Island Hopping for Palms in Micronesia

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Ever since I was smitten with palms over 40 years ago, one place and its palms that fascinated me to no end was Micronesia. The combination of palms and idyllic tropical islands is always extraordinarily appealing. Indeed, the first day I arrived in Honolulu in 1974 for graduate studies at the University of Hawaii I headed straight to Foster Garden. The first palm I saw after entering the garden was a striking *Clinostigma ponapense*, easily the most handsome and regal plant I had ever seen. It was the quintessential palm, a spreading crown of long-pinnate leaves with elegantly pendulous pinnae held by a lime-green, cylindrical crownshaft topping a straight, clean, neat, chalky white, ringed trunk, all supported by a short cone of large, conspicuous, black roots. The label indicated its origin was Pohnpei, Micronesia, and I knew right then that I must visit that place someday. Well, someday took nearly 40 years but in November, 2011 I finally got my wish and I visited Micronesia to photograph and document its palms as part of a larger, multi-year project I am heading up that covers palms on all the Pacific Islands.

I departed Los Angeles on October 30 and spent several days in Honolulu visiting friends and photographing palms and trees. In Honolulu I focused on two species of *Ponapea*, solitary, moderate, pinnate-leaved palms with truncated, toothed pinnae tips related to *Ptychosperma* and occurring in Micronesia and Melanesia. These were *P. hosinoi* and *P. ledermanniana*, which were in the collections of Lyon Arboretum of the University of Hawaii and Hoomaluhia of the Honolulu Botanical Gardens system. Although I hoped to see these two species in habitat in a few days, it was reassuring to have detailed photographs of flowers, fruits and other diagnostic features already in hand in case I was unsuccessful in finding them in Micronesia.

My flight from Honolulu to Micronesia was scheduled to depart very early in the morning (5 a.m.) on November 3. My son Robert, who was accompanying me to Micronesia, arrived in Honolulu late on the night of November 2. We settled into our airport hotel for a few hours sleep, were up at 3 a.m., did last minute packing and headed to the airport for our Continental Airlines flight. There are two ways to travel to Micronesia. One heads west from

Honolulu, island hopping to Majuro, Kwajalein, Kosrae, Pohnpei, Chuuk and then to Guam and Palau. The other way is to fly directly to Guam from Honolulu and then island hop in the reverse order. We chose the first method so that upon our return we would have only two, non-stop flights to arrive in Los Angeles: Guam to Honolulu and Honolulu to Los Angeles.

Micronesia comprises thousands of small, often quintessentially idyllic, tropical islands spread over a vast area of the western and northern Pacific Ocean southeast of Hawaii, north of New Guinea and the Solomon Islands in Melanesia, and east of the Philippines. Several island groups comprise Micronesia, including the Marshalls, Carolines and Marianas archipelagos. Micronesia was the site of fierce fighting during World War II, which in some places devastated the islands' fragile flora and fauna, including the palms. Today continued threats to the palms include loss and degradation of habitat due to farming, agroforestry and infrastructure development; invasive species such as the highly aggressive and invasive, large, rampant vine *Merremia peltata*, which blankets the native vegetation, effectively "smothering" it and suppressing or preventing reproduction; harvesting for food, medicine and materials; natural disasters such as storms and fire; and, in some cases, narrowly restricted ranges.

After World War II the U.S. administered Micronesia as a trust territory. Several of the islands and island groups gained independence in the 1980s and 1990s, including Chuuk, Kosrae and Pohnpei of the Federated States of Micronesia and the Republic of Palau, all part of the Caroline Islands Archipelago.

The islands are of volcanic origin, typically with barrier and/or fringing reefs, but some have been reduced to low, karst limestone rocks. The climate is warm and wet with little or no seasonal variation. Year-round temperatures range from about 24°C (75°F) to 32°C (90°F). Rainfall is high and ranges from 250 cm (100 inches) to 760 cm (300 inches)

1. The attractive fruits of *Metroxylon amicarum* are covered with glossy, brown scales.

annually. Our objectives, in the order we would visit them, were Kosrae, Pohnpei, Chuuk and Palau. Visiting these four islands would enable us to see all of Micronesia's indigenous palms. The palms we most wanted to see were *Ponapea ledermanniana* (Kosrae and Pohnpei), *P. hosinoi* (Pohnpei), *P. palauensis* (Palau), *Clinostigma ponapense* (Pohnpei) and *C. carolinense* (Chuuk). Other species we would see included *Heterospathe elata* and *Pinanga insignis* on Palau and *Metroxylon amicarum* and *Nypa fruticans* on all the islands.

