



PRINCIPES

Journal of The Palm Society

October, 1974
Vol. 18, No. 4

THE PALM SOCIETY

A non-profit corporation primarily engaged in the study of the palm family in all its aspects throughout the world. Membership is open to all persons interested in the family. Dues commence at \$10.00 per annum payable in January but may be increased if an individual member so wishes. Requests for information about membership or for general information about the Society should be addressed to the Executive Secretary.

PRESIDENT: Dr. U. A. Young, 505 Royal Palm Way, Tampa, Florida 33609.

VICE PRESIDENT: Mr. Myron Kinnach, 1600 Orlando Road, San Marino, California 91108.

SECRETARY: Mrs. Lucita H. Wait, 7229 S. W. 54th Avenue, Miami, Florida 33143.

EXECUTIVE SECRETARY: Mrs. Theodore C. Buhler, 1320 S. Venetian Way, Miami, Florida 33139.

TREASURER: Mr. Brian T. Gaine, 6395 S. W. 96th Street, Miami, Florida 33156.

DIRECTORS: 1972-76, Mr. David Barry, Jr., California; Mr. Morgan Evans, Florida; Mr. Myron Kinnach, California; Mr. Otto Martens, Virginia; Mr. Billings McArthur, Florida; Mr. Dent Smith, Florida; Dr. U. A. Young, Florida. 1974-78, Mr. Kenneth Foster, California; Mr. Brian Gaine, Florida; Dr. Jerome P. Keuper, Florida; Dr. Harold E. Moore, Jr., New York; Dr. John Popenoe, Florida; Mr. Toshihiko Satake, Japan; Mrs. Lucita H. Wait, Florida; Madame Ganna Walska, California.

ADVISORY COUNCIL: Nat J. DeLeon, Florida; Walter H. Hodge, Maryland; Eugene D. Kitzke, Wisconsin.

PRINCIPES

JOURNAL OF THE PALM SOCIETY

EDITOR: Harold E. Moore, Jr., 467 Mann Library, Ithaca, N.Y. 14853

EDITORIAL BOARD: David Barry, Jr., Walter H. Hodge, Eugene D. Kitzke, Harold F. Loomis, Nixon Smiley, Dent Smith, P. Barry Tomlinson.

Manuscript for PRINCIPES, including legends for figures and photographs, must be typed double-spaced on one side of 8½ x 11 bond paper and addressed to the Editor for receipt not later than 45 days before date of publication. Authors of one page or more of print will receive six copies of the issue in which their article appears. Additional copies or reprints can be furnished only at cost and by advance arrangement.

Contents for October

The Palm Society Trip to Colombia
Kenneth C. Foster 119
Pasto, Sibundoy, and the Never, Never Land
M. E. Darian 132
Growth Rates of Welfia georgii, Socratea durissima, and Iriartea gigantea Under Various Conditions in a Natural Rainforest in Costa Rica
John H. Vandermeer, Jean Stout, and Gene Miller 148
Regular Features
News of the Society 131
Palmologue 137
Index 158

Cover Picture

The seeds of Borassus flabellifer are surrounded by fibers which are worked in India to make little heads for sale. For a contrasting head made of ivory palm, see the cover for PRINCIPES, January, 1973.

PRINCIPES

JOURNAL OF THE PALM SOCIETY

An illustrated quarterly devoted to information about palms and published in January, April, July and October by The Palm Society, Inc.

Subscription price is \$6.00 per year to libraries and institutions. Membership dues of \$10.00 per year include a subscription to the Journal. Single copies are \$1.50 each. The business office is located at 1320 S. Venetian Way, Miami, Florida 33139. Changes of address, undeliverable copies, orders for subscriptions, and membership dues are to be sent to the business office.

Second class postage paid at Miami, Florida and at additional mailing offices.

Mailed at Lawrence, Kansas
November 30, 1974

The Palm Society Trip to Colombia

KENNETH C. FOSTER

18002 Yorba Linda Blvd., Yorba Linda, Calif. 92686

When I started over a year ago to work on organizing a trip to the South American country of Colombia, I never dreamed of the difficulties and exciting times we would have. On Wednesday afternoon, June 26, 1974 our group of 27 Palm Society members departed from Miami International Airport for Cali, Colombia. (Two additional members from Costa Rica were to join us in Cali swelling the number in our group to 29.) Our departure from Miami on Avianca Airlines perhaps set a pattern of our transportation problems we would encounter on the trip. Our flight was overbooked by 40 people and after much delay and frustration, we squeezed aboard several different flights. With some little luck, and Avianca's cooperation in holding over one of the planes in Bogotá for transfer, we did all arrive in Cali as a group.

Dr. Victor Patiño of the Jardín Botánico in Cali met us at the airport. Dr. Patiño had set up our ground transportation through Viajes Oganessoff, a well known tourist company with headquarters in the Cali Inter-Continental Hotel. I was to later spend many hours in the Oganessoff office to change and remap our trip.

It was pleasant to arrive in Cali, a modern comfortable city located in the Cauca Valley, the richest agricultural valley in Colombia. But as we started through customs, an official of Avianca placed in my hands a telegram from Miami informing me all our luggage was still in Miami. It had never been placed on the plane(s) due to the confusion of our departure. This was a serious problem as we were scheduled to start first

thing the next morning for Buenaventura by charter bus. Buenaventura is one of the richest palm collecting areas located on the Pacific lowlands. Obviously we couldn't leave Cali and hope our luggage would somehow catch up with us not to mention completing customs inspection. So with Dr. Patiño's help I arranged for a one day trip to the mountains east of the Cauca Valley to find a species of *Ceroxylon* located near the remote village of Tenerife. So the next morning, dressed in our Sunday finest, we left for Tenerife and the chance to see and collect one of the famous wax palms of the Andes. As we passed through the Cauca Valley, we stopped at a Catholic monastery where we found under cultivation a tall and beautiful pinnate palm, *Syagrus sancona*. We were able to collect large quantities of fruit from this majestic palm. Then proceeding on, we slowly climbed up into the mountains and by noon started seeing small patches of the wax palms on distant mountains. The white waxy trunks stood out like thin columns of silver. We passed a few trees near the road that held promise of possible collecting. We continued on with intentions of returning to this spot if more abundant collecting could not be found ahead. By early afternoon we stopped in Tenerife, a tiny village at about 7,500 ft. elevation. The local people were growing onions and other cold climate food crops on mountain sides. One could see occasional wax palms left standing here and there and a few remote patches of native growth in the distant deep valleys of the mountains. One could only envision the thousands of wax palms once standing in the area. After a



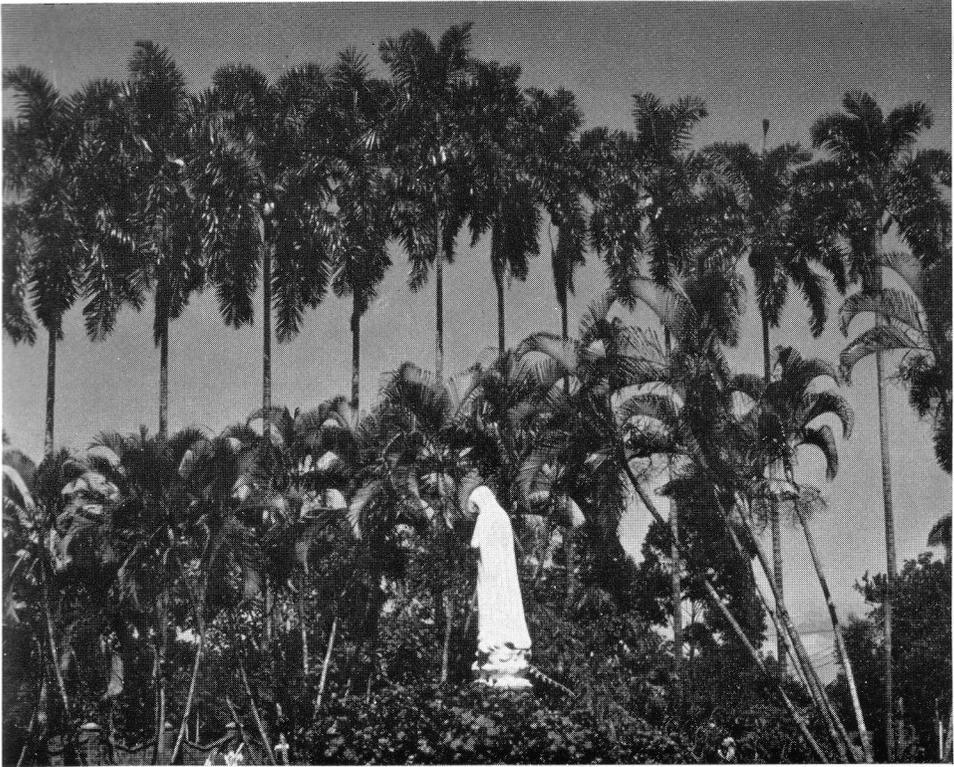
1. A fine old allée of *Scheelea butyracea* located on a farm in the Cauca Valley near Cali, Colombia. Dr. Victor Patiño in foreground.

pause for lunch, consisting of box lunches brought from the Cali Inter-Continental Hotel, we turned the bus around fearing the rugged dirt road would become too narrow ahead. We then drove back to the roadside stand of wax palms.

There were three tall specimens growing in a field of onions. After obtaining permission from the owner of the property, a selected group went down to the trees. We were excited to find thousands of ripe seeds just fallen on the ground from huge fruit clusters high above in one of the trees. The color of the fruit was a vivid orange. We had hired a local man to climb the tree with nothing more than a rope sling and foot braces, but it was not necessary to have him

climb. (Dr. Mardy Darian from Vista, Calif. had come with a set of professional belt and spurs, but his equipment had not arrived due to the luggage delay.)

After collecting a large quantity of fruit for the members of the group, and also the Palm Society Seed Bank, we started down the mountain for Cali. We were nearing Cali when the bus motor gave a series of coughs and finally stopped. In Colombia, as elsewhere in Latin America, vehicle repairs are generally made on the spot by the driver and his helper. In this case the problem was a broken gasket on the fuel pump. Tape and string would just not stop the leaking gas. After three walking trips "down the road" by the helper to obtain more



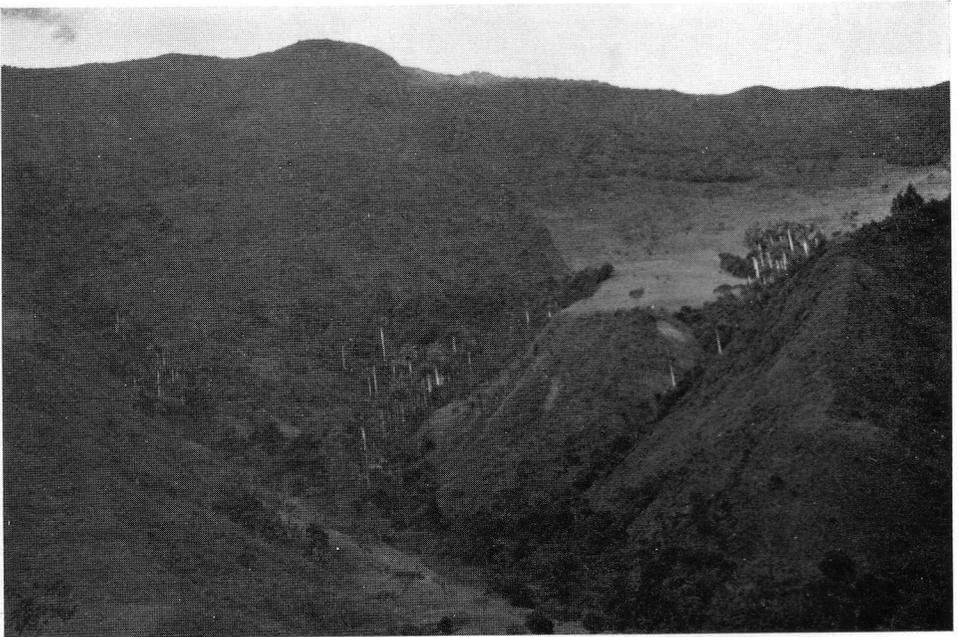
2. *Syagrus sancona* as seen at a Catholic monastery in the Cauca Valley of Colombia. Palms in the lower row are *Chrysalidocarpus lutescens* in lush growth.

gas, the problem was not being solved. It would be impossible to just find a phone, call Ogenesoff, and arrange for another bus to be dispatched in short order for our rescue. Adding to the problem was the disappearing sun and the encroachment of darkness. About this time, Dr. Bob Courtney from Tampa, Florida whipped out his surgical bag, paid a young boy watching our plight a few pesos to find an old inner tube, and soon had carefully cut out the exact shape of a new gasket. We were back in business. I do believe this homemade gasket stayed with us the remainder of the trip. After going to the airport to claim our luggage that night, we were relieved and excited about going to Buenaventura the next morning. How-

ever, our program would have to be adjusted because of our "lost" day.

As we chugged up the other side of the Cauca Valley the next morning, stopping several times to add water to the overheated engine, we made our first stop of the day at kilometer 18 where a small undisturbed patch of forest jungle was found. Everyone scattered, collecting orchids, bromeliads and various aroids. The palms found were several species of *Chamaedorea*, a *Euterpe* with red adventitious roots and an *Aiphanes* sp. One species of *Chamaedorea* yielded a few seed.

Dr. Patiño had arranged for lunch at the Calima Agricultural Station, a field station near Buenaventura. However the slowness of the bus plus the difficulty of



3. A majestic species of *Ceroxylon*, one of the famous wax palms of the Andes, remains in a few pockets of native growth near the village of Tenerife, Colombia, at an altitude of about 7500 feet.

keeping so large a group as 29 avid collectors moving along, caused us to arrive upriver from the station hours late. Dr. Rufino Valela, director of the station, had a powered dugout waiting for us and in three trips took us across the swiftly moving Calima River. The landings had been washed away sometime in the past and it was necessary to scramble down steep, smooth, slippery rocks to reach the boat.

On the other side, Dr. Patiño took us a short distance into the jungle to an experimental stand of peach palms, *Bactris gasipaes*. It was a thrill to see row after row of these clustering, very spiny palms with their bright orange fruit.

