to the Zoo may contact Tim Aller at the San Diego Zoological Gardens."

* * *

One of the Society's members remarked not long ago that since the seed bank has proved to be a success, the next step should be a "seedling bank," where members with surplus young plants might exchange them for others which they want. It is easily demonstrated that there is a surplus—for example, at a recent meeting in San Diego, members donated seedlings of such rarity and desirability that in a few minutes $118.00 was raised, of which the local group was so kind as to send $50.00 to headquarters as a contribution toward the costs of publishing PRINCIPES.

This is an intriguing idea, and merits some thought. Probably if there were a seedling bank it would have to be divided into regional sections, to simplify transportation and handling. Other details would have to be worked out, also.

The chief need is for some of those "dedicated volunteers" who would want to take on this interesting chore. Are there any raised hands?

* * *

Mrs. M. S. H. Kneale, who has been treasurer of the Society since April, 1962, has resigned, due to pressure of other duties. We wish to express to her our sincere gratitude for the fine job she did in this exacting position.

Mr. and Mrs. T. R. Baumgartner have offered to take on the treasurer's work until election time in April. These dedicated palm enthusiasts are true friends and helpers of the Society.

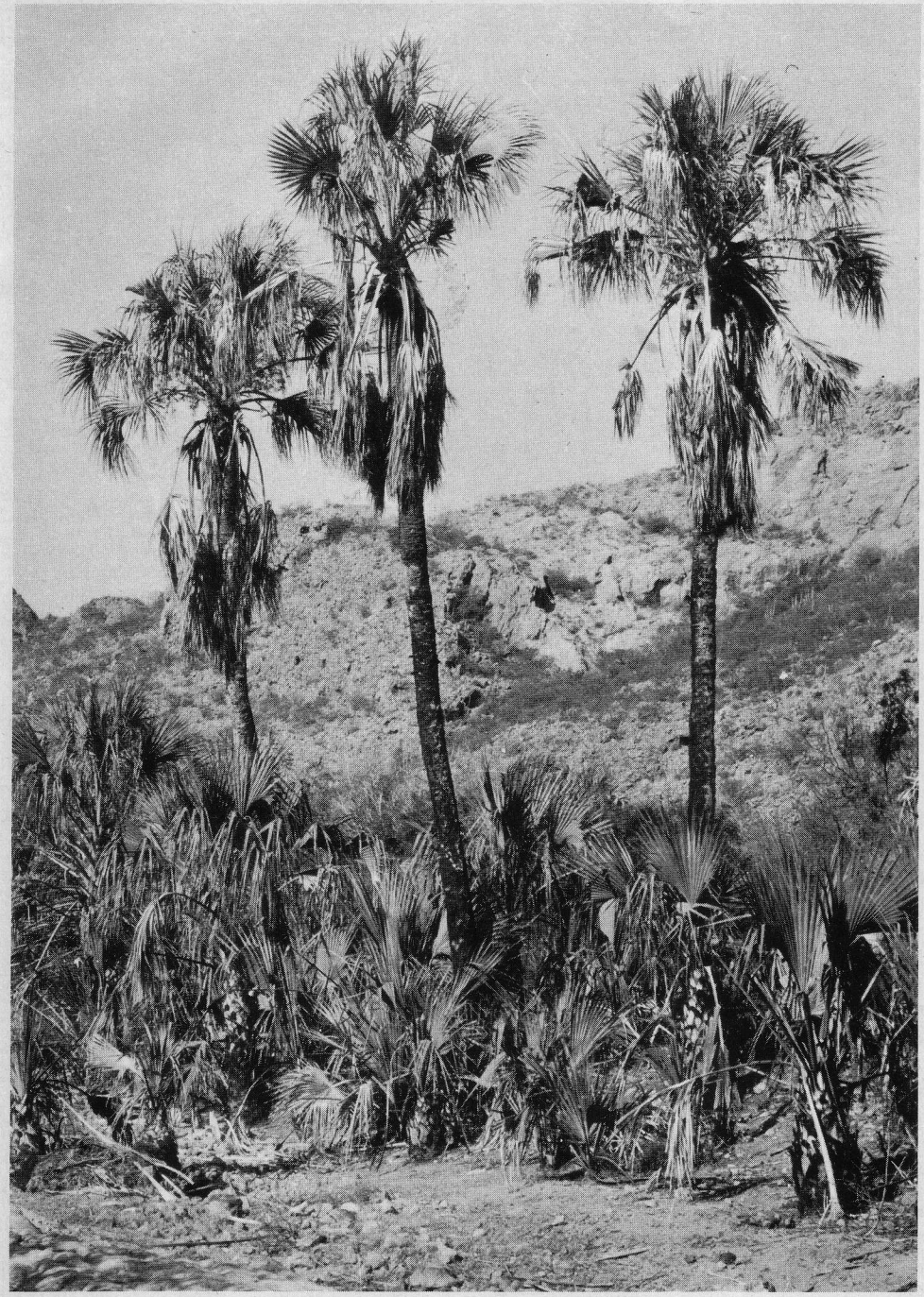
LUCITA H. WAIT

Palms along Mexico's West Coast Highway

ROBERT O. SCHNABEL
Photographs by the Author

When one crosses the Mexican border south of Yuma, Arizona, and heads southeastward along the highway from San Luis to Santa Ana, Sonora, one's thought is how anything could live in this burning desert. Only a few plants and animals have been able to adapt themselves to life on these seemingly endless mountains of buff colored sand and ragged lava flows. This is the Gran Desierto, a two hundred mile expanse of 120° F. summer temperatures, ending in the foothills of the Sierra Madre Occidental mountains where the traveler can see the first palms in the little towns of Caborca, Altar, Santa Ana, and Magdalena. These palms are seedling descendants of *Phoenix dactylifera* brought in from Spain and Africa by the Spanish settlers almost 400 years ago. Scattered among the *P. dactylifera* are numbers of *Washingtonia filifera*, native to the foothill canyons of the Sierra Madre, and also *W. robusta* that have been brought by humans across the Gulf of California and northward from its native area in southern Baja California.

The northernmost outliers of the Sonoran palmetto, *Sabal uresana*, reputedly exist in a remote canyon in the Babisso Range of the Sierra Madre about thirty miles southeast of Magdalena. But, it is not until you have turned due south at Santa Ana and crossed about seventy-five miles of arid plains that you can easily



1. *Sabal uresana* at San Carlos Bay, Sonora.