Kosrae

After over 10 hours of elapsed time from Honolulu, crossing the International Date Line and making brief stops on Majuro and Kwajalein in the Marshall Islands, we finally arrived about midday on Saturday, November 5 at out first objective, Kosrae, in the Federated States of Micronesia.

Roughly triangular in shape, Kosrae rises to 634 m (2080 feet) elevation, and at 15 km (9 miles) across, dominates the lagoon in which it sits. Much off the beaten tourist track, Kosrae is an undiscovered jewel with relatively few visitors. However, it has much to offer those travelers who like lagoon activities, such as snorkeling and diving, or who like trekking in tropical rainforests to see plants, animals and local historic and cultural sites.

Greeted by a blast of hot, humid air as we exited the plane, we rented a 4-wheel drive vehicle and drove to our lodgings at the Pacific Treelodge Resort on the other side of the island. After unpacking and eating lunch at the hotel's superlative Bully's Restaurant, which sits on an inland lagoon at the end of an elevated boardwalk through an enchanting mangrove forest, we headed out to look at palms, mostly common species that occur on most of the islands.

As we did on all our island stops, I had made prior contact with non-profit, non-governmental organizations mostly involved with conservation efforts and environmental studies to provide us with guides to help us find the palms. On Kosrae the Kosrae Conservation and Safety Organization provided a guide, Jacob Sanno, who would accompany us in our exploration. Because we had a shortened first day, Jacob took us to the southern and southeastern part of Kosrae where we found *Metroxylon amicarum* at Malem, *Nypa fruticans* at the end of the paved road in Utwa, and the ever-present *Cocos nucifera* (coconut palm). On the way we could look up to the high ridges and see abundant *Ponapea ledermanniana*

2. *Nypa fruticans*, here at Utwa, Kosrae, forms vast stands in near mangrove tidal and estuarine areas of most islands in Micronesia.

3. In the forest understory along the trail to the Menka Ruins *Ponapea ledermanniana* has a rather open canopy of gracefully spreading pinnate leaves with the pinnae flat and in more or less one plane.

poking their canopies of distinctive, recurved, pinnate leaves above the forest and easily pick out the white inflorescences of the palms against the dark green forest vegetation, but they would have to wait for another day.

Metroxylon amicarum, a tall, solitary, pinnate-leaved palm with large, glossy and scaly fruits (Fig. 1), is unique in the genus in that it does not die after flowering and fruiting like its related species do. *Nypa fruticans*, the

4 (left). Inflorescences of *Ponapea ledermanniana* are white and immature fruits green. 5 (right). At this exposed site near Yesron in Utwa, Kosrae, *Ponapea ledermanniana* has a compact canopy of stiffly recurved leaves with the pinnae arising from the rachis to make a v-shaped blade.

mangrove palm, occurs all over the western Pacific and tropical Asia where it forms dense stands in brackish water estuarine areas. Long pinnate leaves arise directly from short, creeping and branching rhizomes, making a forest of upright leaves looking as if they are arising directly from the ground (Fig. 2). The curious inflorescences (flower stalks) and infructescences (fruit stalks) are club-like, especially the latter with the large fruits densely clustered and packed at the end of a short stalk. Fruits of *N. fruticans* often germinate on the palm before they drop to the ground or into the water to float away. The sun was setting as we hurried back to our lodgings and another fine meal at Bully's Restaurant.

