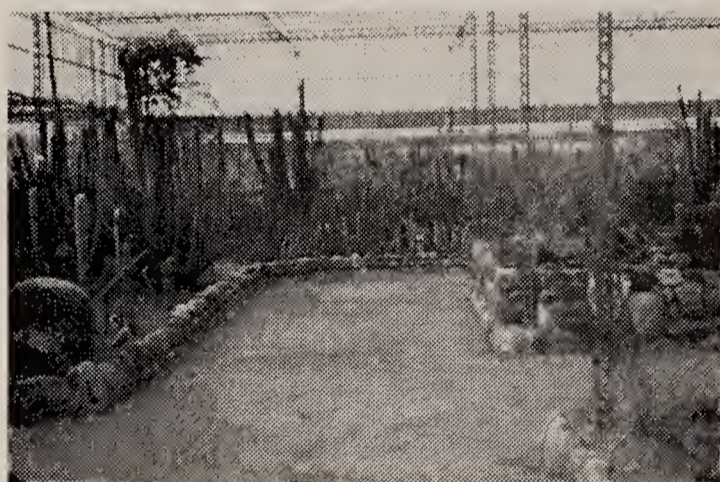
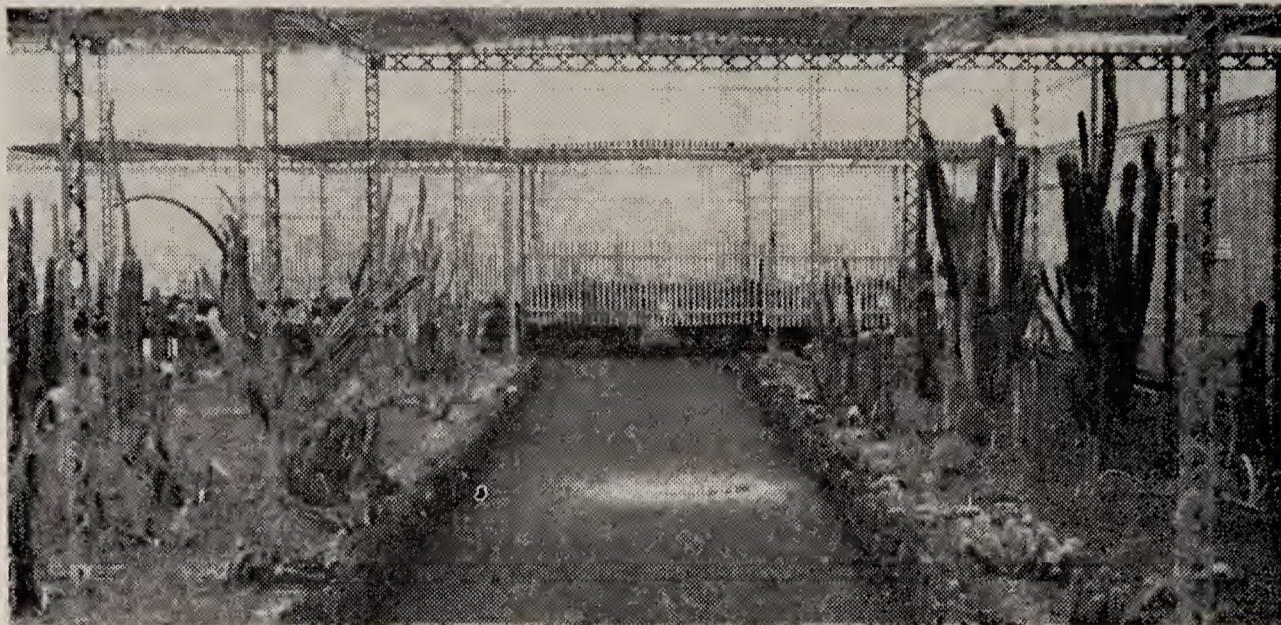
An area 10' x 20' in the northeast corner of the lath house is reserved for an air-conditioned glass-fronted room to be built in the spring for the growing of Epiphyllums, Rhipsalis and other tender tropical cacti. These colorful flowers will be quite an attraction for our visitors in April, May and June.

THE FIRST pair of "before and after" photographs taken in the Cactus House. Both were taken at the entrance. In the "after" picture, below, you enter and are met by this dramatic effect, a wall of black lava rock from northern Arizona makes a background for a grouping of *Cephalocereus senilis*. Handsomer than the old gray river rocks in the "before" picture, isn't it?