see the first *S. uresana*. These are in the Sonoran state capital city of Hermosillo.

Hermosillo, a modern prosperous commercial and agricultural center, is situated at Latitude 29° North, 75 miles inland from the Gulf of California and only 600 feet above sea-level. The area has a long hot summer season and a short warm winter. Climatically it is classified as humid, semi-arid, rain deficient at all seasons. Its less than six inches of rain falls from summer thunder storms and from occasional winter storms from the northwest. Water for irrigation comes from the mountains behind the city where up to 25 inches falls during the year and runs off to the sea by way of the Río Sonora and Río San Miguel water sheds. Some January nights become very cold but frosts are rare and separated by many years. Tropical vegetation such as royal poinciana, *Plumeria*, and papaya abound, and Hermosillo is probably the northernmost (and very marginal) range of *Cocos nucifera* on the west coast of North America. In the past ten years a few coconuts have been planted as ornamentals and one specimen near the pool of the Gandero Motel has two feet of trunk. The native *Sabal uresana* is used extensively to line streets in the modern residential areas, but *Phoenix* and *Washingtonia* are the predominant palms.

Moving southward along Mexico's Highway 15, no palms are encountered until the Gulf Coast is reached at Guaymas where *Cocos nucifera*, and *Roystonea regia* have frequently been planted along the beaches. Desert mountains meet the sea northwest of Guaymas and three species of palm can be seen growing wild along the intermittent streams in the canyons of these rocky cactus-studded ranges. The summer air temperatures at Guaymas are daily over the 100° F. mark and the water temperature of the Gulf ranges near 90° F. In winter, air maximums are in the 80's, minimums in the 50's, and water temperature in the 50's.

Sabal uresana can be seen readily at and near San Carlos Bay, reached by good gravel road 15 miles from Guaymas. This is a fine tree ranging to 25 feet in height with a self-cleaning trunk, and long petioles bearing large dark green fans with the typical *Sabal* costapalmate curve. The fans are covered with a glaucous material that gives a whitish cast to the fan and results in the local name, *palma blanca*, white palm. This is an excellent tree for the desert areas of Arizona as well as the desert valleys and other hot interior valleys of California.

Perhaps a dozen specimens of *Erythea armata* can be found mixed with the hundreds of *S. uresana* at San Carlos. The *E. armata* here are short and scrubby and resemble their cultured domestic California garden cousins only in the conspicuous glaucous blue coloring. A non-botanical description of *E. armata* would state that it is similar to the ubiquitous *W. filifera* except for its startling blue-grey coloring, and its long arching strands of creamy colored flowers. *E. armata* is popularly termed the great blue hesper palm or the Mexican blue fan palm.