Sundays in Micronesia are mostly strict days of rest so Jacob was unable to accompany us to look for *Ponapea ledermanniana* in the morning. However, after breakfast in Bully's Restaurant, Robert and I hired a local guide, Salik, who would take us to see some ancient Micronesian ruins up the Menka River in Utwa, about a two-hour walk along the river and up a valley through dense rain forest. We picked up Salik late on Sunday morning and drove to the trailhead for the Menka Ruins. As we began our walk we engaged Salik in talk about *kuter wet*, the indigenous name for *P. ledermanniana* on Kosrae and meaning "inedible nuts," perhaps in reference and contrast to the seeds of the betel nut palm, *Areca catechu*, which we would see in more abundance on Pohnpei, Chuuk and Palau. He replied that we would probably see some on our walk to the ruins, which was exciting news to say the least. We quickly entered the wet, heavily forested valley, following a muddy but well marked trail that meandered among the great rain forest trees with huge, spreading buttresses, some of which towered well over 30 m (100 feet) above us.

Much to our surprise and delight, we immediately began to see *Ponapea ledermanniana* scattered in dense shade on steep, well-drained slopes above the river or actually growing in somewhat swampy ground along the river. Here it was a solitary, slender, moderate to tall, understory forest palm with a brown, ringed trunk supporting a pinkish brown crownshaft and rather open canopy of

6. Because the rain forest vegetation had been cleared from this site near Yesron, Utwa, Kosrae, the natural nutrient recycling system was severely disrupted and many of the *Ponapea ledermanniana* displayed magnesium- and potassium-deficient older leaves.

gracefully spreading pinnate leaves with the pinnae flat and in more or less one plane (Fig. 3). The jaggedly toothed pinnae tips are a reminder of its close relatives *Balaka*, *Drymophloeus*, *Ptychosperma*, *Solfia*, *Veitchia* and *Wodyetia*. In the rather dense shade of the giant rain forest trees few of the palms were reproductive and the gracefully spreading leaves were in contrast to exposed specimens we would see later with a more compact canopy of strongly recurved leaves.

We spent much time sloshing through the mud and water and scaling steep slopes to examine and photograph the palms. Needless to say, we did not make it to the ruins, and as rain clouds threatened, we made our way back to the auto. After dropping Salik off we ate lunch and then met Jacob, who would take us to a site along Okat Road in Tafunsak on the northeast side of the island to see more *Ponapea ledermanniana*, this time on gently rounded ridges but still mostly as an understory palm with gracefully spreading leaves. Here more palms were in flower and the starkly white inflorescences were conspicuous if not showy against the dark green leaves. As I was taking photographs heavy rain began to fall and we tried huddling under some small trees in an unsuccessful attempt to stay dry. Finally Robert pulled out his umbrella and held it over me as I shot of a series of photos of the white inflorescences and infructescences heavily laden with full-size but not-yet-ripe green fruits (Fig. 4). Several of the palms here, especially those on sloping terrain, had trunks with a conspicuous cone of relatively short, brown stilt roots at the base.

We spent our last day, Monday, on Kosrae with Jacob visiting a site in Yesron in Utwa where *Ponapea ledermanniana* was growing on an unusually steep, exposed, weedy hillside that had been cleared to plant *Manihot esculenta* (tapioca, cassava, manioc). At this exposed site the palms looked entirely different from their understory counterparts that we had previously seen and had compact canopies of stiffly recurved leaves with the pinnae arising from the rachis to make a v-shaped blade (Fig. 5). Also, because the rain forest vegetation had been cleared from the site, the natural nutrient recycling system was severely disrupted and many of the palms displayed magnesium- and potassium-deficient older leaves (Fig. 6).

We felt that, due to its relative abundance, distribution on steep slopes and good regeneration, *Ponapea ledermanniana* is probably not endangered on Kosrae.

7. Near Liduduhnap Falls on the Nanpil River in Nett, Pohnpei, *Ponapea hosinoi* is a solitary, slender, moderate to tall forest palm with a brown, ringed trunk.

8. *Ponapea hosinoi* differs from *P. ledermanniana* in its grayish green crownshaft, conspicuously broader pinnae, and petioles and inflorescences with short, brownish hairs. 9. Rachilla and staminate flowers of *Ponapea ledermanniana* (bottom) are white while those of *P. hosinoi* (top) are brown to greenish.