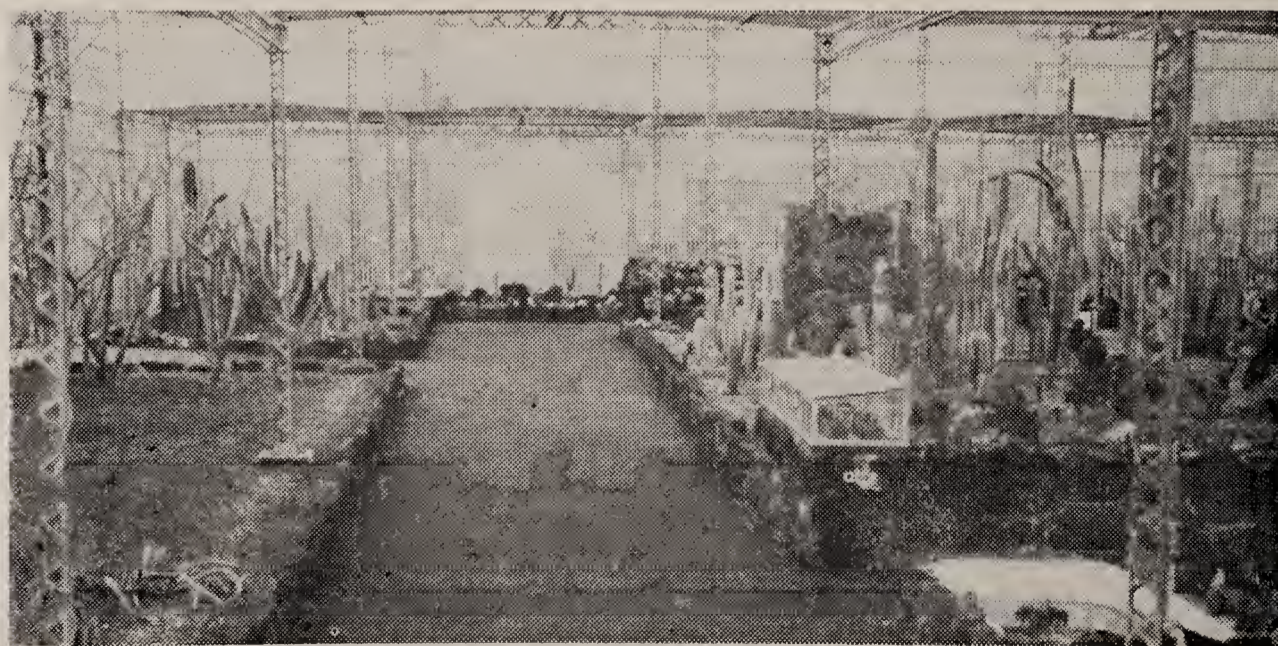




IN THE "before" picture you can see one of our problems. As our collections grew, we were unable to space the plants far enough apart to get good visual effects. We think you will agree that the "after" picture shows plants to better advantage. When plants are well spaced like this, visitors to the Garden can see cactus that they might have overlooked before.



COMPARISON OF the "before" and "after" pictures here shows how much the interior of the Cactus House has been changed. Realignment of the center bed affords a maximum area under the 12' high section for the tallest cactus. The "fishpond" is perhaps unorthodox in shape, but it does contain fish — the Desert Pupfish, *Cyprinodon maculatus*, found at Organ Pipe National Monument.





BESIDES IMPROVING the Cactus House with deeper beds and wider paths, we have also added new legible signs. Those on the lath walls behind each family group of cactus give the genus, common name and country of origin of the plants. These signs supplement the Nature Walk booklet and make the visitor's walk through the Garden a really informative self-conducted tour.



NOTICE THE back-to-front dimensions of the beds — only ten feet in the new ones, as contrasted with thirty in the old. The redwood rail fence in the “after” picture is a support for climbing and trailing types of cactus. We have added large rocks and boulders to some of the beds to highlight individual plants that are perhaps small, but merit a second look from the visitor.



PHACELIA CRENULATA
DESERT HELIOTROPE

HYDROPHYLLACEAE
Waterleaf Family



Details of *P. crenulata*. (Drawing by J. Janish, "Flowers of the S. W. Deserts")

Phacelia crenulata (*phacelia* — cluster, *crenulata* — minutely-notched in leaf margins) is a green-stemmed annual four to sixteen inches tall, with one-to-two-inch-wide leaves that give off a strong onion-like odor.

This is Arizona's most abundant species found below four thousand foot elevation on plains, mesas and foothills. The prevailing phase in Arizona is var. *ambigua*.

These plants are quite conspicuous from February to June at the different elevations with their violet-purple (or sometimes white) flowers arranged on a flowering stalk resembling a scorpion's tail.

Persons with skin allergies should be cautious about picking these flowers or walking among them, as the leaves and stems are covered with long slender hairs and glandular pubescence which will cause poisoning somewhat similar to that of Poison Ivy (*Rhus radicans*). The Garden has helped identify this poisoning for several local doctors who last year had to hospitalize patients who had unknowingly come in contact with the plant.