On the tops and sides of the rocky cliffs and mountains surrounding San Carlos Bay may be found perhaps a dozen specimens of a green *Erythea* described by Dr. L. H. Bailey as *E. clara*. Some experts and palm fanciers feel that this palm is only a color variation of *E. armata* and should not be known as a true species. The reasoning comes from the fact that *E. armata* in the canyons of Baja California exhibits a green form at the higher elevations of its range, but does not take into account the fact that

2. *Erythea clara* at San Carlos Bay, Sonora.

Dr. Bailey did recognize certain botanical differences, although even he exhibits some doubts as to whether this is really a separate species. *E. clara* survives in the most austere of conditions, growing in cracks on rocky hillsides, under torrid desert skies with little rain during the year, and only the humidity of the Gulf to sustain it through the long dry spells.

About 70 miles southeast of Guaymas at the city of Navajoa a paved road branches into the foothills of the Sierra Madre 30 miles eastward to the town of Alamos, the former silver capital of western Mexico. From Alamos, primitive roads branch out into the mountains and canyons where *S. uresana* can be seen in great numbers. Here, also, in considerable number can be found *Erythea aculeata.* Both of these palms extend high into the mountains, almost to the pine forests, and are regularly subjected to freezing temperatures and an occasional snow storm. *E. aculeata,* whose Latin name means prickly, is a medium-sized palm rarely reaching twenty feet in height. Its trunk is slim, under one foot in diameter. Its fan is dark green and glaucous. This palm is thriving in California desert conditions and should be an excellent tree for the hotter palm growing areas of California and Arizona. In this area of southeastern Sonora, *S. uresana* and *E. aculeata* have been, in the past, so abundant that they enter the economy of the region in the form of roof thatch, building logs, and in the case of *S. uresana,* a succulent food. They are fast succumbing to the ravages of mankind, and the number of mature specimens is rapidly diminishing.

South of Navajoa, just past the Sonora-Sinaloa border, the terrain changes from desert to thorn forest, characterized by a humid, semi-arid climate, deficient in rainfall during the winter months, but amply supplied in the summer by tropical thunder storms from the south and by run-off water from the mountains to the east. Temperatures are hot in summer, warm in winter, and frost is virtually unknown. Here, on the wide fertile delta of the Fuerte River is the booming commercial city of Los Mochis, center of a vast cattle, mining, rice, and sugar growing area. At latitude 26° North and only a few hundred feet above sea level, Los Mochis at first glance looks like the other sweltering Mexican west coast cities; but it possesses one asset that should make it well known throughout the botanical world — Jardín Botánico "Las Palmas."

We should thank one man, Ing. Mario Zamora C. for his untiring efforts in bringing about the opening of this garden to the general public, and for bringing about its restoration from former neglect to its emerging status as one of the fine palm gardens of the world. Behind Jardín Botánico "Las Palmas" lies a story of pioneering, revolution, and persistence. Briefly, the story is this. At the turn of the century, a Mr. Johnson went to Los Mochis as the head of the then new sugar refinery. Once established in Los Mochis, he acquired twenty acres of land, built a home on the edge of the plot and sent to New York for landscape architects to lay out a formal English garden—with Mexican adaptations. One section he devoted to a collection of all the species of plant life growing along the west coast of Mexico, and the second section he reserved exclusively as a palm garden. He then proceeded to send to all parts of the world for seeds of palms which he germinated and placed in his garden.

During the 1920's and the era of the Mexican revolution Mr. Johnson faded from the scene and the garden, although well established at that time, was neglected and allowed to go wild. In the

3. A double colonnade of royal palms, *Roystonea regia*, at Jardín Botánico "Las Palmas," Los Mochis, Sinaloa.

decade of the 1950's the sugar mill and the adjacent Johnson properties were acquired by the Compañia Azucarera de Los Mochis, S. A. This company, in turn made the good decision to engage as its superintendent a young chemical engineer named Mario Zamora, and fortunately Señor Zamora happened to be a palm enthusiast who immediately recognized the worth of the gardens that had come under his control. Mario has now convinced the company that these gardens are a thing to be preserved for posterity and at present there is a crew of workers grubbing out the brush, trimming and readying the lawns, paving the streets, and generally making the gardens ready for the visitors that will surely stream to its gates. The gardens may now be visited by asking permission at the company offices.