Pohnpei

I was full of anticipation when we arrived Tuesday, November 8 about mid-day in Pohnpei. I was finally going to see *Clinostigma ponapense* in the wild, a nearly life-long dream. Pohnpei, circular in outline and the largest, highest and most populous island in the Federated States of Micronesia, is about 25 km (15 miles) across, rises to about 790 m (2600

feet) elevation and dominates the lagoon in which it sits. It is also one of the rainiest spots on earth, with some mountain locations receiving over 760 cm (300 inches) of rain annually. Dense rain forest covers the island and numerous rivers make their way from the interior out to the sea. After checking into our hotel and buying supplies, we headed to the offices of the Conservation Society of Pohnpei, which would provide us with guides and a vehicle in our search for the island's palms.

On Wednesday our guide Relio Lengsi drove us to see *Clinostigma ponapense* and *Ponapea hosinoi* near Liduduhnap Falls on the Nanpil River in Nett, long a classical collecting area for palms and other plant species on the north side of the island. Along the way to the falls, on the few occasions when the clouds briefly lifted and the mountainous interior was visible, it was easy to see the ridgelines with abundant *C. ponapense* poking their elegant canopies high above the surrounding vegetation.

Under threatening skies, Relio parked the auto near the falls and we entered the dense, wet rain forest, using a water-pooled, muddy, gently upward-sloping track, and nearly immediately encountered both species of palms. They were abundant, even gregarious, and we observed all life stages, from seedlings to reproductive adults. Here *Ponapea hosinoi* was an understory palm, only occasionally breaking through into the open in forest fringes or in disturbed sites. Like *P. ledermanniana*, it is a solitary, slender, moderate to tall forest palm with a brown, ringed trunk (Fig. 7). However, it differs from *P. ledermanniana* in its grayish green crownshaft, conspicuously broader pinnae, petioles and inflorescences with short, brownish hairs (Fig. 8), shorter fruits and floral details (Fig. 9).

Correspondence with Steve Perlman of the National Tropical Botanical Garden on Kauai in Hawaii and Carl Lewis of Fairchild Tropical Botanic Garden in Miami, Florida, who had visited Kosrae, Pohnpei and Palau a few years earlier to survey *Ponapea*, indicated that *Ponapea hosinoi* was mostly distributed on the northern side of Pohnpei while *P. ledermanniana* was mostly in the southern half. Thus, we were greatly surprised to find one individual of *P. ledermanniana* growing amongst a group of *P. hosinoi* on the northern side of Pohnpei. The two growing side-by-side enabled us to see easily the differences between them (Fig. 10).

The exceedingly handsome and plentiful *Clinostigma ponapense* is an emergent species,

10. Near Liduduhnap Falls on the Nanpil River in Nett, Pohnpei, differences between *Ponapea ledermanniana* (left) and *P. hosinoi* (right) are easy to see when they occur side by side.

11 (left). *Clinostigma ponapense* typically has inflorescences and infructescences in all stages of development, from in-bud flowers to mature fruit. 12 (right). What is most handsome about *Clinostigma ponapense* is its canopy of rich green, long-pinnate leaves with elegantly pendulous pinnae.

thrusting its regal canopy well above the surrounding vegetation. A dense cone of relatively short, brownish orange prop roots supported the ringed, chalky white trunk. Below the crownshaft were inflorescences and infructescences in all stages of development, from in-bud flowers to mature fruit (Fig. 11). What is most handsome about this palm, though, is its canopy of rich green, long-pinnate leaves with elegantly pendulous pinnae (Fig. 12).

As the clouds lowered and heavy rain began to fall, Relio suggested that we visit his family's farm near Meitik in Nett, not only to escape the rain but to eat lunch and view more *Clinostigma ponapense*. We needed no further encouragement as the rain became an ear-deafening downpour, flooding the road at several places on our way back down the mountain.