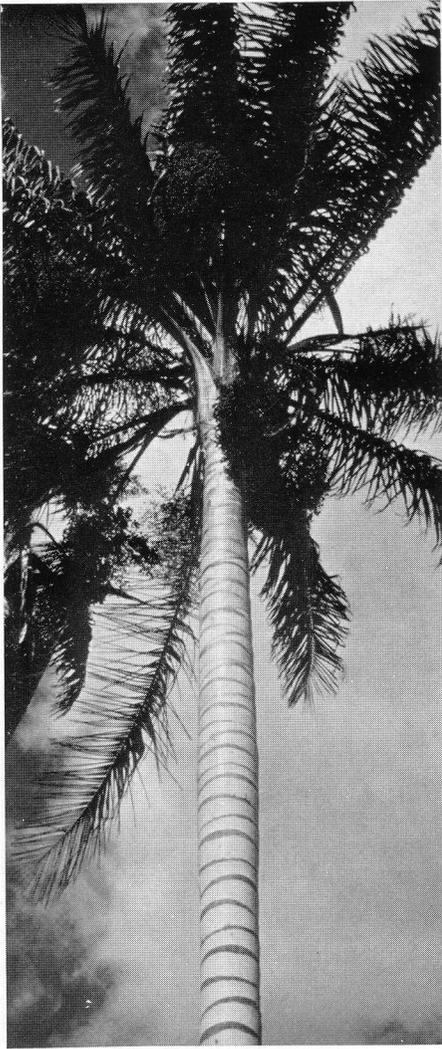
The soft fleshy coats of the seeds are eaten by the local people and add substantially to their diet. The flavor resembles a peach, hence the name. Almost every house we saw in jungle areas would have a stand of peach palms in its yard.

Next, the plan was to walk through the jungle for about two miles, ending up at the river near the experimental station. A boat would be waiting to take us across and then a short walk would take us to the station for a belated lunch. By now the rains had come. The Buenaventura area receives almost constant rain, but this afternoon it came down in torrents. Boots were required to traverse

→

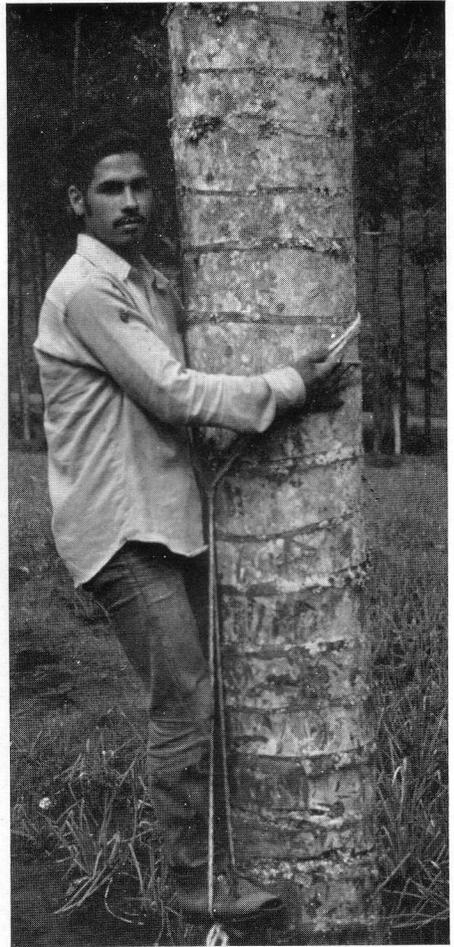
4. A stand of *Ceroxylon* growing in a field of cultivated onions beside the road near the mountain village of Tenerife, Colombia. The palm to the left is about 100 feet tall and has huge clusters of ripe fruit hanging from the crown. There were quantities of fruit on the ground which have been distributed by The Palm Society Seed Bank.





5. A close view shows the prominent waxy surface of the trunk of *Ceroxylon* at Tenerife.

the wet, muddy path and one would frequently find oneself sinking knee-deep into the soggy mud. Still, spirits ran high as we started seeing a magnificent jungle. *Jessenia polycarpa* was the dominant palm with many very attractive trunkless species, *Attalea allenii*, *Orbignya cuatrecasana* and *Ammandra decasperma*, also in abundance. Almost at



6. A young man from Tenerife demonstrates the local method of climbing a wax palm with only a rope. It was not necessary to have him climb as there were thousands of ripe fruit newly fallen on the ground.

once I realized how difficult it was going to be to keep the group even remotely together as we proceeded along the sometimes hazardous path. With a local cutter and Dr. Patiño in the lead, information as to what was being seen was sent back along the trail as best as possible. I just wonder in what condition the information was arriving at the end of the line after 29 repeats!



7 An experimental stand of the peach palm, *Bactris gasipaes*, located at Baja Calima on the property of the Calima Agricultural Station. The fruits serve as a popular item in the diet.

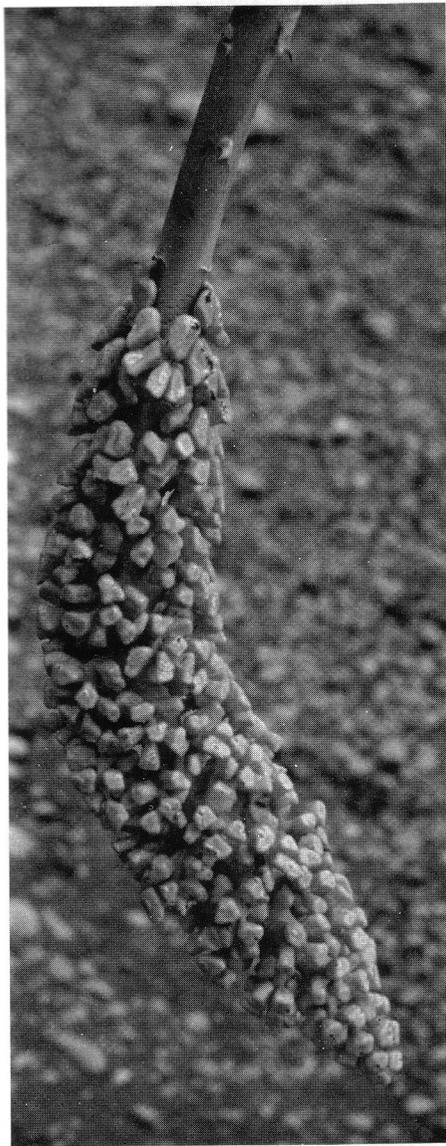
Soon the path got more rugged with many roots and obstacles to step over, small streams to wade through, and as we moved along the group seemed to cluster into three smaller groups. I was at the end of the first group running back and forth to make sure the second group would keep up. The path now narrowed down to almost no path at all and without piling logs and other material on branch paths it would be impossible for the groups behind to know which path to follow. After about four hours of sloshing along my real concern was to make sure none were lost. Adding to our problems was the possibility it would soon be dark. Despite assurances that the river was "just ahead" time was running out. We were ex-

hausted and soaked. There was no longer any verbal contact with the others behind. I myself almost became lost as I went back, couldn't find the others, and was able to join the front group after barely being able to make voice contact with them.

Just as total darkness fell, we reached the river. There was no boat awaiting us. After shouting in vain for those behind for the next half hour it was decided that the cutter would swim across the river, proceed to the station and bring help. Since we had no idea we would be in the jungle after dark we did not have any light. In total darkness, and in soggy condition, we waited until the faint sound of a motor could be heard on the river. When the boat ar-



8. Dr. U. A. Young, newly elected president of The Palm Society, observes the curious trunkless palm, *Ammandra decasperma*, on the road from Buenaventura to Baja Calima. Of special interest are the oddly shaped inflorescence of a male plant and the completely round petioles.



9. A closeup shows the strange stalked male flowers with tiny stamens scattered like grains of sand which suggested the generic name *Amandra* (see *Principes* 7: 70. 1963).

rived it was discovered that when we did not show up at the appointed time and after a two hour wait for us, the boatman had returned to the village, thinking our plans to reach the station had

been altered and a boat was no longer needed. We fully expected to go by boat to the station, but the boatman said it was much too dangerous to try to move on the swift-moving river after dark. There were floating tree stumps and other hazards that would surely upset the boat. So we were only ferried across the river to make our way to the station on foot as best we could. "Only twenty minutes" became our standing joke on the trip to the station. In reality it was another two hours to cover the "twenty minutes." In total darkness it was very hazardous as we crept along. We stumbled along as best we could sometimes crossing streams knee deep and using up every bit of our remaining energy. All the while I was envisioning the remainder of our group lost somewhere in the thick, darkened jungle.

At last the generator-created lights of the station were seen through the jungle ahead. As we stumbled into the main room, I was amazed to see the rest of our party already in camp. What had happened, according to Dr. U. A. Young, was that the second group, after realizing they were lost behind the first group, accidentally took a wrong path that led them down to the river, but further back. As it was still light, they were able to flag down a passing boat and were taken to the station. As to the third, and smallest group, when they realized they were separated and probably lost, they, by chance, came upon a woodcutter whom they prevailed upon to paddle them to the station two at a time in the woodcutters tiny dugout. So we had all arrived safe to enjoy our "lunch" at 10:00 p.m. It was amazing that no one was injured as the members of the first group thrashed and groped their way from the river to the station.

Even though we had reservations at the Hotel Comfort in Buenaventura, we



10. Arrow points to the airport at Pasto, Colombia, whittled out of the knife edge of an Andean mountain. A complete change of plans for the second half of the trip was required because the main group of Palm Society members was unable to reach the airport after two days of trying.

Photo by Don Hodel.

were obliged to make the best of the sleeping arrangements at the station. My sincere thanks to Dr. Valela for his help in offering us all he had at his disposal. After awaking at 5:00 a.m. to put on still soaked clothes, we proceeded down to the river at dawn to be moved by boat to the village and the waiting bus. We then were transported into Buenaventura.

After cleaning up and breakfast, we set off to locate the very interesting cycad, *Zamia chigua*. A fishing boat had been hired for our trip. Because of the rapid drop in the tide, we were not able to boat to the mouth of the Anchicayá River. Sand bars would have stranded the boat. Undaunted, we picked up a

local man in a dugout who was able to show us another location for the *Zamia chigua*. Seeds and trunks were collected.

That night back in Buenaventura, Dr. Patiño had arranged for us a delightful dinner at a good restaurant. Local folkloric dancers were engaged for our entertainment. Following supper the plan was to drive up to Lake Calima and stay the night at the Palermo Hotel. It was 8:00 p.m. by the time we left Buenaventura. One and a half hours was the expected time to reach Lake Calima. With the extra weight of the trips collections the bus struggled up the mountains once again. It was after 11:00 p.m. when we reached the lake. After much circling around the lake for several hours in

search of the hotel we were escorted to the hotel by a military jeep who was patrolling the lake because of a hydraulic dam at the end of the lake. After awakening the manager we finally got to bed at about 2:00 a.m. The next morning as the sun shone brightly we were able to appreciate the beauty of the setting. We spent the rest of the morning cleaning our seed and plants at the edge of the lake. This was much to the amusement of the other guests and hotel personnel. A trip back to Cali and the beautiful Hotel Inter-Continental completed our day.

At 7:00 a.m. the next morning we departed for the airport to fly at 9:45 a.m. to Pasto to start the second half of our exciting Colombian trip. A fond goodbye was given Dr. Patiño who had come to the hotel to see us off. At the airport we deposited our luggage with Avianca (the weight having about doubled due to extensive plant collecting). At 9:45 the plane for Pasto had not yet arrived. In about another hour a four engine prop plane landed with one engine out of commission. This was our plane. After a delay Avianca announced cancellation of the flight. There was no other way to get to Pasto this day. A bus ride would take 18 hours over mountain roads so treacherous that drivers will not drive after dark. After much confusion with Avianca, they agreed to put us up at the Cali Inter-Continental Hotel with all expenses paid. Again the next morning found us waiting for the plane to Pasto. It did arrive about on time and we climbed aboard. With the engine repaired, we were off for the one-hour flight to the mountain city of Pasto. As we started to descend the plane suddenly turned and headed back to Cali. The jumbled announcement over the planes speaker said the airport at Pasto had just closed down due to bad weather.

In this case, the bad weather consisted of cross winds that prevent a plane from landing.

As we flew back to Cali, I realized the second half of our trip would have to be cancelled as there was no longer time to complete our program. Again Avianca put us up at the Cali-Inter-Continental Hotel. It had now cost Avianca about \$1,200.00 for their inability to land us at Pasto. A very rapid decision was in order for us to continue our Colombian collecting trip. It would be almost impossible to arrange to visit a fresh area containing palms in abundance, transportation, lodging, food, etc. for 29 eager Palm Society members on such short notice. I called together a small committee from our group to discuss the best way to proceed. We decided to return to the Buenaventura area to do additional collecting, as we were not able to complete our program there the first time around.

I did give permission to Mardy Darian and three others of his choice to try again the next day to fly to Pasto where *Parajubaea cocoides* was known to be growing plus possible other high-elevation cold-hardy palms. And I will say here that they did successfully make the trip and had just enough time to locate and collect *Ceroxylon hexandrum*, *Geonoma* sp., *Euterpe* sp., and the attractive *Parajubaea cocoides*. It was found that the road had been washed away leading down the eastern side of the Andean Cordillera to the lower Putumayo. So even if the entire group had been able to spend the scheduled time in Pasto, we could not have reached Puerto Asis in the inland jungle area as had been originally scheduled. In addition to the trip to Pasto by Dr. Darian and his group, Norman Bezona from Hawaii and Michael Evans from California flew to Leticia on the Amazon River where Colombia, Brazil and Peru come together.

They collected seed of *Bactris*, *Euterpe*, *Mauritia*, and *Oenocarpus*. All in these two parties joined the main group in Bogotá to return to the U.S. with the rest of us.

So it was a smaller group that headed back to Buenaventura the next morning. We took the slower "old road" that provided some of the best collecting of the entire trip. It was a happy but exhausted group that pulled into Buenaventura at 10:00 p.m. The next day we retraced our steps to Baja Calima collecting along the way, *Manicaria saccifera*, and possibly the most important find of the day, *Metasocratea hecatonandra*. Dr. Patiño had sent a message to the Experimental Station by radio-telephone, so Dr. Valela knew we were back in the area. Even though Dr. Valela had a number of important guests to entertain, he came down the river from the station to greet us and arranged for two of his best guides to be with us. Upon crossing the river at the village, our plan, this time, was to only penetrate the jungle a few hundred yards. With the help of the guides, five or six palms were collected including *Astrocaryum standleyanum* var. *calimense* armed with ferocious long spines. It was everyone's wish to return again some day to this beautiful, exciting jungle so rich in palms.