At the Los Mochis gardens several mature examples of each of more than seventy species can be observed as well as thirty other species growing in the lath house. Included are such rare trees as *Pritchardia Gaudichaudii*, *Aiphanes caryotaefolia* and a spectacular unidentified *Sabal* distinguished by its lack of trunk and its plethora of long (up to 20′) arching petioles terminating in ten-foot fans. At the end of Royal Palm Road irrigation water regularly carries seeds of *Roystonea regia* into a shallow basin where literally thousands of seedlings are thriving. This is the source of most of the royal palms that are so fast coming into prominence along Mexico's west coast. A list of the palms in the Jardín Botánico "Las Palmas" de Los Mochis, as compiled by Mario Zamora appears at the end of this article.

While Los Mochis is very close to the tropics, and its winters are generally warm, light frost sometimes occurs in January. The coldest night known re-

4. *Sabal Rosei* near La Fortuna, Nayarit.

corded a low of 32° F. for a period of thirty minutes!

As one proceeds southward toward Culiacán the thorn-forest thins, giving way here and there to small grassy llanos where stands of *Sabal Rosei* may be observed. In Culiacán the traveler should not miss the dozen beautiful specimens of *Roystonea regia* surrounding the swimming pool of Los Tres Rios Motel. These twenty-year-old palms were transplanted from Los Mochis ten years ago. Along the Avenida Huyamo, a stylish riverside residential boulevard, a prominent specimen of *Caryota urens* is well worth visiting.

At Mazatlán, on the seacoast at Latitude 23° N., *Cocos nucifera* is the predominant palm, and from this area southward the coconut is grown extensively as a commercial crop. In the city itself *C. nucifera, Livistona chinensis, Chrysalidocarpus lutescens,* and *W. robusta* are most used as ornamentals. For the palm lover, however, no trip to Mazatlán would be complete without visiting the patio of the Belmar Hotel. Here may be seen many spectacular clumps of *Ptychosperma Macarthurii* reaching upwards to twenty and more feet. *Coccothrinax* and *Thrinax* species can be seen mixed with several ten-foot *Phoenix Roebelenii,* and a magnificent *Livistona rotundifolia* dominates one corner of the garden. However, the most outstanding plant in the garden is not a palm but an enormous cycad with a trunk diameter of at least six feet, branching and rebranching into a dozen separate crowns!

Upon departing Mazatlán toward the south the traveler notes that the cactus and acacias of the Sinaloan thorn-forest

5. Thatched hut made entirely from products of *Sabal Rosei* near Acaponeta, Nayarit.

are rapidly thinning out. Within fifty miles, in the state of Nayarit, the flora undergoes complete change for this is now a region geographically classified as "humid, tropical, deficient in rain only in winter." The highway follows the narrow coastal plain threading southward, skirting the swamps and lagoons to the west and paralleling the base of the foothills to the east.

Along this coastal plain and extending upward into the hills are hundreds of thousands of specimens of *Sabal Rosei* growing in clumps, thickets, forests, or as solitary specimens. *S. Rosei* occurs in the grasslands and also mixed with the broad leafed trees which are, in season, riotously colored by the flowers of vines and the flashing wings of macaws, parrots, and other brilliant hued birds. The agriculture of the region is mainly the production of corn, sugar, bananas and coconuts.

S. Rosei is a valuable economic commodity in the Nayarit lowlands where its bole is used for telephone poles, scaffolding, fence posts, bridge structures, corrals, stockades, and human dwelling places that also use its fans as thatch. The growing bud makes a succulent food, and the fruit is eaten by pigs and other animals.

In the Nayarit lowlands a strange relationship may be seen in which *S. Rosei* plays the role of "host" to another plant. Also growing in this region are many strangler figs *(Ficus* sp.); and birds, after eating the fruit of the fig, roost in the palms and drop the fig seeds into the leaf sheaths. The young fig appears as an epiphyte with roots descending to the ground. These eventually expand and

6. A trio of *Acrocomia mexicana* northwest of Tepic, Nayarit. The two on the left are being enveloped by strangler figs, the one on the right is covered with an epiphytic cactus.

coalesce. As the years pass the fig branches and broadens into a tree which slowly encases the entire trunk of the palm. The palm dies and only the fig remains. This ironic play of nature can be seen in its varying stages everywhere in the palm country of Nayarit with *S. Rosei* and sometimes *Acrocomia mexicana* playing the central role.

The heart of Nayarit's palmland is undoubtedly at the junction of the west-coast highway and the highway leading out to the sea at San Blas. In all directions the traveler may now see many specimens of *Acrocomia mexicana* growing in groves, in groups, or solitarily. In spite of its liberal coating of inch-long vicious black thorns on the trunk and petioles, *A. mexicana* is locally used as building material and thatch. The fruit is enjoyed by animals and humans alike, having a thin, mild-flavored, custard-like edible layer between skin and seed.

In this region several identified and unidentified species of *Chamedorea* can be found both in the wild and under cultivation in gardens.