The rain let up as we finished our lunch at Relio's farm and we decided to explore some areas near the farm but at higher elevations. We left the paved road and continued up a rocky track until it petered out in a *kava* and betel nut plantation near Nankurupwung in Nett. Although the rain had stopped the clouds were hanging low to the mountain, mostly obscuring views of extensive, gregarious stands of *Clinostigma ponapense*. Suddenly the clouds lifted slightly and right in front of us, in a surreal setting, emerged an old, tall, venerable *Metroxylon amicarum* (Front Cover). As we headed back down the road to complete the day's activities we stopped to photograph betel nut palms (*Areca catechu*) and a local *kawa* farmer's house thatched with leaves of *M. amicarum* (Fig. 13).

The next day was also rainy and we spent it on the southern side of Pohnpei looking for more *Ponapea ledermanniana*. Relio again accompanied us and also along was Emos Epariam, another employee of the Conservation Society of Pohnpei who new the area well. The rain was heavy and unrelenting. Nearly every stream or small river was furiously lapping at the seemingly less-than-adequate bridges we crossed. During a break in the rain we ascended a muddy track near Pwok in Kitti where we encountered several specimens of *P. ledermanniana* heavily laden with white

inflorescences and infructescences (Fig. 14). We tried to photograph more *Clinostigma ponapense* and only snapped off a few photographs of the curious aerial roots newly emerging some distance up the trunk before the rain quickly returned with a vengeance and drove us back to the shelter of our car. On our return to the hotel we stopped at Emos's house, met his family and indulged in authentic local Pohnpei food.

After seeing *Ponapea hosinoi* and *P. ledermanniana* on the island, we felt that both species are likely to be endangered on Pohnpei, while *Clinostigma ponapense* was abundant and regenerating and did not appear to be threatened.

On our last day on Pohnpei, which was bright and sunny, we were tourists in the true sense of the word, and with Relio we circled the entire island, stopping to take in several cultural sites, including the ancient and mysterious ruins at Nan Madol. Nevertheless, along the way, it was impossible not to look at palms, and we stopped several times to admire splendid specimens of *Areca catechu* and *Metroxylon amicarum* before returning to our hotel to pack for the next day's departure to Chuuk.

Chuuk

On Saturday, November 12, we caught our island-hopping flight from Pohnpei to Chuuk, formerly known as Truk. Chuuk comprises several mountainous islands rising to about 350 to 450 m (1150 to 1475 feet) elevation in an immense lagoon about 70 km (43 miles) across. The sight of one of WW II's important battles that left the lagoon floor littered with many Japanese ships, Chuuk is now primarily known as a diver's paradise for those who want to explore shipwrecks and tropical marine life. However, we were primarily interested in the enigmatic and little known palm, *Clinostigma carolinense* that, once named from Chuuk, had mostly disappeared from the annals of botany and horticulture. I was rather perplexed why such a large palm on relatively small islands had eluded botanists and horticulturists for over half a century while its close relative, *C. ponapense*, was not uncommonly cultivated in tropical locations in Hawaii, Australia and Southeast Asia. Had the ferocious air and sea battles in Chuuk, which decimated much of

13 (left). Near Nankurupwung in Nett, Pohnpei a local *kawa* farmer's house is thatched with leaves of *M. amicarum*. 14 (right). This *Ponapea ledermanniana* near Pwok in Kitti, Pohnpei was heavily laden with white inflorescences and infructescences.

15. Near Penia on Weno in Chuuk these *Clinostigma carolinense* were similar to *C. ponapense* but seemed larger and grew in highly disturbed, weedy forest remnants.

the islands' vegetation, resulted in the eventual extinction of *C. carolinense*?

As our plane taxied to a stop at the terminal on Weno, I glanced out the window and, much

to my surprise and delight, I could easily see large stands of *Clinostigma carolinense*, known locally as *kiniau* or *tiniau*, with its characteristic spreading canopy of long-pinnate, gracefully arching leaves and elegantly pendulous pinnae, lining the low ridge top just behind and above the main town and airport. This reassuring sight made us think that seeing and photographing *C. carolinense* would be an easy task although, as usual, our optimism was tempered by past experiences that reminded us that when it comes to finding palms, all is not as it seems. Sure enough, after checking into our hotel, we pointed out the clearly visible and enticingly close palms to hotel staff and inquired about access to the ridge. An incredulous stare and the response, "There's no way to go there; no one goes there," crushed our optimism.