As our time was now running out, we returned to Cali and flew on to Bogotá for a day of rest, shopping and final packing of seed. On Sunday, July 7, our entire group boarded an Avianca jet for Miami and home. Even though our trip did not go entirely as scheduled, and certainly there were many more problems than anyone could have imagined, the thrill of the jungle, good fellowship, and of course, excellent palm collecting, made the trip very worthwhile.

Palm Society members who traveled to Colombia: Gerald Batts, Wilson, N.C.; William Bell, Miami, Fla.; David and Marian Besst, Maitland, Fla.; Norman Bezona, Hilo, Hawaii; Jenni Bradley, Laguna Beach, Cal.; Allan Bredeson, Lemon Grove, Cal.; Robert and Madeline Courtney, Tampa, Fla.; Mardy and Cherie Darian, Vista, Cal.; J. Michael Evans, Newport Beach, Cal.; Kenneth Foster, Yorba Linda, Cal.; Gary Hendrix, Miami, Fla.; Donald Hodel, Whittier, Cal.; DeArmand Hull, West Palm Beach, Fla.; Franklyn Ketchum, Huntington Beach, Cal.; Otto Martens, Virginia Beach, Va.; Lois Rossten, Huntington Beach, Cal.; Virginia Ryder, San Francisco, Cal.; Joseph Salerno, Howard Beach, N.Y.; Gordon and Patricia Smith, Maitland, Fla.; Merrill Wilcox, Gainesville, Fla.; Robert and Catherine Wilson, San Vito, Costa Rica; U. A., Ben and Brad Young, Tampa, Fla.

Palms observed on the Colombian trip. An asterisk (*) denotes palms from which seeds were collected.

Cali—Tenerife—Km. 18. *Aiphanes* sp.; **Ceroxylon* sp.; **Chamaedorea* sp.; *Euterpe* sp.; *Sabal mauritiiiformis*; **Scheelea butyracea*; **Syagrus sancona*.

Pasto. **Ceroxylon hexandrum*; *C. utile*; **Euterpe* sp.; **Geonoma* sp.; **Parajubaea cocoides*.

Leticia. **Bactris* sp. (small, clustering); **Bactris* sp. (large, clustering); *Geonoma* sp. (several); **Euterpe* sp.; **Mauritia flexuosa*; **Oenocarpus* sp.; **Socratea* sp.

Buenaventura. *Ammandra decasperma*; **Astrocaryum standleyanum* var. *calimense*; **Attalea allenii*; **Bactris gasipaes*; **Bactris* sp. (clustering); **Bactris* sp. (single); *Euterpe andina*; *Euterpe* sp. (clustering); **Euterpe* sp. (single); **Geonoma* sp. (single, one foot high); *Geonoma* sp.; *Iriartea* sp.; *Jessenia polycarpa*; **Manicaria sacci-*

fera; *Mauritiella pacifica*; **Metasocratea hectonandra*; *Oenocarpus dryander*; **Orbignya cuatrecasana*; *Phytelphas seemannii*; *Socratea exorrhiza*; **Wettinia quinaria*.

I wish again to thank Dr. Victor Patiño of the Jardín Botánico in Cali for his help and assistance; indeed, the trip

would not have been possible without his help. I wish also to thank Dr. Rufino Valela, Director of the Calima Agricultural Experiment Station, Baja Calima, for the courtesy shown our group, and Mr. Allan Bredeson of Lemon Grove, California, who acted as my interpreter. His help was essential.

NEWS OF THE SOCIETY

1974 Biennial Meeting in Miami, Florida

Palm Society members who had arrived in Miami by 6 p.m. Saturday, June 22, 1974 had their first visit with each other at the Reception-Buffer hosted by the Dade County members at the Corbin Education Building at Fairchild Tropical Garden. A gay mood prevailed as new and old-time members greeted each other. Adding to the pleasure of the occasion and giving a foretaste of what was to come were the rare and beautiful potted specimen palms grown by the Garden and used to decorate the area.

Dr. John Popenoe, Director of Fairchild Garden, opened the Garden at 8 a.m. on Sunday, June 23 so members could take advantage of the cooler morning hours as well as enjoy a free tram ride with Paul Drummond acting as narrator. Members then wandered about admiring the hundreds of palms and especially enjoyed a visit to the Rare Plant House. Here are found palms, ferns and many other exotics that need some protection from Miami's occasional cool spells, sometime winds or hot sun. At the registration desk members were delighted to learn that due to the large registration (115 paid member registrations, total attendance including wives and children 170), there would be no charge for the Sunday sandwich lunch or for the Monday box supper.

A delicious and plentiful sandwich lunch was served at noon. Afterwards all adjourned to the Nell Montgomery Garden House. President Foster convened the meeting at 1:30 p.m. He welcomed the many members, especially those from afar such as Dr. V. Santos from Manila, Mr. and Mrs. Michael Carter from England, Mrs. Frances Schobel and Mr. Norman Bezona from Hawaii, Mr. and Mrs. Melvin Sneed from Jamaica, Mrs. M. H. Hilder from St. Croix, Virgin Islands, Anthony Lambe from Portugal and Mr. and Mrs. George Kimber from the Cayman Islands. The others came from all over the U.S. with an especially large contingent from California.

The President, Secretary, Treasurer and Executive Secretary each gave brief reports. Mr. Otto Martens announced that Madame Ganna Walska, Board member, had given him a check for \$1,000 for the society with the stipulation it be used to cover unmet expenses of the Biennial Meeting or for other purposes of the society. President Foster expressed the sentiments of the entire membership when he asked Mr. Martens to thank Madame Ganna Walska warmly for her generous gift.

The President announced that Dr. Jerome Keuper, President of Florida Institute of Technology at Melbourne, Florida had invited the society to hold the 1976 Biennial Meeting on the campus, where the already numerous palm plantings are constantly being added to.

(Continued on page 135)

Pasto, Sibundoy, and the Never, Never Land

M. E. DARIAN DVM

2615 S. Santa Fe, Vista, Calif. 92083

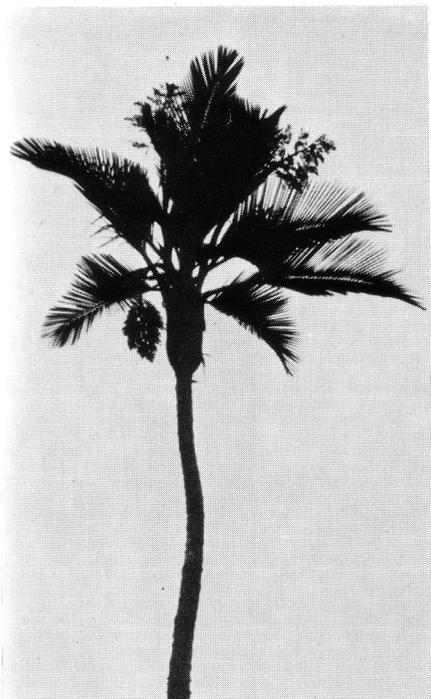
The party of 29 persons which journeyed to Colombia after the biennial meeting in Miami suffered two successive failures attempting the trip to Pasto. Rather than risk three days of cooling our heels at the Cali Inter-Continental Hotel, most of the group decided to go back to Buenaventura to collect palm seed and seedlings, but my heart wasn't in it because any material collected at that tropical area was virtually useless in southern California and my ambition was to see more *Ceroxylon*s and possibly collect seed of some *Euterpe* species which could survive a light frost or two. After a bit of a heated discussion and some wild tales predicting our demise, we nevertheless received Ken Foster's blessing and Avianca's cooperation to allow four of us to try to fly to Pasto one more time.

On July 2nd, we had actually flown to Pasto but the plane returned without landing at Pasto; the day before that we hadn't even boarded the plane. So we considered ourselves lucky as we boarded, because on the way we saw a possible bad omen—a man had been killed as a truck had overturned. When our taxi driver insisted on looking at the accident, I feared missing takeoff at the airport. Our next big dream was of landing at Pasto as we looked at all the familiar faces in the DC6 who had tried the day before. The third try was as charmed as our party of four; we were overjoyed just to land. Don Hodel, Dr. Wm. D. Bell of Fairchild Tropical Garden, Cherie Darian, my wife, translator, and agent who did all our bargaining,

and myself made up our party. In addition, we had our gear, especially the belt and spurs I had dragged around so uselessly up to now but which were soon to become very necessary.

At the Pasto Airport Cherie got us a taxi driver to drive us to and from the airport and Pasto and during our day and a half there for 900 pesos (about \$35.00). Our driver recommended the Hotel Pacifica, which we would also recommend, and as quickly as possible we took off for Chiles, after seeing a few *Parajubaea cocoides* in town. At Tuquerres at 3500 meters altitude (about 10,000 feet), we spotted our first *Ceroxylon utile* with flower and fruit. Unfortunately, only one of 500 had a seed in it. Cherie found it and I "pray" over "our limited fortune" daily now. We also saw a *Geonoma* sp. which bore fertile fruits and these we collected and turned over to De Hull for distribution. After going almost to the Ecuadorian border within half a degree of the Equator we had to turn back because of a washed-out road. Along the road we saw and photographed the power line poles—trunks of *Ceroxylon utile*. An exhausting climb with belt and spurs up a miserable, weak, twisted specimen of *C. utile* failed to yield fertile seed, perhaps the result of dioecious palms spread too far apart for fertilization by nature.

On July 4th, we decided to make the run toward the Amazon, or as far as we could get and return by nightfall. On the way, we saw a *Parajubaea cocoides* in a yard. Cherie did some translating, we got inside the patio, and the handy



1. *Ceroxylon utile* at Tuquerres, Colombia.



2. *Geonoma* grows at high elevations in Colombia.

belt and spurs enabled me to climb a 35–40 ft. tree and cut down several hundred seed in quick order. After taking pictures of ourselves we were off for the Sibundoy Valley.

Here after many continuous turns at 3600 meters, we entered the “Never Never Land.” This mountainous region 16 kilometers from Pasto is covered by a constant cold mist, yet the ground is covered with the same type of plants we expected to see in the lower typical tropical area. We saw philodendrons, bromeliads, orchids, ferns, tree ferns, and palms—namely *Ceroxylon utile*. We jumped out and started collecting with our bare hands, managing to uproot four *C. utile* seedlings, one of which is now slowly showing life signs. I only lasted five minutes in this cold, wet vegetation and my fingers became numb from the cold, so numb that I gave up and re-

turned to the cab. At 20 kilometers from Pasto we saw *C. utile* on a mountainside cow pasture at 3500 meters. We passed some very steep cuts, canyons, and sheer walls and started to drop in elevation. At 53 kilometers from Pasto at 2900 meters I spotted the one palm I was especially eager to find. On a curve in the road, up a canyon, I saw a suckering *Euterpe* sp. with the characteristic, large, spreading inflorescence which looked like an exploding firecracker.



3. Don Hodel, local women, and *Euterpe* sp., 53 kilometers from Pasto on road to Sibundoy.

We jumped out and crossed the road and started to look for seedlings. This palm is very slim with numerous suckers about 4 inches thick, trunks 15–25 feet high, and a 30-inch-long crownshaft. There were about 30 projecting, unopened inflorescences. When Cherie explained to the Indian woman what we wanted she left and returned with a beautiful 6-inch plant and when she found out we were willing to pay she returned with hundreds. These haven't started to move yet. We finally found two fertile stalks bearing all the fruit we would need and again several hundred seed would be given to De Hull for distribution. This made it four sets of palm



→
4. Don Hodel climbed *Ceroxylon hexandrum*, 53 kilometers from Pasto on road to Sibundoy at 2900 meters altitude.

seeds from four different genera *Parajubaea*, *Geonoma*, *Euterpe*, and our next find—just down the road—a *Ceroxylon hexandrum* 40–50 feet high. This was to become Don Hodel's big kick as he belted up and tried the spurs. He made it to the fruit and cut down the first few hundred seed while we were content to photograph him. It began to rain as we gathered several hundred seed. I had to climb this same tree to get additional seed and a plentiful supply was cleaned by Cherie to save De Hull the chore of cleaning.

We truly felt victorious on this small trip and we still had time left so on we sped only to come to another washed-out road. Dr. Bell had been extremely interested in all the various flowering plants but was most keenly anxious to find cycads in this area. On our way

back we saw what perhaps others before us may have claimed to be cycads. Actually they were small, almost stumpy, tree ferns which he collected, but he was denied his cycads. I suppose lady luck had decided to run out at this time, because Bell didn't find his cycads and just after we left the next morning for the market place we received an urgent message—return quickly, the plane will be leaving an hour and a half early. You guessed it, we rushed madly back to the airport so we could wait at the airport for over seven hours. They kept telling us it was easy to get out of Pasto; the difficult trick was to get into Pasto. So when we finally took off, we really weren't interested in the 15 wrecked planes at the end of the runway, only to get back to the main group and share our treasures.

News of the Society

(Continued from page 131)

Excellent facilities are available including inexpensive dormitory rooms, a cafeteria, a banquet room and an air-conditioned auditorium. The Dent Smith Trail, an area of native growth with a brook is a delightful setting for the many exotic palms which are now becoming mature. Busses belonging to the Institute stand ready to take the group to Tampa to see Dr. U. A. Young's magnificent palm collection and other nearby points of interest.

The Nominating Committee, Chairman Otto Martens, member David Barry Jr. and Dr. Stewart Mathews, presented the slate of Officers for 1974–1976 as follows:

President—Dr. U. A. Young
 Vice-President—Mr. Myron Kinnach
 Secretary—Mrs. Lucita H. Wait
 Treasurer—Mr. Brian T. Gaine

Directors for 1974–76:

Mr. Kenneth C. Foster—California

Mr. Brian T. Gaine—Florida
 Dr. Jerome P. Keuper—Florida
 Dr. H. E. Moore, Jr.—New York
 Dr. John Popenoe—Florida
 Mr. Toshihiko Satake—Japan
 Mrs. Lucita H. Wait—Florida
 Madame Ganna Walska—California

There being no nominations from the floor, Dr. Mathews moved that the slate be unanimously elected. Motion seconded and carried.