A must for the tourist in this area is the ride out to San Blas through the wild forests of *Orbignya Guacuyule*, the coquito palm. The asphalt highway at places virtually tunnels through the enormous green fronds and rigid pale trunks of these magnificent sixty-foot palms. The fruit or nuts of *O. Guacuyule* have for years been harvested for their oil content and are consumed by both humans and farm animals as a nourishing food. San Blas is a small somnolent south-sea island type village scattered amid acres of *Cocos nucifera* along the warm Pacific beaches.

Back at the highway junction, a visit must be made to the establishment of Señor Heriberto Parra. Sr. Parra maintains a restaurant, a small zoo, and a large collection of exotic tropical plants, and on the side acts as a guide for tourists interested in hunting "tigers." *El tigre*, the jaguar, is plentiful in the surrounding hills and swamps. Heriberto not only will conduct you through his nursery showing his extensive collection of rare *Musa* species, breadfruit, travellers' trees, and the like but will furnish you a guide to take you out into the field for a look at the hard to find and spiny-trunked palm, *Cryosophila nana.*

From Señor Parra's nursery, the highway turns away from the coastal plain and slowly climbs the green outliers of the Sierra Madre. *Orbignya Guacuyule* is immediately left behind, *Sabal Rosei* abounds in countless numbers, and *Acrocomia mexicana* gradually thins out until finally at the city of Tepic, approximately two thousand feet in altitude, the palm land is left behind.

About fifty miles further inland and two thousand feet higher, near the state boundary line between Nayarit and Jalisco, the really alert traveler may observe a few specimens of *Brahea dulcis*. *B. dulcis*, the rock palm, grows on rocky ridges in poor soil, where the goat herders occupy their time and augment their incomes by weaving its fans into straw hats. This is the last native palm to be encountered growing wild along the Nogales to Mexico City highway.

Palms Growing in
Jardín Botánico "Las Palmas," Los Mochis, Sinaloa, Mexico
compiled by Ing. Mario Zamora C.

Aiphanes caryotaefolia
Archontophoenix Alexandrae
Archontophoenix Cunninghamiana
Arecastrum Romanzoffiianum
Arenga pinnata
Arenga tremula
Caryota mitis
Chamaedorea brachypoda
Chamaedorea elatior
Chamaedorea spp.
Chamaerops humilis
Chrysalidocarpus lutescens
Coccothrinax argentea
Cocos nucifera
Copernicia cerifera
Corypha Gebanga
Cryosophila sp.
Cryosophila Warscewiczii
Dictyosperma album
Elaeis guineensis
Erythea aculeata
Erythea armata
Erythea sp. *(E. armata* or *E. elegans)*
Howeia Forsteriana
Jubaea chilensis
Latania Loddigesii
Livistona australis
Livistona Saribus (L. cochinchinensis, L. Hoogendorpii)
Livistona Mariae
Livistona rotundifolia
Livistona spp.
Mascarena lagenicaulis
Mascarena Verschaffeltii
Paurotis Wrightii
Phoenix acaulis
Phoenix canariensis
Phoenix dactylifera
Phoenix reclinata
Phoenix reclinata (hybrid form)
Phoenix Roebelenii
Phoenix rupicola
Pritchardia Gaudichaudii
Pritchardia Thurstonii
Ptychosperma Macarthurii
Rhapis excelsa
Roystonea oleracea
Roystonea regia
Sabal Palmetto
Sabal Rosei
Sabal sp. *(S. mauritiaeformis* or *S. umbraculifera)*
Sabal sp. (probably *S. mexicana*, seed from Oaxaca)
Scheelea Liebmannii
Thrinax excelsa
Thrinax Morrisii
Thrinax spp.
Trachycarpus Fortunei
Trachycarpus Martianus
Veitchia Merrillii
Washingtonia filifera
Washington robusta (previously *W. sonorae)*
Several unidentified mature specimens

In the Lath House

Arenga sp.
Astrocaryum mexicanum
Chamaedorea erumpens
Chamaedorea sp.
Chamaedorea Seifrizii
Coccothrinax alta
Erythea Brandegeei
Latania lontaroides (L. Commersonii)
Licuala grandis
Livistona Benthamii
Pinanga Kuhlii
Pritchardia affinis
Pritchardia arecina
Pritchardia Hillebrandii
Pritchardia lanaiensis
Pritchardia Lowreyana
Pritchardia pacifica
Reinhardtia gracilis var. *gracilior*
Sabal bermudana
Serenoa repens
Thrinax parviflora
Trachycarpus Martianus
Trachycarpus Takil