Nonetheless, we unpacked and headed to the hotel's restaurant to meet Clark Graham, a former U.S. Peace Corp volunteer who arrived in Chuuk in 1966, married a Chuukese woman, and settled down and raised a family. After his Peace Corps service, Clark operated diving and other businesses before founding a non-profit foundation and school to provide young children and adolescents with additional, after-school education and training in computers, math, English and athletics. Over lunch we shared with Clark our inquiry with the hotel staff about the palms on the nearby ridge. Clark explained that land ownership on Chuuk was intensely provincial, all land was privately owned, and even to pass over one's land required permission from a local chief and payment of a fee. Local lack of interest in the palms and restricted access meant that few if any people were aware of the palms and even fewer had visited them.

Clark reassured us, though, when he said that the next day he and a local villager would guide us to a stand of *Clinostigma carolinense* on his wife's property! We delighted by this news and over a few beers Clark regaled us with tales of his 45 years on Chuuk, which provided us with many laughs and surprises of the numerous characters and antics Clark had experienced over the years on this Pacific island.

The next morning dawned clear, sunny and hot as the hotel staff drove us out to Clark's school at Penia in a rickety and beat-up pick-up truck. After a tour of the school and loading up with water, Clark introduced us to the local villager who would accompany us to see the palms. He led us up a steep trail behind the school that wound through highly disturbed and weedy secondary forest composed primarily of coconut palms and breadfruit, bananas and mangoes. We were grateful for

16. On Weno the handsome canopy of *Clinostigma carolinense* pokes above mango and other trees in forest remnants with the immense Chuuk lagoon and barrier reef in the background.

17 (top). The light green inflorescences of *Ponapea palauensis* are held below the leaves. 18 (bottom). In the Rock Islands of Palau *Hydriastele palauensis*, with its characteristic canopy of strongly recurving, pinnate leaves, is typically conspicuous on the ridgelines

the shade these trees provided for it was exceedingly hot and humid. However, we soon had to traverse lengthy swaths of shadeless, chest-high grass that offered no protection from the oppressive sun and heat. Once we stopped and rested in the scant shade of a few coconut palms, and the villager effortlessly collected several green coconuts. With gleaming machete blades swirling in the sun, he quickly opened them and we drank heartily of the cool, refreshing liquid, a welcomed addition to our bottled water.

We continued through the tall grass, slowly making our way toward a remnant patch of weedy, disturbed forest where we could see several *Clinostigma carolinense* poking their magnificent canopies above *Merremia*-draped vegetation. Finally we arrived at the forest remnants and, although eager to observe and photograph the palms, we first huddled happily in the shade to drink voraciously of water and more coconut liquid.

Similar to and perhaps not distinct from its close relative *Clinostigma ponapense*, *C. carolinense* can be distinguished primarily by its smaller fruits. However, the few specimens we saw seemed also to be larger palms (Fig. 15), with a trunk near the base considerably huskier and of greater diameter than that of *C. ponapense*. We took photos (Fig. 16) and made notes, lingering among the palms and soaking up their ambience, certainly in no hurry to begin the long, hot trek back to the school. We did notice that there appeared to be little regeneration in the weedy, disturbed forest, a worrisome observation that lead us to believe that *C. carolinense* is likely to be endangered. Once back at the school, we consumed large quantities of water, desperately trying to rehydrate our parched bodies.

Exhausted from the long, hot trek to see *Clinostigma ponapense*, we spent the next and final day relaxing, exploring Weno, and visiting with Clark. In the afternoon, we joined some young Japanese who were in Chuuk performing service in the Japanese equivalent of the Peace Corps. We visited a cave near the base of the low ridge behind the village that contained a large artillery piece with which the Japanese had protected the entrance to Chuuk lagoon. The site provided a stunning view of the main town and not too far above us we could see several specimens of *Clinostigma carolinense*, so close yet inaccessible due to the thick, dense, weedy vegetation.

Palau

On Tuesday, November 15 we said our goodbyes to Clark and departed from Chuuk for the next and final leg of our island-hopping adventures, the Republic of Palau. After a short layover on Guam, we arrived in Palau in the evening, where Ann and Clarence Kitalong, with whom we would be staying and who would help us find the palms, warmly greeted us and took us to their house.