Dr. Jack Fisher, Plant Morphologist at Fairchild Tropical Garden, stated that he was very concerned about the problem of lethal yellowing disease and the possibility that The Palm Society might spread this disease to areas of the world not now infected. The Palm Society's Seed Bank is the most active distribution center for palm seeds in the world today and it would be a catastrophe if through its efforts new palm areas should become infected, either through seeds or through transport of plants by its members. He therefore proposed a quarantine on both seeds and

plants originating in South Florida or other infected areas until more is known about transmission of lethal yellowing. Dr. H. E. Moore, Jr. moved that such a ban be instituted and that the Departments of Agriculture of the State of Florida and of the United States be sent copies of such a resolution. Motion seconded and carried. This resolution had already been brought up at the prior Board Meeting and approved by the Board. This policy had been implemented previous to the Biennial Meeting and was the reason for the cancellation of the previously planned sale of rare palm seedlings.

The first speaker of the afternoon, Dr. Robert Read, Associate Curator at the Smithsonian Institution, enlightened the audience on the Sex Life of Palms. Dr. Read showed detailed slides of the enormous variety of palm flowers and described the various ways pollination is achieved.

Mr. George Gwin, Supervisor, Division of Plant Industry, State of Florida, gave a brief summary of the history of lethal yellowing disease of palms. In the U.S. the disease was first observed in Key West in 1955 and now is rampant in the southern counties of Florida, especially in the Miami area. It is estimated that approximately 60,000 coconuts have died in the last three years in addition to the other palms that now have been found also to be infected. The effects of the disease can usually be controlled by injections of Terramycin; injections must be repeated every four to seven months. Terramycin will be available to the public in July, with two types of injectors being developed which individuals can use to treat their own trees.

Dr. William D. Bell, Horticulturist at Fairchild Tropical Garden, spoke about the experiments he has been making with the soil in which palm seedlings are

planted. A more detailed report of his work will appear in a separate article.

The last part of the afternoon's program was a panel discussion on the germinating and growing of palm seeds. It was emphasized that no matter what mix is used, adequate and constant moisture, drainage, and porousness of growing medium are important. Panelists were Ken Foster, amateur grower, Nat DeLeon, avid palm grower and horticulturist in charge of Miami's beautiful Parrot Jungle, Stanley Kiem, Superintendent of Fairchild Tropical Garden, Otto Martens, retired commercial palm grower, Bill Mowry, John Turner and Dr. U. A. Young, all three successful amateur growers of rare palms.

The Sunday evening banquet at the pleasant Riviera Country Club was a festive affair, preceded by a social hour. Members sat at tables for 10 decorated with magnificent anthuriums contributed by member Mrs. Margaret Hirose of Hawaii and arranged by John Turner. At each table a star was placed under one plate awarding the arrangement to the lucky finder. Each lady present was given a charming ceramic palm pendant made and contributed by member Jamie Hampton of Boca Raton. Ruth Shatz, able chairman of entertainment, helped pass out these favors. Otto Martens formally presented Madame Walska's \$1,000 check to retiring President Foster.

After dinner Dr. H. E. Moore, Jr. showed some of his many wonderful slides and the audience listened spellbound while he told about the palms he had seen on far flung islands.

Monday morning a visit to the magnificent and towering palm collection at the Jennings Estate was a thrilling experience despite the hungry mosquitos. From here members drove to Paul Drummond's garden where the rare palms are

(Continued on page 155)

Palmologue

Letters and Excerpts

Palmologue is about to change its shape and even its content. Its course has to be altered to make the business of putting it together somewhat less uncertain and more manageable. Letters sometimes are scarce and at other times come in droves, but not all contain anything of general interest. All of this involves endless correspondence pro and con, and is so time-consuming that the palms around my diggings begin to languish from neglect.

It should not be inferred that Palmologue will be improved when it sheds its subtitle "Letters and Excerpts," although it is to be continued as a regular feature, subject only to the will of Heaven. Beginning with the April number of PRINCIPES it will consist of such scribblings as I can produce with my own Venus No. 2 pencil, and I cannot predict that they will be either readable or bear-

able. In any case it will be ten times easier to confect some stuff of my own composition than to juggle with a stack of correspondence, and in one-tenth of the time as well. In sum, the real reason for the switch is that it's the only labor-saving device I could think up, and accordingly I shall adopt it with rapacity if not with enthusiasm.

But does any of this mean that most palmy letters are devoid of interest? No, quite to the contrary. I just might quote from letters that come my way, and then again I might not. It just depends on the state of palmology and on whether Betelgeuse is in juxtaposition with Aldebaran. And besides that, I really don't know what I may write about, unless about palmy odds and ends from hither and yon.

—Dent Smith

From Mr. Stanley Kiem, Miami, Fla., June, 1974.

Mr. Claire C. Coons has done a good job of describing the Palm Weevil and its damage to palms; with good photographs by Mr. Lewis S. Maxwell (*Principes* 18: 69–70). The following comments might provide additional information as to how we are trying to control this serious insect pest at Fairchild Tropical Garden.

In controlling the palm weevil *Rhynchophorus cruentatus*, for the past several years we have been using a relatively new insecticide, Baygon, in a mixture of sawdust, with apparently good results as a preventative.

Previous to the use of Baygon we lost several susceptible palms each year, usually in the late summer to fall. By the time the palm shows signs of an infestation, it is often too late to save it, as usually the weevil larvae have eaten into the heart of the palm and already killed the bud.

This has been a problem at the F.T.G. for many years and various insecticides have been used with fairly good results. These included DDT, Parathion, Dieldrin and BHC. We stopped use of these insecticides as they were proved too dangerous for use, both by our grounds crew and also for the sake of visitors to the Garden. While the Extension Service of the University of Florida has in the

past recommended treatment with BHC, it is now on the restricted list of agricultural pesticides and as such is not available to the homeowner.

Although we had continued to drench palms with Cygon, after they showed an infestation, with fairly good results, we wanted to find some effective way to prevent the weevils from getting started in the buds of palms. Because we have such a concentration of palms in the Garden, there apparently is a large enough weevil population built up over the years in this area for us to expect at least several palms being attacked each summer. Our present preventative treatment is applied in April and again in October, and consists of using a 1% Baygon dust manufactured for use mainly by exterminators.

A mixture is made of one part 1% Baygon dust to four parts sawdust, and this mixture is scattered about the bud of the palm until the leaf bases 4 to 5 down from the bud are mainly filled. The sawdust acts as a good carrier for the Baygon dust, prevents it from being washed away by rains and the adult weevils from crawling down through the insecticide mix in the attempt to lay their eggs about the palm bud. A can on the end of a bamboo pole has worked quite well in getting the mixture up into the buds of tall palms.

During the several years that we have used these preventive measures, the most susceptible palms which were treated have been free of the weevils, while several much less susceptible palms which were not treated became infested.

Although the weevils prefer *Phoenix* and *Latania* palms, they also attack *Sabal*, *Butia*, *Pritchardia*, *Livistona* and *Dictyosperma* in about that order of preference.

The 1% Baygon dust may prove difficult for the average homeowner to find,

but it can probably be obtained from the various pest-control services. Then, too, other suitable insecticides could be used in a similar sawdust mix as a weevil preventative.

Mr. Kiem is the Superintendent of the Fairchild Tropical Garden and is qualified by long experience to wage war against the palm weevils commonly termed "beetles" by gardeners. In the absence of DDT for direct kill of both weevils and their larvae after infestation, the preventive measures outlined by Mr. Kiem would seem to promise an effective defense against the loss of valuable palms. In my locality the month of October would be too late for preventive measures, for in that month the weevil larvae, if present, are already fully developed and the infestation is at its height. This does not invalidate the use of a suggested preventive treatment in an earlier month, say August, in this more northern section of Florida. But dangerous or not, DDT in its day saved many an infested palm that appeared far on its way to certain destruction, which is something that no mere preventive can ever match. The wisest course nowadays, nevertheless, is to fall back on the old adage that says an ounce of prevention is worth a pound of cure.

**From Dr. Robert W. Read,
Lanham, Md., July, 1974.**

I am delighted to hear that so many *Coccothrinax* and *Thrinax* species are doing so well in Daytona Beach. They are certainly ornamental and if as hardy as you indicate they deserve greater attention horticulturally. *Thrinax* should no longer be a problem, as far as the names go, as my monograph is soon due off the presses. It will be published in the Smithsonian Contributions to Botany Series and will be available from the

Superintendent of Documents, for a price as yet unknown. (Watch for a later announcement.)

In addition to a number of other projects I will be concentrating on *Coccothrinax* during the next year and hope to work out a good key during that time. My recent trip to the eastern Caribbean was partly concerned with *Coccothrinax*.

Dr. Read is now Associate Curator of the Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, D.C. It is welcome news indeed that he expects to do further work with Coccothrinax next year and to produce a key to the species, many of which are now masquerading under assumed names in our gardens. In next Palmologue I hope to deal with the cold tolerance of the determined species of both Coccothrinax and Thrinax, based on twenty-three years' experience with growing the palms at 29° N.

**From Mr. Carl O. Foster, Jr.,
Greensboro, N. C., June, 1974.**

It has been ten years since I last corresponded with you in reference to some *Phoenix dactylifera* seeds. Since that time, I have successfully grown two *Trachycarpus fortunei* outside that now have trunks of six feet. They burned badly two years ago when the temperature dropped to 4° F. below zero, followed by five days of low temperatures during which the high was 13° F. They have now regained their original beauty. Scattered around the landscape of my present home are numerous specimens of fruiting *Sabal minor* and *Rhapidophyllum hystrix* which were not affected at all. In addition I have five butias and a clump of *Chamaerops humilis* which are growing quite well.

I am in the process of building a new home and I have already begun to trans-

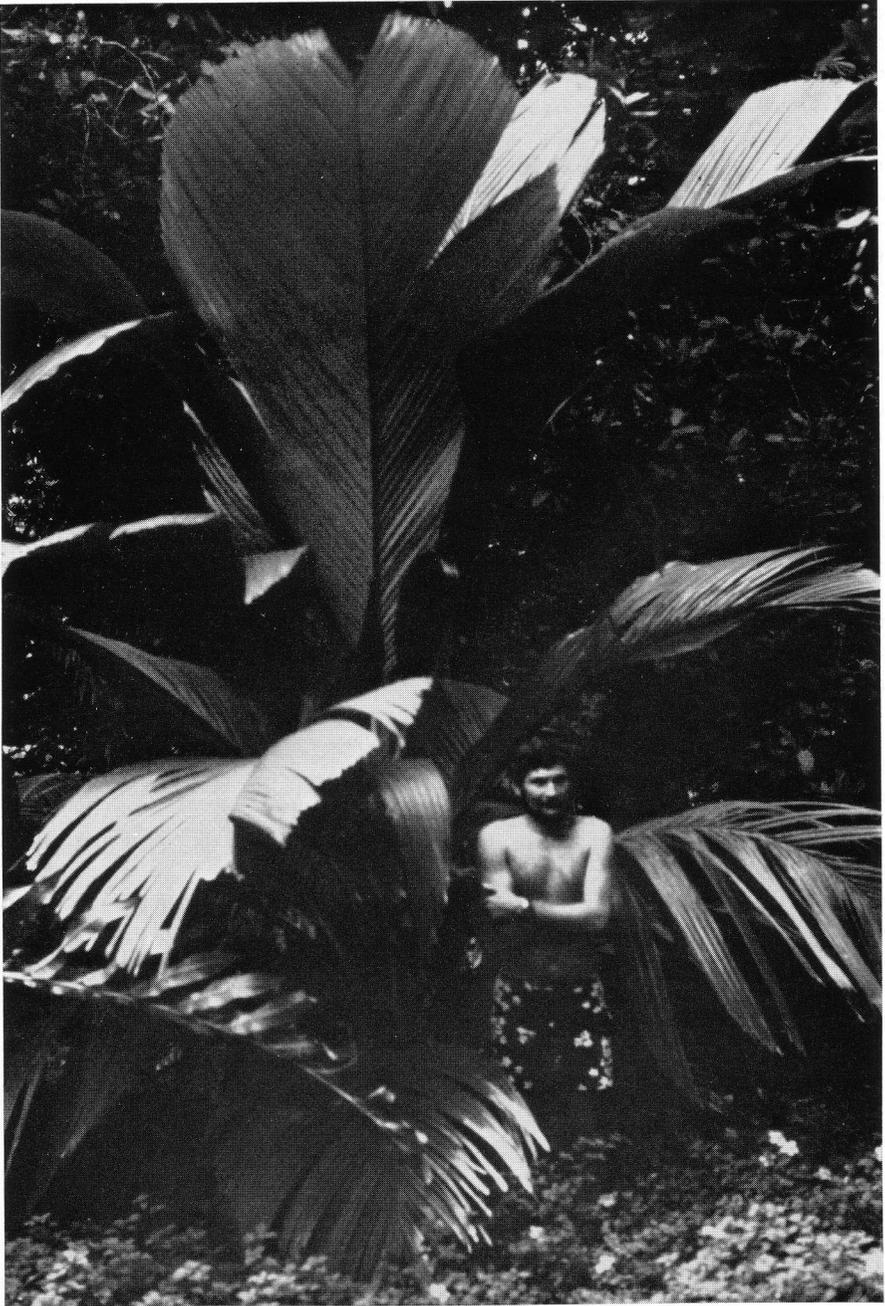
plant many of the palms. The exciting thing is that an enclosed atrium is included in the house plans. This gives me an opportunity to grow some tender palms. I have thumbed through many issues of *PRINCIPES* in an attempt to choose a palm for the planter in the atrium. Because we are using an oriental motif in this room, my wife and I decided that a three- or four-foot *Licuala grandis* would blend perfectly. If you have any information which would be of any help to me, please let me know.

Though often available at one or more nurseries in Miami, I suggested that it might be hard to obtain Licuala grandis or other palm plants because of the quarantine against transporting palms outside the area affected by the Lethal Yellowing disease. Quite obviously this quarantine is not being enforced at nurseries, for Mr. Foster obtained without the slightest difficulty the desired palm from a Miami nursery. Nothing wrong, surely, in exporting palms from Miami to Montana or anywhere else not subject to widespread devastation. But in any case, how is a nurseryman to determine what a customer will do with the potted palms he might buy?