P. crenulata ranges through western California and all of Arizona except its northeast portion.

REFERENCES:

Jaeger, E. C., DESERT WILDFLOWERS
Kearney & Peebles, ARIZONA FLORA



"Scorpion tail" shape of *P. crenulata*. (From Jaeger, "Desert Wildflowers.")

WILDLIFE OF THE DESERT



Chipmunks are the connecting link between ground and tree squirrels, and combine the most attractive features of both. The chipmunk seen above is *E. quadrivittatus*, found in the high deserts of N. Arizona. *E. dorsalis*, more faintly striped, is found at lower altitudes.

CYLINDROPUNTIA ACANTHOCARPA
BUCKHORN CHOLLA

CACTACEAE
Cactus Family



DBG photo

Cylindropuntia acanthocarpa, a 3' tall plant. Note short terminal joints.

Cylindropuntia acanthocarpa (acantho—thorny, carpa — fruit) is an open-branched shrub either sprawling in form or growing upright to six feet high, and having a short main trunk. The long alternate branches become quite woody and are about one inch in diameter. Terminal joints are one to three inches long, later maturing to about twelve inches long, are cylindrical and bear elongated compressed tubercles of three - quarters to one-and-one-quarter inches long.

Spines are eight to twenty in a cluster, acicular, three - quarters to one-and-a-half inches long. Glochids are quite numerous, small and yellow.

The flowers are rotate with yellow-to-red streaked petals, appearing through April and May, and are followed by a fruit with few tubercles. The upper

part of the dried fruit bears stout brown spines one-half inch long. Seeds are sharply angular and creamy - yellow in color, and are one-quarter of an inch broad.

C. acanthocarpa ranges from two to four thousand feet in elevation, through western Arizona, southern Utah and Nevada, eastern California and northern Sonora, Mexico. It is quite common in sandy washes and flats. The plant is low and sprawling in its hot lower elevations and can be confused with *C. echinocarpa* where both are growing together in the low desert.

The Pima Indians have been known to steam the flower buds, remove the spines, and eat the buds along with saltbush greens.

TYPE LOCALITY — Cactus Pass in the Cottonwood Range, Hardyville-Prescott Road, Arizona.

DISTRIBUTION — Arizona, Utah, Nevada, California, and Sonora, Mexico.

REFERENCES:

Benson, L., ARIZONA CACTI.

Earle, W. H., CACTI OF THE SOUTHWEST

Kearney & Peebles, ARIZONA FLORA



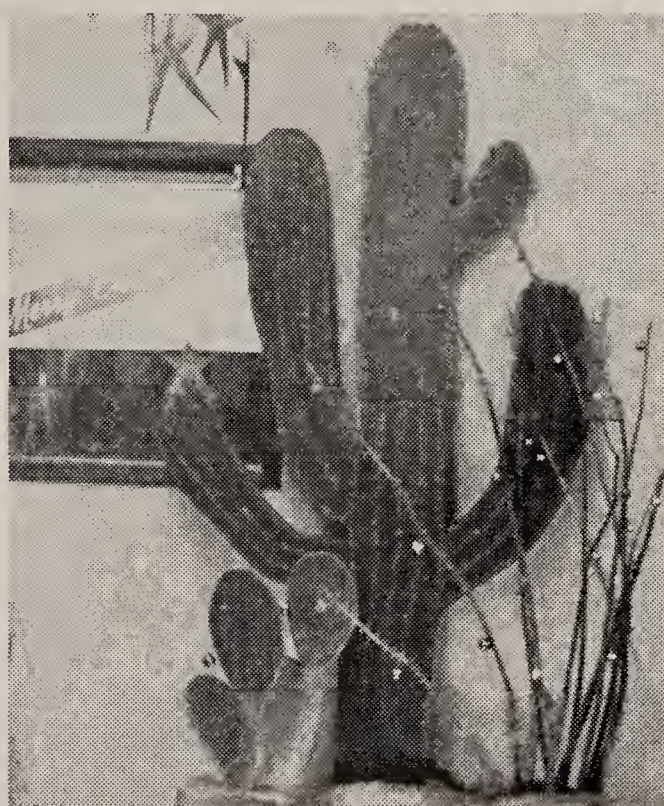
DBG photo

Fruit of *C. acanthocarpa*, showing the clustered spines on the tubercle.