Like Chuuk, most of the islands comprising Palau sit in an immense lagoon about 100 kms (66 miles) long and 20 kms (13 miles) wide. Babeldaob, the largest island and home to the international airport, is comprised mostly of volcanic soils although pockets of limestone

19. When especially abundant on the smaller Rock Islands of Palau, *Hydriastele palauensis* were unusually impressive because they seemed to dominate the islet and its vegetation.

rocks dot the landscape here and there. The more southerly islands are mostly limestone and include the famous Rock Islands of Palau. The warm, wet climate means that dense rain forest covers most of the islands, and this forest makes the Rock Islands particularly striking and attractive because the thick vegetation occurs right down to the high tide mark. Access to the Rock Islands is by boat but many are difficult if not impossible to land on because wave action has undercut or sheared off the base of the islands, leaving no easy entry site.

Ann, who operates an environmental consulting service and has co-authored a book about the trees of Palau, is another Peace Corps volunteer and came to Palau in the late 1970s, married a Palauan, and settled down and raised a family. Her husband Clarence is a local chief who constantly kept us laughing with his rather dry sense of humor and vast knowledge of local culture and personages. More importantly, he is a true man of the sea and loves nothing more than to be spending the day on his boat, cruising the mostly uninhabited Rock Islands, snorkeling and fishing. Clarence's love of boats and the sea and his vast knowledge of the confusing and complex labyrinth of Palau Rock Islands were especially advantageous for us because two of the palms we wanted to see on Palau, *Hydriastele palauensis* and *Ponapea palauensis*, are restricted to these islands.

The next day, after buying water, drinks and food for lunch, we headed out with Clarence and Ann in Clarence's boat to look for *Ponapea palauensis* and *Hydriastele palauensis*. The former is a rare palm, known only from a few sites on two of the Rock Islands, while the latter is much more common. Anne guided us and Clarence expertly maneuvered his boat to a landing on one of the islands with *P. palauensis*. These islands are composed of karst limestone, a deeply eroded, pitted and fissured grayish rock with razor-sharp edges. A stumble or fall on this rock would easily result in serious injury or even worse. While Clarence wisely stayed in the boat and did some fishing, Ann and we carefully and deliberately made our way over the sharp rocks, taking extreme caution to step with accuracy and precision to avoid a nasty fall. Progress was slow but we finally arrived at a small population of the palms but not without incurring several cuts on our shins, ankles, arms and hands.

Unlike its close relatives on Kosrae and Pohnpei, which occur on volcanic soils, *Ponapea palauensis* inhabits solid limestone rock, its roots growing down into cracks and crevices and pockets of accumulated leaf litter and other organic matter, sometimes conspicuously arching and branching through the air in rather spectacular fashion. A tall, slender understory palm. *P. palauensis* has a brownish, ringed trunk supporting a short, grayish green crownshaft and spreading canopy of pinnate leaves with jaggedly toothed pinnae. The light green inflorescences are held below the leaves (Fig. 17) and carry the greenish white staminate flowers and later the fruits. On an earlier visit to this site Ann had noticed that the introduced sulfur-crested cockatoo (*Cacatua galerita*) had ravaged the newly emerging spear leaves of many of the palms, perhaps trying to get to the delicate and tasty apical meristem or palm heart. We noticed little of this damage now but nearly full size yet still immature fruits had been foraged for the endosperm, possibly by rats, prompting Ann to develop a plan to return to the palms and bag the infructescences to protect the fruits. Because of the threats posed by the exotic cockatoo and the palm's rarity and narrowly restricted distribution, we felt that *P. palauensis* must be critically endangered.