**From Mr. Merrill Wilcox,
Gainesville, Fla., April, 1974.**

The *Butia* hybrid I gave you resulted from pure pollen breeding techniques. The male parent was an *Arecastrum* of the general type sold by Reasoner's as "Coronado"; the female parent was a large *Butia capitata* with a lavender inflorescence and recurved fronds.

The *Syagrus* × *tostana* F₂ was an open-pollinated seedling of FTG X-9-41E S. × *tostana*, so I don't know what the father is; but S. × *tostana* itself is a named hybrid of *Syagrus coronata* and *Arikuryroba schizophylla*. It is quite



1. Michel Guerin in the shade of a young *Pelagodoxa henryana*, Botanical Garden of Papeari.

attractive, setting many large orange fruits.

After going back and reading your comments on *Chamaedorea radicalis* and *C. microspadix* at 22° F in PRINCIPES 8: 32 (1964), there doesn't seem anything new in my observation of no damage at 22°, 24° and 25° (under a liveoak) over three winters.

Mr. Wilcox is the only one I know of who has successfully crossed Butia with Arecastrum. The hybrids I have known are accidental, and not deliberately made by man. This is not to say, however, that other hybridizers have always failed. Even if success were common, I might not know of it.

**From Mr. Melvin W. Sneed,
Montego Bay, Jamaica, June,
1974.**

In pursuit of our more or less inflexible policy of traveling within the boundaries of Capricorn and Cancer, we went to the Society Islands, (Archipel de la Société), the latter part of March and early April, 1974. We did not go to the Marquesas, or the other three archipelagos of French Polynesia.

We didn't have to go beyond Tahiti to find *Pelagodoxa*, which is indigenous to the Marquesas, some 700 miles north-east of Tahiti, and which was our number one objective as a collector's item in the region.

Dr. George Gillett reported on "*Pelagodoxa* in the Marquesas Islands" (*Principes* 15: 45-48, 1971). His inventory of the *Pelagodoxa* population there in the indigenous area, at the time of his field trip in August, 1970, was two mature trees and 27 smaller plants. He also noted other places where specimens of the palm were located.

Dr. Gillett was kind enough to write us about certain private gardens in Ta-



2. *Pelagodoxa henryana* juvenile and potted seedlings in background. Botanical Garden of Papeari.

hiti where *Pelagodoxa* could be found, as did the J. D. Sullivans from Ventura, California, who had been to Tahiti in 1973. This is exactly the kind of help you can expect from members of The Palm Society, and we certainly appreciated it.

Pelagodoxa henryana is a beautiful palm, no question about it, and thanks to the current efforts of a very enthusiastic Director of the "Botanical Garden of Papeari," Tahiti, it is being propagated for planting as fast as seedlings can be brought along. The Director is Michel Guerin, an utterly delightful and most dedicated individual as well as a member of The Palm Society. (Michel and a young tree are shown in Fig. 1).

Of course the seeds are not plentiful. There are four pelagodoxas in the physi-

cal confines of the Garden and six more on adjacent property available to the Garden, not all of which are old enough to fruit. The best estimate at the time we were there is that approximately 120 to 140 fruits per year are all that become available. But Michel Guerin is gathering the available seeds and germinating them. Potentially, he has more seedlings and juveniles under way (see the juvenile in Fig. 2 and the seedlings in pots in the background) than the above mentioned inventories in the Marquesas and the Papeari garden combined.

He also seems to have arrived at the best way to get germination. He collects the fruits, which are heavy and some four to five inches in diameter, and lets them lie on the ground until the outer tubercles soften and largely rot away. This gets the fruit down to the endocarp. The shell is one-eighth inch thick, and reasonably hard at this stage. A hammer will crack it, and when the shell falls away the seed emerges undamaged. The seeds run 2 to 2¼ inches in diameter. They're almost round, but very slightly ovate. The embryo, where the seed will germinate, is slightly off-center on one end of the seed. The seed is firmed into the germinating mix, or potting soil, *horizontally*, in a half-gallon container, so that the embryo is *over* the center of the pot. But the seed is not buried. It is covered only halfway, or enough more to keep it firmly in the pot. It is not placed in the container with embryo-end of the seed down.

We detail this because a contributing factor to failure to germinate *Pelagodoxa* seeds apparently occurs when the seeds are completely, or too deeply, buried in the germinating medium. We don't have any first-hand experience to report on this as yet, except to assure that Michel Guerin is getting results in Tahiti.

So in the course of events it would appear that *Pelagodoxa* is not about to become extinct, although from the limited information available we suppose that if all the existing specimens of it everywhere were uprooted for distribution to the current roster of Palm Society members, there wouldn't be anything like enough to go half-way around. At the same time, we are not unmindful of the French Government's atomic experiments in Polynesia. But so far, if this could have been an inhibiting factor, we neither saw any evidence nor heard any concern about it.

Yes, we have a *Pelagodoxa* seedling that we brought back to Jamaica. It was one of Michel Guerin's propagations, and after six weeks here, seed still attached, it looks great. Then, after an unconscionable delay, we finally received an airmailed carton containing the 10 *Pelagodoxa* seeds and other "goodies" we posted to ourselves from Papeete. Some of the "goodies" didn't survive, but the pelagodoxas did, and that was really what mattered. We have these seeds set, as indicated above, and just hope that some of Michel Guerin's success will be reflected from the Tahitian to the Jamaican sunset.

As a general note, the Society Islands are delightful. We started out on Tahiti, then went to the outlying Islands of Raiatea, Tahaa, Bora Bora, and Moorea (Michener's Bali Hai), then back for more time in Tahiti. For palm and plant lovers, Tahiti has the most to offer, with Moorea next, assuming you get around and look. Very few things are indigenous to the Islands. There are dense stands of coconut palms completely fringing the Islands, though few are seen even a short distance up the mountain sides, and other than on Tahiti, other species of palms are few and very rarely seen.

We were somewhat surprised, for instance, to find that over the years no one apparently had made much effort to establish *Roystonea* in the Islands. The garden at Papeari has one Royal palm and we saw three others on the grounds of a hotel in Papeete. We do hope this will be changed a bit within a few years, since we played "Johnny Appleseed" and left a number of our good Jamaican *Roystonea* seeds there, along with seed of a dozen other species.

The Botanical Garden of Papeari, in our judgment, has considerable potential, given some monetary impetus. It is located about half way around Tahiti, some 30 miles from Papeete. There are approximately 40 species of mature palms there, including such as *Metroxylon warburgii*, *Corypha umbraculifera*, a fine stand of *Nypa fruticans*, *Socratea durissima*, *Opsiandra maya*, and several that are unidentified.

We had fun in the Islands, and in no way regret our decision to explore them in some detail rather than flit in for only a day or two and then on for a fleeting moment somewhere else. *Pelagodoxa* alone is worth the trip. Then, too, we found ourselves making the inevitable comparisons of Jamaica with Tahiti, always mindful of the historical link between the two, when Captain Bligh "ferried" the Breadfruit seedlings from Tahiti. Our uncomplicated conclusion: Jamaica has more Breadfruits now than does Tahiti! But, the Tahitian dancers quite apparently have greater mastery in the use of palm leaflets, if that's what those wriggling grass skirts are made of!

To be safe it's best to say "monocotyledonous skirts," so that everyone will know what they are made of. Both the grasses and the palms are monocots, and that solves any riddle.

From Mrs. Richard H. Baxter, Paradise Valley, Az., August, 1974.

My husband and I enjoyed the August 1 article about you and your interest in palms in *The Christian Science Monitor*.

We have recently moved from the Midwest to Arizona and are living in a home with several varieties of palms. We love them, and they are just beautiful, but we don't know what to do with them to continue the lovely care they had.

Can you recommend any certain gardening book that would include the watering, fertilizing and general care of palms? Also, it would be interesting to identify the ones we have. Does the journal mentioned in the article, "Principes," give this information and is it available through subscription or how?

As yet I have not seen the dossier published in The Christian Science Monitor, and had not suspected that my notoriety would ever reach that far. Several other readers of the paper have written to ask me about how to care for palms, and of course I immediately drop a raucous hint to join The Palm Society. In the instance of the correspondent quoted, I suggested a short-cut to full information would be to solicit it from one of the Society members in that part of Arizona and accordingly supplied the names and addresses of several members in Phoenix, Tempe and Mesa.

I note that the Postal Service has changed the abbreviation of Arizona from Ariz. to just plain Az. This interests me mightily, for I was once an inhabitant of the Wonderful Land of Az. Back in 1916, about a year before World War I started, Pancho Villa and I used to chase each other back and forth along the Arizona-Sonora border just for something to do. I soldiered in Douglas, Yuma, the Salt River Valley and other

places, and when finally discharged from the Army, in Texas, I went straight back to Az and worked underground in a copper mine at Globe and later at the copper smelter in Miami, Az. All because of allegiance to Arizona.

The writer of the following letter, is the Curator of the Botanical Garden, Department of Botany, University of California, Berkeley.

From Mr. Bruce Bartholomew, Berkeley, Calif., July, 1974.

Dr. Harold E. Moore of the Bailey Hortorium referred us to you as a possible source of palm seeds. We hope to build up a collection that can grow outside here at Berkeley. We do not have very severe winters, but every few years the temperature may drop as low as 25° F. Our lowest recorded temperature was 14° F. in December, 1972, but hopefully this was a once in a century sort of temperature. We would like to build up a collection of species of known wild origin, and if you have any available seeds or can refer us to other sources, we would greatly appreciate it.

The wild palms in the Daytona Beach vicinity of Florida are of five species, namely, *Serenoa repens*, *Sabal palmetto*, *S. etonia*, *S. minor* and *Rhapidophyllum hystrix*, and I have advised my correspondent that I will gladly supply seed when in season. No doubt other members will be happy to aid the project in any way they can, especially the newly-formed group of Society members in the Bay Area. Most of the palms now in cultivation in California and elsewhere are good species—good in the sense that they are authentic species not to be differentiated from wild palms of the same species. It is a fact that nearly all cultivated palms have their origins in known wild species, even if of the second or

later generations, with so few hybridizations among them as to be a negligible percentage—perhaps less than one half of one percent—of all cultivated palms. Thus it seems probable that twenty or more palm species could be successfully grown outdoors at Berkeley, with emphasis on the word, "more."

From Mr. John E. Turner, Miami, Fla., June, 1974.

During the 1974 biennial meeting of The Palm Society in Miami several Society members visited my garden and among them were Otto Martens and yourself. You asked me to send you a letter containing a few highlights of my experiences with palms which might be of interest to other members of the Society. At the time of the meeting I had prepared a location diagram of the vari-



4. John Turner (left) and Otto Martens (right) stand beside *Satakentia liukuensis* (taller) and *Kentiopsis oliviformis* (shorter) at Palmoa South.



5. John Turner and *Pelagodoxa henryana* at Palmoa South.

ous palms in the garden and an improved version accompanies this letter.

At "Palmoa South" the interior garden was designed as a screened atrium, 20 feet high, 30 feet wide and 40 feet long. The west side of this area opens onto an entry lanai where we can sit and watch the palms grow.

The first sizable palm one encounters in the garden is a 12-foot specimen of *Iriartea* with a huge crop of stilt roots and huge "webbed" leaflets up to 20 inches long. This species has a velvety brown base to the petiole and thrives with little attention as long as it receives adequate water.

Nearby stands a 16-foot specimen of *Verschaffeltia splendida* with foot-high aerial roots and a trunk armed with 2-inch black spines. Its beautiful entire leaves first open like a giant fan with a pink blush. It also requires little fer-

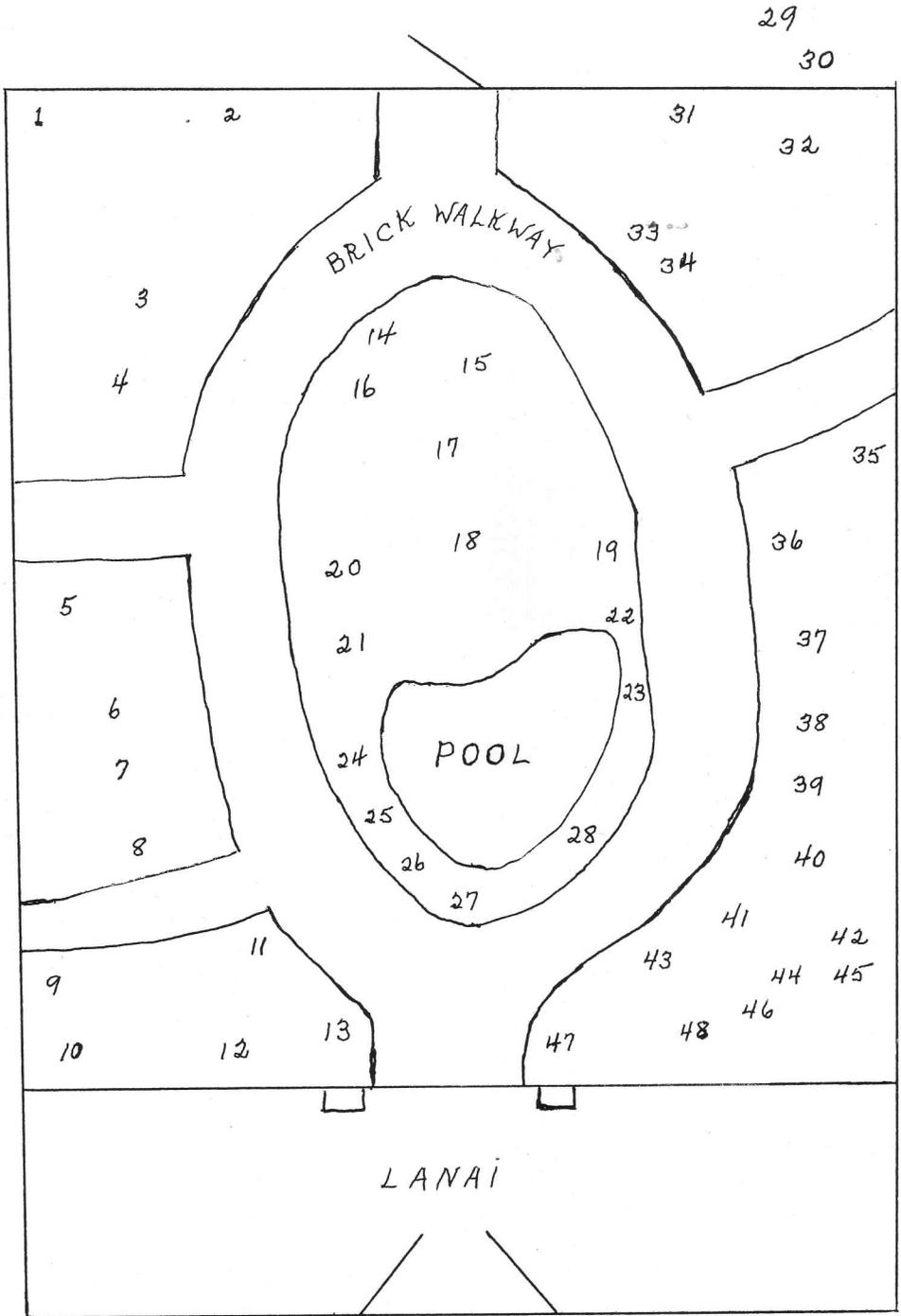
tilizer but plenty of water to thrive. Even with two or three fertilizings per year some of the more fast-growing specimens, such as *Actinorhytis* and *Ptychococcus*, are about to go through the "roof" after only three and one-half years.