CHRISTMAS "UNDER DESERT STARS"



Like everyone else, the Garden likes "something a little different" for holiday decorations. This year the ladies of the Cactomaniacs put their very un-maniacal brains to work and chose "Under Desert Stars" for a theme. They made mobiles of multicolored stars, sprayed and sprinkled with glitter, and hung them in the auditorium, visitors' building and even the lath houses. Also, large cardboard saguaros and real ocotillo and prickly pear were decked with ornaments. The ladies above, photographed unawares by Mr. F. E. Baselt, are Mrs. Baselt, Mrs. J. C. McDougall, Miss Virginia Fraser, Mrs. H. E. Pratt, Mrs. O. Friedrichs and Mrs. W. H. Earle. All of the "star makers" are listed on p. 119.



A HYBRID MESQUITE FOR DESERT GARDENS



DBG photo

A five-year-old tree, approximately twelve feet tall.

For many years the Chilean Mesquite, *Prosopis chilensis*, has been used in southern Arizona gardens. Its rapid growth rate and lush appearance make it a desirable item for the desert landscape, but a shallow root system with a tendency to blow down in high wind is objectionable.

The common Mesquite of central Arizona is *Prosopis juliflora* var. *velutina*, called the Velvet Mesquite. This species has an extended flowering period ranging from April to August and covers the flowering term of *Prosopis chilensis*. Natural cross-pollination is a common occurrence, and much of the seed collected from Chilean Mesquites produce hybrid plants of superior quality.

The hybrid product of this cross has a medium to rapid growth rate in direct

ratio to available moisture. It is a medium-sized tree with a rounded crown which is easily pruned into a canopy above head height. The leaves and leaflets are larger than those of the Velvet Mesquite and give a greater density to the crown. A deep tap root system is gained from the native parent species and reduces the tendency to blow down. Spines when present are short and blunt and there is no stem suckering from the main trunk as is so frequent with Velvet Mesquite.

For landscaping use this hybrid mesquite is a multi-purpose plant. Its most important role is in providing shade during the hot days of summer. With selective pruning and shaping, it makes an excellent specimen tree, and when a screening effect is desired, it can be forced to branch low, providing a dense spreading crown.

The F1 hybrid of *Prosopis juliflora* var. *velutina* and *Prosopis chilensis* is highly recommended for its rapid growth rate, hardiness, resistance to wind damage, and excellent landscaping qualities.



DBG photo

Leaflets, larger than those of the native parent. Spines reduced.

HABITAT OF CYLINDROPUNTIA RAMOSISSIMA

An excellent picture of *Cylindropuntia ramosissimarom* habitat. This plant is somewhat less than two feet tall, and is growing in typical rocky soil of desert floors and washes in western Arizona. Note the heavy woody base which distinguishes it from other chollas. Photographed by Roy Miller. (See SAGUAROLAND BULLETIN, October 1965, for an article on *C. ramosissima*.)



Christmas "Under Desert Stars" (cont.)

Our thanks to these Cactomaniacs members for star-making and mobile-making — in short, for Christmas-making: Mr. and Mrs. Fred Baselt, Mrs. Otto Friedrichs, Mrs. John McDougall, Mrs. Weston Cook, Mrs. Z. Maye Brady, Mrs. J. S. Houck, Mrs. Alline Foss, Mrs. R. I. Turner, Mrs. C. Cederstrand, Mr. and Mrs. Hiram Pratt, Miss Virginia Fraser, Mrs. L. W. Laizure, and Mr. and Mrs. A. Paul Newman.

FIELD TRIP TO SAGUARO LAKE



The Garden's Fall Class in desert plants concluded with an 11-day field trip. Twenty-three class members botanized along the Beeline Highway to Saguaro Lake (for lunch, where these photos were taken), and up the Beeline for a further ten miles before returning home.



GARDEN ACTIVITIES

DECEMBER

Wed.	1st	CLASS—Culture of Desert Trees & Shrubs	3 P.M.
Thurs.	2nd	ILLUSTRATED LECTURE—Arizona Scenics	3 P.M.
Sun.	5th	ILLUSTRATED LECTURES—Arizona Scenics	3 & 4
Tues.	7th	CACTOMANIACS meeting	8 P.M.
Wed.	8th	CLASS—All-day Desert Field Trip	9 A.M.
Thurs.	9th	ILLUSTRATED LECTURE—Leaf Succulent Plants	3 P.M.
Sun.	12th	ILLUSTRATED LECTURES—Leaf Succulent Plants	3 & 4
Thurs.	16th	ILLUSTRATED LECTURE—Collecting Plants in Mexico	3 P.M.
Sun.	19th	ILLUSTRATED LECTURES—Collecting Plants in Mexico	3 & 4
Thurs.	23rd	ILLUSTRATED LECTURE—Arizona Cacti in Flower	3 P.M.
Sun.	26th	ILLUSTRATED LECTURES—Arizona Cacti in Flower	3 & 4
Thurs.	30th	ILLUSTRATED LECTURE—Arizona Wildflowers	3 P.M.