After visiting another, close-by site with more *Ponapea palauensis*, we headed for one of the few rock islands with a small beach where we could tie up the boat and eat lunch. After lunch and a brief bit of snorkeling in the crystal clear water, Ann and Clarence took us to see *Hydriastele palauensis*. This palm turned out to be quite common and conspicuous, thrusting its distinctive canopy of strongly and stiffly recurved, pinnate leaves well above the dense but relatively short forest of the Rock Islands (Fig. 18). Frequently these distinctive canopies were visible on the island ridgelines, even from a considerable distance. A tall, slender palm, it has a whitish crownshaft supporting the distinctive canopy (Back Cover) below which are held the sparsely branched, somewhat broom-like inflorescences. These palms, especially when abundant and on the smaller Rock Islands, were unusually impressive because they seemed to dominate the islet and its vegetation (Fig. 19). They sometimes occur on the sheer, vertical, limestone rock walls only a meter or two from above the water, seriously challenging one's understanding of the relationship among

20. Betel nut palms (*Areca catechu*) are widely cultivated in Micronesia for their seeds.

21. In the open on Babeldaob, Palau, *Heterospathe elata* is a tall, if not majestic palm.

plant, water and soil for successful growth. In a few bizarre cases, the trunks of these wall dwellers grew down before finally turning up.

Because of a prior commitment Ann was unable to accompany us the next day but we returned to the rock islands and again Clarence skillfully guided us among the labyrinth of islands and islets, mostly looking for more *Hydriastele palauensis*. On one of the Rock Islands upon which we were able to land we found *Heterospathe elata* and *Pinanga insignis*, species more common on volcanic soils and ones we would see in abundance the next day. We encountered more *H. palauensis* and its relative abundance impressed upon us its remarkable limestone rock island habitat.

We left the Rock Islands, heading to the southeast coast of Babeldaob, where Clarence wanted to show us a hill with a stunning view and limestone rock outcrops harboring gregarious stands of *Heterospathe elata*. Again, Clarence skillfully navigated his boat, this time through shallow, nearly overgrown, backwater channels thick with encroaching mangroves to arrive at our destination. After a quick lunch, we walked through plantations of betel nut palms (Fig. 20) and ascended the small but steep hill, passing through solid, dense stands of *H. elata*. At the rather precipitous top we admired the panoramic view of southern Babeldaob before descending and returning to the boat. We returned to the Rock Islands and finished off the day by visiting a sunken Japanese war plane, snorkeling and fishing, the latter providing us with a bountiful and tasty dinner.

Ann joined us for our last day in Palau and we headed north, not by boat but by auto, to explore Babeldaob for *Heterospathe elata* and *Pinanga insignis* growing on volcanic soils. The relative abundance of both species surprised us, the former occurring along road sides, in gullies, on slopes and ridges, in primary or weedy, disturbed forest, typically thrusting its handsome canopy of spreading pinnate leaves well above the surrounding vegetation (Fig. 21). The latter grew mostly in undisturbed primary forest and was equally abundant. An unusually attractive, colorful, and eye-catching understory palm, *P. insignis* is noted for its greenish to brown, ringed trunk, pinnate leaves with relatively broad, glossy, dark green pinnae, purplish brown crownshaft, and large, conspicuous, pendant infructescences heavily laden with red to purplish black, distichously arranged fruits.

We returned to Ann and Clarence's house, ate dinner, hastily packed, and then tried to catch a few hours of sleep before our very early morning departure to Guam and then onward to Los Angeles via Honolulu. We were happy and content and remembered with great affection the wonderful people, palms and places in Micronesia that we had seen.

Acknowledgments

Numerous people and institutions assisted us on our journey to see and document Micronesian palms, and all deserve our sincere thanks. They include David Lorence and Steve Perlman of the National Tropical Botanical Garden; Karen Shigamatsu, Mashuri Waite and Steve Connely of Lyon Arboretum of the University of Hawaii; Josh Sands and Alma Phocas of the Honolulu Botanical Gardens; Carl Lewis of Fairchild Tropical Botanic Garden; Andy George and Jacob Sanno of the Kosrae Conservation and Safety Organization; Patterson Shed, Relio Lengsi, Emos Epariam and Ryoko Kawakami of the Conservation Society of Pohnpei; Clark and Curtis Graham of the SHIPS/HOOPS Institution on Chuuk; and Ann and Clarence Kitalong of Palau. Audrey Keeler and the International Palm Society supported Don's travel in Micronesia.