With regard to fertilizer I find that some of the newly introduced *Pinanga* palms will not survive fertilizing and it seems to actually hinder their growth or kill them outright. Fortunately a goodly number of pinangas seem to thrive in South Florida in protected situations and will probably become common here one day.

Certain palms such as the beautiful *Oenocarpus panamanus* require highly acid soil to thrive, or they soon dwindle away and die. All of the palms cultivated here seem to do best with two or three weekly waterings.

One of the most exciting palms to watch grow is the sealing wax or *Cyrtostachys lakka* and also the *C. renda*. My largest specimen is about 8 feet tall in the ground and shows the magnificent fluorescent red petioles and crownshafts which have made the palm so striking and so famous. A comparatively slow grower, the sealing wax palm is greatly stimulated by full sun, wet roots and heat. One successful "trick" I've discovered is to water the plant two or three times a day (particularly in the winter) with water from the hot-water tap at about 100 degrees. It loves heat and this encourages vigorous suckering and growth.

Sealing wax palm suckers are a whole curiosity in themselves, developing in unusual or grotesque forms. One type grows from beneath the trunk base outward a foot or more before coming to the surface of the soil at about a 30° angle. Another form develops at the base of a trunk and "leans" outward in



3. The numerals in the garden design show the locations of the rarer palms at "Palma South," home of Mr. John E. Turner in Miami as listed on the facing page.

1. *Desmoncus* sp.
2. *Areca catechu*
3. *Chamaedorea arenbergiana*
4. *Phoenixophorium borsigianum*
5. *Areca langloisiana**
6. *Cyrtostachys renda*
7. *Cyrtostachys lakka*
8. *Cyrtostachys lakka*
9. *Drymophloeus oliviformis*
10. *Areca langloisiana**
11. *Gulubia* sp.
12. *Loxococcus rupicola*
13. *Drymophloeus beguinii*
14. *Rhapis excelsa*
15. *Borassodendron* sp.
16. *Strongylocaryum* sp.**
17. *Hydriastele rostrata*
18. *Salacca edulis*
19. *Ptychococcus paradoxus*
20. *Strongylocaryum* sp.**
21. *Drymophloeus beguinii*
22. *Oenocarpus panamanus*
23. *Pinanga* sp.
24. *Vonitra* sp.
25. *Iguanura* sp.
26. *Pinanga javana*
27. *Iriartea* sp.
28. *Verschaffeltia splendida*
29. *Kentiopsis oliviformis*
30. *Satakentia liukiensis*
31. *Oncosperma* sp.
32. *Calyptogyne* sp.
33. *Actinorhytis calapparia*
34. *Geonoma oxycarpa*
35. *Pinanga kuhlii*
36. *Pelagodoxa henryana*
37. *Areca guppyana*
38. *Pelagodoxa henryana*
39. *Balaka* sp.
40. *Physokentia* sp.
41. *Ptychosperma waitianum*
42. *Reinhardtia gracilis* var. *rostrata*
43. *Socratea* sp.
44. *Reinhardtia latisecta*
45. *Reinhardtia simplex*
46. *Brassiophoenix* sp.
47. *Drymophloeus beguinii*
48. *Brassiophoenix* sp.

[* Now better designated *Areca vestiaria* according to Dransfield in *Principes* 18: 51-57. 1974.
 ** *Strongylocaryum* sp. has recently been identified with *Ptychosperma salomonense* by F. B. Essig (personal communication. Ed.)

typical palm-sucker fashion. Still another comes from the base curving upward and downward like a cow's horn until it terminates in a new plant eventually.

I enjoy seeing new leaves open, especially when they have color, and in palms it is inevitably a reddish brown or pink (when not some shade of green). Among this list must be included certain species of *Verschaffeltia*, *Oenocarpus*, *Vonitra*, *Geonoma*, *Ptychosperma* (*waitianum*), *Pinanga* and *Iguanura*.

Palms relatively cold-hardy here include *Salacca*, *Gulubia*, *Drymophloeus*, *Pelagodoxa*, *Siphokentia*, *Kentiopsis*, *Reinhardtia* and *Physokentia*. One of the tenderest palms I've ever encountered was *Areca macrocalyx* which literally melted in a week's time after exposure to a temperature of 40° F.

Palm-growing when confined to the experimental delicate types is quite a challenge and one which many of us

can enjoy in limited space for years at a time. That is one of the nice attributes to the newly named *Ptychosperma waitianum*, in that its trunk is never more than ¾" in diameter and it will thrive for many years in a relatively small container, displaying for all the world to wonder at, its furry encrusted petioles and shiny green fishtail leaves.

Please excuse me now, I have to water a certain palm. . . .

Very likely that certain palm is the sealing wax, Cyrtostachys, which seems to thrive on three daily waterings. If only my climate were suitable I'd be willing to water that palm FOUR times daily and even tell it bedtime stories every night. The palms that Mr. Turner names as relatively hardy to cold make this commentator green with envy, for in this locality they would all perish the very first normal winter unless afforded special protection.

Growth Rates of *Welfia georgii*, *Socratea durissima*, and *Iriartea gigantea* Under Various Conditions in a Natural Rainforest in Costa Rica

JOHN H. VANDERMEER, JEAN STOUT, AND GENE MILLER

Department of Zoology, University of Michigan, Ann Arbor, Michigan 48104

The abundance and diversity of subcanopy palms lends a characteristic appearance to most neotropical wet forests. From small shrubs to large understory trees, the palm family is one of the most common and obvious features of these forests. Since palms are so abundant, their influence on the total dynamics of the forest is likely to be significant. Although considerable effort has been expended on other aspects of palms, they have been little studied in their natural environment from an ecological point of view. For example, in Corner's natural history (1966), not one of the 15 chapters is devoted to palm ecology. Notable exceptions are Michalowski's (1958) short discussion of the ecology of Paraguayan palms, Bannister's study of *Euterpe globosa* [= *Prestoea montana*] (1970), Kiew's (1972) notes on *Iguanura*, some recent pollination work (Schmid, 1970, 1970a; Essig, 1971, 1973), and work on seed predation (Janzen, 1971, 1972; Wilson and Janzen, 1972).

The theoretical impetus for the present study comes from a well known pattern of forest dynamics. As articulated by earlier authors (e.g. Jones, 1945; Watt, 1947) and somewhat modified recently (e.g., Gomez-Pompa, *et al.*, 1972; Horn,

1974), patterns of light interception in a forest result from the process of old trees falling and the resulting light gap gradually returning to the original state through the process of ecological succession. Thus, at a given time, a forest is expected to contain patches of light (light gaps) of various ages and origins, some recently created by a falling tree and therefore open almost completely to the sky and others created long ago, virtually filled with old vegetation and therefore relatively dark in the understory. The various types of light gaps found in a primary forest provide a variety of special habitats for any plant species. In an attempt to understand how some common understory palms fit into this general picture, data were obtained for *Welfia georgii*, *Socratea durissima*, and *Iriartea gigantea* with regard to relative growth rates under different light conditions.

All three species are common in the Atlantic lowland of Costa Rica, principally as subcanopy trees; however, *I. gigantea* and *S. durissima* frequently reach the main canopy and may even emerge. These three palm species have no economic importance, but we suspect that their impact on the total dynamics of the forest is great.



1. A light gap in the forest at La Selva, Costa Rica. Left, typical canopy cover above a minor light gap; Right, understory in the same light gap.

Methods

The study was undertaken at the La Selva field station, owned and operated by the Organization for Tropical Studies, in the Atlantic lowlands of Costa Rica. The site is located in neotropical lowland wet forest (Holdridge, 1967) and has particularly abundant populations of the three species in question. The site is characterized by a complicated pattern of old and new alluvial deposits along with extensive residual soils and is interrupted by many swamps and streams. These topographical factors result in high habitat diversity. In an attempt to sample from a variety of habitats, plants were selected from five different areas.

The sampling procedure involved first, classification of the habitat and second, measurement of relative growth rate of the individual.

The habitat classification was made for each individual plant by examining qualitatively the situation in which the plant was found, and placing it into one of the following categories:

- (1) "Climax"—complete canopy cover, dark understory.
- (2) Major light gap, not overtopped—relatively recent large treefall such that any plant in the area was more or less completely exposed to open sky.
- (3) Major light gap, overtopped—same as (2) except the plant in question was overtopped by a vine or other second growth species.
- (4) Minor light gap—reasonably complete canopy cover, but a paucity of understory trees such that a medium amount of light was falling to the forest floor due to diffuse light coming through the relatively thin upper canopy (see Fig. 1).

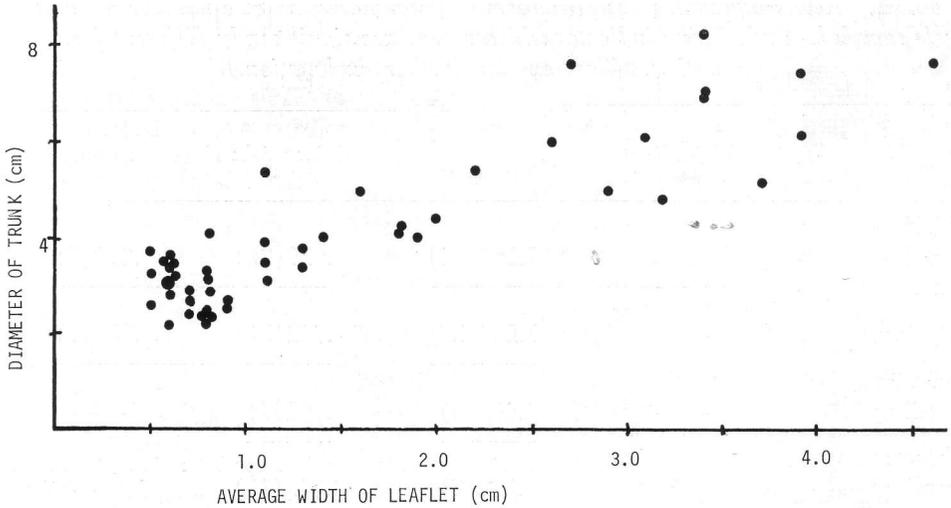
The above categories were defined qualitatively owing to the lack of any kind of sophisticated apparatus to measure continuously the pattern of light interception in the forest. In a large proportion of samples (depending on the area, perhaps up to 50 percent), it was impossible to classify the state of the forest. Any plant occurring in such a sample was omitted from the analysis; only those plants which clearly fell into one of the four categories were considered.



2. *Weljia georgii* at La Selva, Costa Rica. a, closeup of a seedling; b, a small sapling; c, a large sapling; d, an adult; e, closeup of *Weljia* infructescences. Note inflorescence at left with male flowers.

Our method of estimating the relative growth rates of individuals rests on a knowledge of the developmental morphology of the palm leaf. Consider the growth pattern of *Weljia*. Upon ger-

mination, one leaf bearing two leaflets is sent up. The next few leaves each have two leaflets. After a certain number of leaves have been produced the succeeding leaves have more than two leaflets.



3. Diameter of trunk as a function of average width of leaflet for seedlings of *Welfia*.

Under favorable light conditions, each of these new leaves will have more leaflets than the previous one. This process continues until the tree begins growing upward. It then grows to a height of six to twenty meters at which point it begins fruiting. This pattern of growth is common for many palms (Tomlinson, 1960, 1961; Kiew, 1972). We have classified all individuals into seedling or sapling, based on this developmental sequence. A seedling is defined as any plant whose leaves contained only two leaflets. Any individual *Welfia* that had at least one leaf with more than two leaflets and that exhibited no above ground stem (trunk) was considered a sapling (Fig. 2b, c). Individuals of *Iriartea* and *Socratea* were considered saplings if they had at least one leaf that had more than two leaflets and if the growing tip was no higher than six feet above the ground.

During the seedling and sapling stages of *Welfia* the trunk, which is beneath the ground, increases in diameter up to a critical point at which time the tree begins growing upward (Tomlinson, 1960). In order to categorize individual seed-

lings and measure their growth rate, it was necessary to find some above ground characteristic which correlates with the trunk diameter. A sample of fifty seedlings of various sizes was collected, several leaf characteristics measured on each leaf, and the diameter of the trunk measured. Of the characteristics measured, the average width of the two leaflets appeared to show the highest correlation with trunk diameter. This relationship is shown in Figure 3. Clearly, as leaf width increases, the diameter of the trunk increases and, therefore, the relative growth of an individual plant can be estimated by the increment of leaflet width of successive leaves.

Although the early growth of stilt root palms such as *Socratea* and *Iriartea* is basically different from that of *Welfia* (Tomlinson, 1960), this difference has no important consequences for the implications of this study. Therefore, we presume that the growth rate of seedlings of all three species can be estimated by the increment of leaflet widths.

Reasoning simply from the developmental morphology of the leaf of these

Table 1. Relative growth rates. Numbers in parentheses indicate number of individuals sampled. Underlining indicates which means are significantly different from one another. (See text for further explanation.)

	Major light gap (overtopped)	"Climax"	Minor light gap	Major light gap (not overtopped)
<i>Welfia</i> seedlings	<u>1.087(8)</u>	<u>1.168(44)</u>	<u>.929(22)</u>	<u>.872(6)</u>
<i>Welfia</i> saplings	—	<u>1.203(27)</u>	<u>.842(21)</u>	<u>.830(9)</u>
<i>Iriartea</i> seedlings	—	<u>1.405(8)</u>	<u>.891(4)</u>	—
<i>Iriartea</i> saplings	—	<u>.892(7)</u>	<u>.893(13)</u>	—
<i>Socratea</i> seedlings	—	<u>1.175(12)</u>	<u>.856(11)</u>	—
<i>Socratea</i> saplings	—	<u>.836(6)</u>	<u>.811(5)</u>	—

three species, it is obvious that relative growth rates of saplings can be estimated by the increment in leaflet numbers of successive leaves.

Thus we have methods for estimating growth rates of both individual seedlings and individual saplings. Obviously these techniques do not permit us to say anything about absolute growth rates since the rate of actual leaf development and senescence is not actually known and is probably not even approximately the same under different conditions (Smith, 1963). However, they are certainly reasonable techniques for looking at the population from a qualitative point of view.

Results and Discussion

Considering only the youngest and next youngest leaf, we can compute the ratio between the two (leaflet widths for seedlings and leaflet numbers for sap-

lings), taking the youngest leaf as the denominator. Thus, if we have a ratio greater than 1, the plant may be said to be declining, whereas a ratio less than 1 indicates that the plant is growing. The combined data for all five sampling areas and computations of the mean ratio for each canopy type for each of the three species are presented in Table 1. Duncan's Multiple Comparisons test was used for the *Welfia* data and a standard student's t-test was used for the *Iriartea* and *Socratea* data. The underlined values in Table 1 indicate the level of statistical significance. Two means that are connected by underlining do not differ from one another but do differ from any mean that is not connected to them through underlining. Thus, for example, the growth of *Welfia* seedlings in minor light gaps (.929) is not significantly different from growth in major light gaps when they are not over-

topped (.872); however both of these means are significantly different from both growth in a climax area (1.168) and growth in major light gaps if they are overtopped (1.087). Similarly, the growth of *Iriartea* seedlings in a climax situation is significantly different from growth in a minor light gap; whereas, the growth of *Iriartea* saplings in a climax area is not significantly different from growth in a minor light gap.

Consider first the data on *Welfia*. In a climax situation *Welfia* exhibits a declining growth rate (1.168 for seedlings and 1.203 for saplings). This growth pattern is not significantly different from that of individuals overtopped in a major light gap. However, in either a minor light gap or a major light gap when not overtopped, both seedlings and saplings exhibit positive growth rates. Thus, it would appear that *Welfia* is a "specialist" on a certain type of light gap, i.e., what we are here calling a minor light gap. *Welfia* seedlings and saplings are not able to grow in a perfectly climax situation and lose out in biological competition with other second growth species in a major light gap situation.

The data for *Iriartea* and *Socratea* are somewhat scanty; however, the trend seems to be similar to that of *Welfia*. Both *Iriartea* and *Socratea* show the same pattern as *Welfia* for climax areas and minor light gaps in the seedling stage. However, in both genera the saplings do not seem to show this trend. Once *Iriartea* and *Socratea* reach the sapling stage, they apparently are capable of growth even under climax situations. It is tempting to look at differences in the actual values of these ratios between species and between seedlings and saplings; however, this is most certainly not valid because for all cases, different life forms are represented and

the ratios therefore are in no way comparable. The data are useful only to look at relative growth rates of the same life form under different environmental conditions.

In view of the above results, it would appear that the pattern of light interception in the forest is extremely important to the population dynamics of all three species. It appears that these three species are similar qualitatively in that, in the climax forest after seed dispersal by birds or mammals, the seedling exists very near or below its compensation point. That is, each leaf photosynthesizes just enough to produce another leaf of the same size and morphology. In fact it seems that in a truly climax situation the seedling is actually below its compensation point. In the absence of a tree-fall in the near vicinity, the seedling will eventually die. If a treefall does occur, the seedling immediately begins growing and continues to do so until the light gap is grown over. However, if the treefall is very close to the seedling, or for some other reason the resultant light gap is very large, vines and other rapidly growing second growth species choke out the seedling. Thus, the three palm species are specialists on a particular type of light gap. If the gap is too small the plant remains near or below its compensation point and eventually dies. If the light gap is too large, other species competitively drive the plant to extinction.

This dynamic situation points to a rather interesting interrelationship between a population and the environment in which it exists, possibly a very general interrelationship which might be incorporated into a more abstract theoretical framework. These three palms respond to particular patterns of light interception in the forest, but, owing to their abundance, they are strongly implicated in causing these particular patterns.

Thus the physical environment (light patterns) dictates the mode of growth and survival of these populations, and these populations (*Welfia*, *Socratea*, *Iriartea*) dictate the mode of formation of patterns of light interception (the physical environment). Thus, we have a cyclic process where physical factors are determined by biological factors, and vice versa.

The rather gross qualitative way in which these data were collected is sufficient to demonstrate the point of the paper, but not sufficient to gain quantitative information such that a mathematical model of the effect on the population dynamics can be constructed. Clearly, what is needed is some way of measuring the light conditions in specific areas and correlating those light conditions with growth and survivorship properties of individual plants at different life stages. If these measurements could then be tied to the development of the forest in general, one could make predictions about the future history of any one of these populations under various types of forest modification.

Acknowledgments

We gratefully acknowledge the support of the Costa Rican staff of the Organization for Tropical Studies. This work was supported by a Rackham faculty research grant from the University of Michigan.

LITERATURE CITED

- BANNISTER, B. A. 1970. Ecological life cycle of *Euterpe globosa* Gaertn. In Odum, H. T., A Tropical Rain Forest. USAEC Division of Technical Information Extension, Oak Ridge, Tenn., pp. B299-B314.
- CORNER, E. J. H. 1966. The natural history of palms. Univ. Calif. Press, Berkeley, Calif. 393 pp.
- ESSIG, F. B. 1971. Observations on pollination in *Bactris*. *Principes* 15: 20-24.
- . 1973. Pollination in some New Guinea palms. *Principes* 17: 75-83.
- GOMEZ-POMPA, A., C. VÁZQUES-YANES, AND S. GUEVARA. 1972. The tropical rainforest: a nonrenewable resource. *Science* 177: 762-765.
- HOLDRIDGE, L. R. 1967. Life Zone Ecology. Tropical Science Center, San Jose, Costa Rica, 206 pp.
- HORN, H. S. 1974. Markovian properties of forest succession. In J. Diamond and M. L. Cody (Eds.), *Ecology of Communities*, Harvard Univ. Press.
- JANZEN, D. H. 1971. The fate of *Scheelea rostrata* fruits beneath the parent tree: predispersal attack by bruchids. *Principes* 15: 89-101.
- . 1972. Association of a rainforest palm and seed-eating beetles in Puerto Rico. *Ecology* 53: 258-261.
- JONES, E. W. 1945. The structure and reproduction of the virgin forest of the north temperate zone. *New Phytologist* 44: 130-148.
- KIEW, R. 1972. The natural history of *Iguanura geonomaeformis* Martius: a Malayan undergrowth palmet. *Principes* 16: 3-10.
- MICHALOWSKI, M. 1958. The ecology of Paraguayan palms. *Principes* 2: 52-58.
- SCHMID, R. 1970. Notes on the reproductive biology of *Asterogyne Martiana* (Palmae). I. Inflorescence and floral morphology: phenology. *Principes* 14: 3-9.
- . 1970a. Notes on the reproductive biology of *Asterogyne Martiana* (Palmae). II. Pollination by syrphid flies. *Principes* 14: 39-49.
- SMITH, D. 1963. Growth rates of certain palms. *Principes* 7: 7-18.
- TOMLINSON, P. B. 1960. Essays on the morphology of palms. II. The early growth of the palm. *Principes* 4: 140-143.
- . 1961. Essays on the morphology of palms. III. Seedling leaves and juvenile foliage. *Principes* 5: 8-12.
- WATT, A. S. 1947. Pattern and process in the plant community. *Journal of Ecology* 35: 1-22.
- WILSON, D., AND D. H. JANZEN. 1972. Predation on *Scheelea* palm seeds by bruchid beetles: seed density and distance from the parent palm. *Ecology* 53: 954-959.

News of the Society

(Continued from page 136)

nestled among the native growth. Host Paul had provided a lavish buffet lunch, providentially under shelter when a sudden tropical shower fell but did not dampen spirits. From this garden it was only a short stroll to the lushly landscaped garden of Nat DeLeon where again many rare palms grow among native trees with bromeliad beds at their feet and orchids above. A cool punch was most welcome for the day was hot and sticky.

Immediately after another short down-pour members gathered at the Buhler home at 6:30 p.m. where a delightful breeze from the bay helped keep everyone comfortable while eating a quickly served box supper. The tables were set up by the members since the rain had made it questionable until the last moment whether eating outdoors would be possible. Afterwards newly-elected President Dr. U. A. Young showed slides of a recent trip to South America and a movie made by his son of his large palm collection. Dr. Moore was prevailed upon to show one more box of his slides.

Early Tuesday morning, June 25, a group of some 40 members left for a day's trip to Nassau, at the invitation of Mr. and Mrs. Arthur Langlois, to see the well-known palm collection at their home, "The Retreat." Others took a bus trip to Key West while others visited well-known Miami gardens and nurseries, among them The Kampong, former home of Dr. David Fairchild now owned by Mrs. Edward Sweeney and the garden of Mrs. Elsa Margraff, both Palm Society members.

That afternoon, after a four-hour delay, the 29 members who flew to Colombia finally took off and to all intents and purposes the 1974 Biennial Meeting had come to an end. The many letters

sent by those who attended would indicate that it was most successful, due in great part to the many new members, the compatibility of interest of those present and the cooperation and hard work of those who planned the meeting.

The saga of the Colombia trip will appear in a separate article.

Western Chapter

A small gathering of members in the immediate vicinity was held at the home of member Jim Wright in La Jolla, California on August 3 at 6:30 p.m. for a slide show and pot luck dinner. By 7 p.m. about 30 people were enjoying the garden tours and partaking of a fabulous dinner. Beer, fruit punch and coffee also were available. The group was honored by having Mike Evans from Newport Beach show his slides from the recent palm collecting Colombia trip. Afterwards some members stayed to help clear up and host Jim was most appreciative of their help as well as thanking those whose enthusiasm made the dinner and meeting possible.

TEDDIE BUHLER

President's Report

The past two years have been a very successful time for The Palm Society. Our membership has jumped to an all time high of over 800 members at present, and every indication is that the growth will continue and will reach the 1,000 member mark which Dent Smith, our founder, hoped 17 years ago someday to reach. Well this goal is now in sight thanks to your continued enthusiasm for The Palm Society. We have tried to let even more people know about our society through ads in various publications such as the *Horticulture Magazine*, *Bromeliad Society Journal* and

soon the annual Fern Society Roster. Many interested people in these other plant societies find it very easy to become active in The Palm Society. After all, palms are the "princes" of the plant kingdom.

You will shortly hear a report from Mrs. Lucita Wait on the activities of the seed bank. But I would like to thank Lucita now for the outstanding work she has performed with the seed bank. She has received valuable help from Mr. De-Armand Hull, who has made many of the contacts and organized the expeditions that are bringing in rarities from all over the world. Those little packets of seeds many of us have received have helped build enthusiasm for growing palms from seed. Later in the program this afternoon you will have a chance to ask a panel of experts questions on seed germination and seedling growing.

In addition to our society's growth in numbers, our informal "Palm Society Chapters" have increased also. Chapters in South Florida, Central Florida, and of course the Western Chapter in California have been with us for some time. But now we must add West Palm Beach, Hawaii, and most recently, Northern California to the growing list of areas having Chapters. Now if the good members in Texas would start a chapter, we would be well represented in all our geographical areas. So you can see how easy and natural it is for The Palm Society to grow.

No president's report would be complete without making mention of PRINCIPES, our outstanding journal. And in this report I want to publically thank its editor, Dr. Harold E. Moore, Jr., outstanding botanist and the worlds foremost student of the palms. Hal, thank you for all you have done for us.

Soon, we will have an election, and a new group of officers and directors will

take over the leadership of The Palm Society. But the very important position of Executive Secretary will not change. The everyday business of the society will continue to be carried on by Mrs. T. C. Buhler. Teddie has made my job easier these past two years through her efficiency and hard work. I hope she will continue to serve us all for many years to come. Teddie, my personal thanks to you.

Finally, a personal word from your outgoing president. I felt very humble two years ago when you elected me President of The Palm Society. And today I feel even more humble at having had the opportunity of working with such a wonderful group of people. I must think of the many friendships made, of the warm, sincere associations encountered with so many in our society. The past two years has been the most exciting time of my life. I know we have a vital society and it will continue to grow and prosper. Thank you very much.

Respectfully submitted,
s/KENNETH C. FOSTER

Back Issues of Principes

The Board of Directors voted at the Biennial Meeting to charge \$1.50 per issue for back numbers of PRINCIPES still in stock except those that have been reprinted and for which \$2.00 must be charged.

The 11 issues of Vol. 1, No. 1 through Vol. 3, No. 2 (Vol. 1 has five issues) are to be reprinted if enough orders are received. Each issue will cost \$2.50 or a total of \$27.50 for all 11 issues, including postage and handling.

Orders for these early issues must be accompanied by full payment. If all 11 issues are ordered by March 31, 1975 a prepublication discount of 10% may be deducted from the order. The discount does not apply on less than the 11 issues,

or if the reprints are ordered after the above date.

List of Nurseries Offering Palms

In order to serve the membership of The Palm Society better, it is desired to publish a list of nurseries that are able to supply palms. Nurserymen and buyers alike are invited to address letters and/or catalogs to the editor, Dr. Harold E. Moore, Jr., 467 Mann Library, Cornell University, Ithaca, N. Y. 14850, providing name, location, and comments on the range of stock available.

New Advisory Council

At the June, 1974, meeting of the Board of The Palm Society, on motion duly made and seconded, It was RESOLVED that the by-laws be amended as follows:

"There shall be an ADVISORY COUNCIL consisting of all former Presidents of the Society upon termination of their terms as directors and for so long as they retain membership in the Society; and further to consist of such other members as may have rendered outstanding services to the Society or who may have added luster or prestige to the Society, such members to be elected to the Advisory Council by majority of that body itself, subject, nevertheless, to approval by the Board of Directors. Any members of said Advisory Council may attend any meetings of the Board of Directors and be invited on occasion to express opinion, but not entitled to vote."

Only three past presidents are at present eligible to the Advisory Council, but others will be added as their terms on the Board of Directors expire, and doubtless other outstanding Society members may be added.

LUCITA H. WAIT

Myron Kinnach— New Vice President

Myron Kinnach, newly elected Vice President of The Palm Society, was born in Los Angeles, California, on December 26, 1922. From 1951 to 1962, he was Assistant Manager, Botanic Garden, University of California, Berkeley, and from 1962 to the present he has been Curator and Superintendent of the Huntington Botanical Gardens, San Marino, California.

Mr. Kinnach has been the leader of or a participant in ten botanical expeditions to Mexico and one to Honduras. He is much interested in the taxonomy of the Cactaceae and has published about 30 papers on this subject, including various new species and revisions of certain genera, epiphytic and scandent cacti in particular. At present, he is writing a handbook on the subtropical palms to be published in about two years. This book will present pertinent data about some 150 species designed to be useful to the serious fancier of these plants.



Myron Kinnach

* * *

Biographical sketches of other officers have appeared previously in PRINCIPES 1: 75-76 (Mrs. Wait), 17: 27-28 (Dr. Young, Mrs. Buhler), and 18: 34-35 (Mr. Gaine).

INDEX

Figures in *Italic* indicate pages with photographs or other illustrations

- Acoelorrhaphe, derivation of name 72
 Acrocomia lasiospatha 40
 Actinorhynchus calapparia 145, 147
 Aiphanes 121, 130
 Ammandra decasperma 124, 126, 127, 130
 Archontophoenix 106, 107
 alexandrae 107
 cunninghamiana 86
 Areca catechu 71, 147
 communis 52, 53
 henrici 54
 langloisiana 51, 52, 54, 147
 leptopetala 53, 54
 macrocalyx 147
 paniculata 52, 54
 punicea 53
 vestiaria 53, 54, 55, 56, 147
 Arecanut and spices (review) 71
 Arecastrum 106, 107, 139
 derivation of name 72
 romanzoffianum 86
 Arenga undulatifolia 1, 2
 Arikury, derivation of name 72
 Arikuryroba, derivation of name 72
 schizophylla 139
 Astrocaryum standleyanum var. calimense 130
 vulgare 8, 9, 10
 Attalea allenii 124, 130
 Bactris caepitris 40
 gasipaes 7, 14, 15, 16, 20, 122, 123, 130
 sp. 14, 130
 Balaka sp. 147
 Barry, Jr., David 75
 Bartholomew, Bruce 144
 Baxter, Mrs. Richard H. 143
 Bear, Elwood 60
 Bezona, Norman
 The propagation, growth, and distribution
 of *Pritchardia affinis* 65
 Biennial meeting 34, 50, 131
 Borassodendron sp. 147
 Borassus flabellifer 3
 Brassiophoenix sp. 147
 Brown, Peter H.
 Palm popularity wavers in city 104
 Buhler, T. B.
 News of the society 34, 71, 112, 131
 Notes on marcottage of certain palms 111
 Butia 106, 107, 138
 capitata 26, 28, 62, 84, 85, 86, 139
 Calamus 39
 Calyptrocalyx, derivation of name 72
 Calyptroglyne sp. 147
 Carpentaria, derivation of name 72
 Carter, Michael A. F.
 Palms in southern England 84
 Caryota 107
 aequatorialis 88, 89
 albertii 87
 cumingii 88
 griffithii 87, 88, var. selebica 87
 macrantha 88
 majestica 88
 maxima 87, 89
 merrillii 88
 mitis 88, 92, 109
 nana 88
 no 87, 89
 obtusa 87, 89, var. aequatorialis 88, 89
 rumphiana 88, 89, 90, 91, 92, 93
 var. australiensis 87
 var. borneensis 87, 89, 92
 var. indica 87, 89
 var. javanica 87, 88, 89
 var. moluccana 88, 89
 var. papuana 87
 speciosa 88
 Certatolobus, derivation of name 72
 Ceroxylon 39
 hexandrum 129, 134, 135
 quindiense 59
 sp. 119, 121, 123, 124, 130
 utile 132, 133
 Chamaedorea 106
 arenbergiana 147
 ernesti-augusti 111, 112
 humilis 111
 hybrids 62
 metallica 111
 microspadix 141
 radicalis 141
 sp. 121, 130
 Chamaerops humilis 25, 39, 60, 84, 85, 86,
 107, 139
 Clinostigma mooreanum 32
 Coccolithrinax 40, 138, 139
 Cocos nucifera, curved stems of 36
 Commercial propagation of two little known
 ornamental palms 32
 Coons, Claire C.
 General Roy Stone: portrait of a gentleman
 99
 Some observations on the palm weevil
 Rhynchophorus cruentatus 68
 Corypha umbraculifera 3, 143
 Craig, Jack E.
 Some Malaysian palm notes 108
 Culture of Rhapsis in Japan, the 75
 Cyrtostachys, derivation of name 72
 lakka 145, 147
 renda 108, 145, 147
 Darian, M. E.
 Pasto, Sibundoy, and the never, never land
 132
 Desmoncus sp. 147
 Dictyosperma 138
 Dransfield, J., 21
 New light on *Areca langloisiana* 51
 Notes on *Caryota* no Becc. and other
 Malasian *Caryota* species 87
 Variegated pinangas 22
 Drummond, Paul
 The elegant *Ptychosperma* in South Florida
 107
 Drymophloeus beguinii 147
 oliviformis 147

- Dugand, Armando 59
 Ecology of palms, the 39
 Editor's corner 21
Elaeis hybrid 63
 Errata 64
 Essig, F. B. 21
Euterpe andina 130
 globosa 148
 oleracea 15, 40
 precatória 15, 40
 sp. 13, 121, 129, 130, 133, 134, 135
 Experiments in palm growing in Tennessee 25
 Fossil palm 35
 Foster, Carl O., Jr. 139
 Foster, Kenneth C.
 The Palm Society trip to Colombia 156
 Fremaux, C. S. 63
 Gaine, Bryan T. 34
Gaussia 40
 General Roy Stone: Portrait of a gentleman 99
Geonoma oxycarpa 147
 sp. 129, 130, 132, 133, 135
 Glassman, S. F.
 A revision of B. E. Dahlgren's Index of American palms (review) 114
 Growth rates of *Welfia georgii*, *Socratea durissima*, and *Iriartea gigantea* under various conditions in a natural rainforest in Costa Rica 148
Gulubia sp. 147
 Hardest palms 35
Hedyoscepe canterburyana 32
 Hodge, W. H. 21
Howea 106, 107
 belmoreana 32
 forsterana 32
 Hull, DeArmand 71
 Palm questions and answers 30, 70
 Hybridization 35, 62, 63, 64
Hydriastele rostrata 147
Hyphaene 39
Iguanura sp. 147
 wallichiana 108
Iriartea gigantea 148-154
 sp. 130, 145, 147
Jessenia bataua 4
 polycarpa 124, 130
 Johnson, Dennis V. 21
 Arecanut and spices (review) 71
Jubaea chilensis 84, 85, 86
 spectabilis 107
 Kanagawa, Toshio, letter from 57
Kentia canterburyana 32
 mooreana 32
Kentiopsis oliviformis 144, 147
 Kiem, Stanley 137, 138
 Kinnach, Myron 157
 Kitzke, E. D. 21
Latania 138
Leopoldinia piassaba 6, 7
Lepidocaryum tenue 7, 8
Lepidorrhachis mooreana 32, 33
 Letters 35, 57
Livistona 107, 138
 australis 86
 chinensis 86, 106
Lodoicea 39
Loxococcus rupicola 40, 147
 Lubar, Joel F.
 Experiments in palm growing in Tennessee 25
Malortica pumila 59
Manicaria saccifera 130, 131
 Martens, Otto 64, 144
 Commercial propagation of two little known ornamental palms 32
 Martin, Benjamin 71
Mauritia flexuosa 130
Mauritiella cataractarum 12
 pacifica 131
Maximiliana martiana 12
 McCurrach, Mrs. James C. (death notice) 35
 Mello filho, Luis Emygdio de, letter from 35
Metasocratea hecatonandra 130, 131
Metroxylon warburgii 143
 Milburn, J. A. and M. H. Zimmermann
 Sapsuckers: do they suck palm sap? 67
 Miller, G. 148
Mischophloeus paniculatus 52, 53, 54
 vestiarius 54
 Moody, Norman 71
 Moore, Jr., H. E. 21
 What's in a name? 72
 Mowry, Bill 71
Nannorrhops ritichiana 26
 New advisory council 157
 New light on *Areca langloisiana* 51
 News of the society 34, 71, 112, 131
 Notes on *Caryota no Becc.* and other Malaysian *Caryota* species 87
 Notes on culture 111
 Notes on marcottage of certain palms 111
Nypa fruticans 39, 143
Oenocarpus 130
 bacaba 4
 dryanderæ 131
 panamanus 145, 147
Oncosperma 108, 147
Opsiandra maya 143
Orbignya cuatrecasana 124, 131
 Palm briefs 32, 65
 Palm literature 21, 71, 114
 Palm questions and answers 30, 70
 Palm society biennial meeting 131
 new officers of 135
 trip to Colombia 119
 Palm symposium, contents of 21
 Palm weevil 68, 137
 Palmologue 58, 137
 Palms and religion in the northwest Amazon 3
Parajubaea cocoides 129, 130, 132
Parascheelea anchistropetala 5, 6
 Pasto, Sibundoy, and the never, never land 132
Pelagodoxa henryana 140, 141, 142, 145, 147
 Pérez Jiménez, Luis Alfredo
 Some ecological notes on *Sabal yucatanica* in Mexico 94
Phoenicophorium borsigianum 147
 Phoenix 39, 57, 138
 canariensis 84, 85, 86, 106
 dactylifera 3

- Physokentia sp. 147
 Phytelphas seemanii 131
 Pigafetta filaris 30, 52
 Pinanga coronata 22
 densiflora 22, 23, 24
 disticha 22, 24, 109, 110
 insignis 22
 kuhlii 22, 147
 javana 22, 147
 maculata 22
 patula 22
 pulchella 23, 24
 sp. 147
 ternatensis 53
 Podococcus barteri 21
 Prestoea montana 148
 Principes, back issues of 156
 Pritchardia 138
 affinis 65, 66
 Propagation, growth, and distribution of
 Pritchardia affinis 65
 Pseudopinanga aristata 23, 24
 Popenoe, Paul
 The date palm (notice) 21
 President's report 155
 Pseudophoenix 40
 Ptychococcus paradoxus 145, 147
 Ptychosperma elegans 86, 107, 108
 paniculatum 52, 54
 vestiarium 53, 54
 salomonense 147
 waitianum 21, 147
 Read, R. W. 21, 138
 Palm literature 114
 The ecology of palms 39
 Reinhardtia gracilis var. rostrata 147
 latisecta 147
 simplex 147
 Reprinted from here and there 104
 Rhipidophyllum hystrix 26, 27, 28, 29, 60, 61,
 139, 144
 Rhipis "elegans" 82
 excelsa 75-83, 147
 filiformis 82
 flabelliformis 75
 gracilis 82
 "grandifolia" 82
 humilis 75
 laosensis 82
 micrantha 82
 "minor" 82
 "ptychophylla" 82
 robusta 82
 Rhopalostylis 39
 sapida 86
 Rhynchophorus cruentatus 68-70, 137
 Roystonea 107, 143
 Sabal 138
 etonia 144
 mauritiiformis 130
 minor 26, 29, 39, 86, 139, 144
 palmetto 30, 144
 yucatanica 94-98
 Salacca edulis 147
 Sapsuckers: do they suck palm sap? 67
 Satakentia liukiensis 144, 147
 Scheelea butyracea 120, 130
 Schultes, R. E. 21
 Palms and religion in the northwest Amazon
 3
 Seaforthia communis 52
 vestiaria 53, 54
 Seed bank 21
 Seedlings, treatment of 70, 71
 Serenoa repens 144
 Smith, Dent
 Palmologue 58, 137
 Sneed, Melvin W. 141
 Socratea 130, 147
 durissima 143, 148-154
 exorrhiza 4, 9, 11, 131
 Some ecological notes on Sabal yucatanica in
 Mexico 94
 Some Malaysian palm notes 108
 Some observations on the palm weevil
 Rhynchophorus cruentatus 68
 Spider mites 30
 Stout, J. 148
 Strongylocaryum sp. 147
 Syagrus 40
 coronata 139
 hybrids 63
 sancona 119, 121, 130
 × tostana 139
 Tennessee, palm growing in 25
 Thrinax 138
 excelsa 41, 42, 43
 floridana 42
 harrisiana 43, 46
 multiflora 42
 parviflora 37, 38, 40, 42, 43, 44, 45, 46, 47,
 48, 49, 50
 radiata 42, 43
 Trachycarpus fortunei 25, 26, 27, 28, 39, 60, 61,
 75, 84, 86, 139
 Treasurer, new 34
 Turner, John 144, 145
 Uhl, N. W. 21
 Vandermeer, J. H., J. Stout and G. Miller
 Growth rates of Welfia georgii, Socratea
 durissima, and Iriartea gigantea under
 various conditions in a natural rainforest
 in Costa Rica 148
 Variegated pinangas 22
 Caryota mitis 22
 Verschaffeltia splendida 145, 147
 Vonitra sp. 147
 Wait, Lucita H. 157
 Washingtonia 39
 hybrids 64
 robusta 86, 106
 Welfia georgii 148-154
 Western chapter 155
 Wettinia quinaria 131
 What's in a name? 72
 Wilcox, Merrill 139
 Yamaguchi, Kiyo-o and David Barry, Jr.
 The culture of rhipis in Japan 75
 Yanilos, Theresa 35
 No! The palm isn't falling 105
 Young, U. A. 61
 Zimmermann, M. H. 67