An Unforgettable Visit to the Spectacular and Unique Home of *Pritchardia thurstonii* in Fulaga Lagoon, Fiji

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I have been fortunate in my 45 years of growing, planting, and pursuing palms around the world. I have grown and planted palms in California and Hawaii in the United States and in Tahiti in French Polynesia. With the exception of Africa, I have visited every continent where palms naturally grow to observe, study, photograph, and appreciate them in their wild, native habitats.

Perhaps the most special and attractive place for me is the Pacific Ocean with its myriad islands steeped in history, intriguing people, immeasurable beauty, and astounding, exotic habitats with numerous, handsome, and appealing palms. So smitten have I been with the Pacific and its palms that 15 years ago I embarked on a long-term project to document and catalog the palms of this great region of the world, many parts of which I had been visiting during the last 41 years. Over this time I have visited nearly all the Pacific Islands to study and document their indigenous palms.

Of all the Pacific island palm genera, I am particularly enamored with *Pritchardia*, the quintessential Pacific island fan palm, and have been since I moved to Hawaii to undertake graduate studies at the University of Hawaii in 1974. I have studied the taxonomy, ecology, phytogeography, and horticulture of this intriguing genus and have published numerous papers on these subjects, including several naming and describing new species (Butaud and Hodel 2017; Hodel 1980, 1985, 1993, 2009a, 2009b; Hodel and Butaud 2010; Hodel and Hodel 2009). The culmination of my work on *Pritchardia* was the review of the genus (Hodel 2007) and the comprehensive account of the Hawaiian species (Hodel 2012).

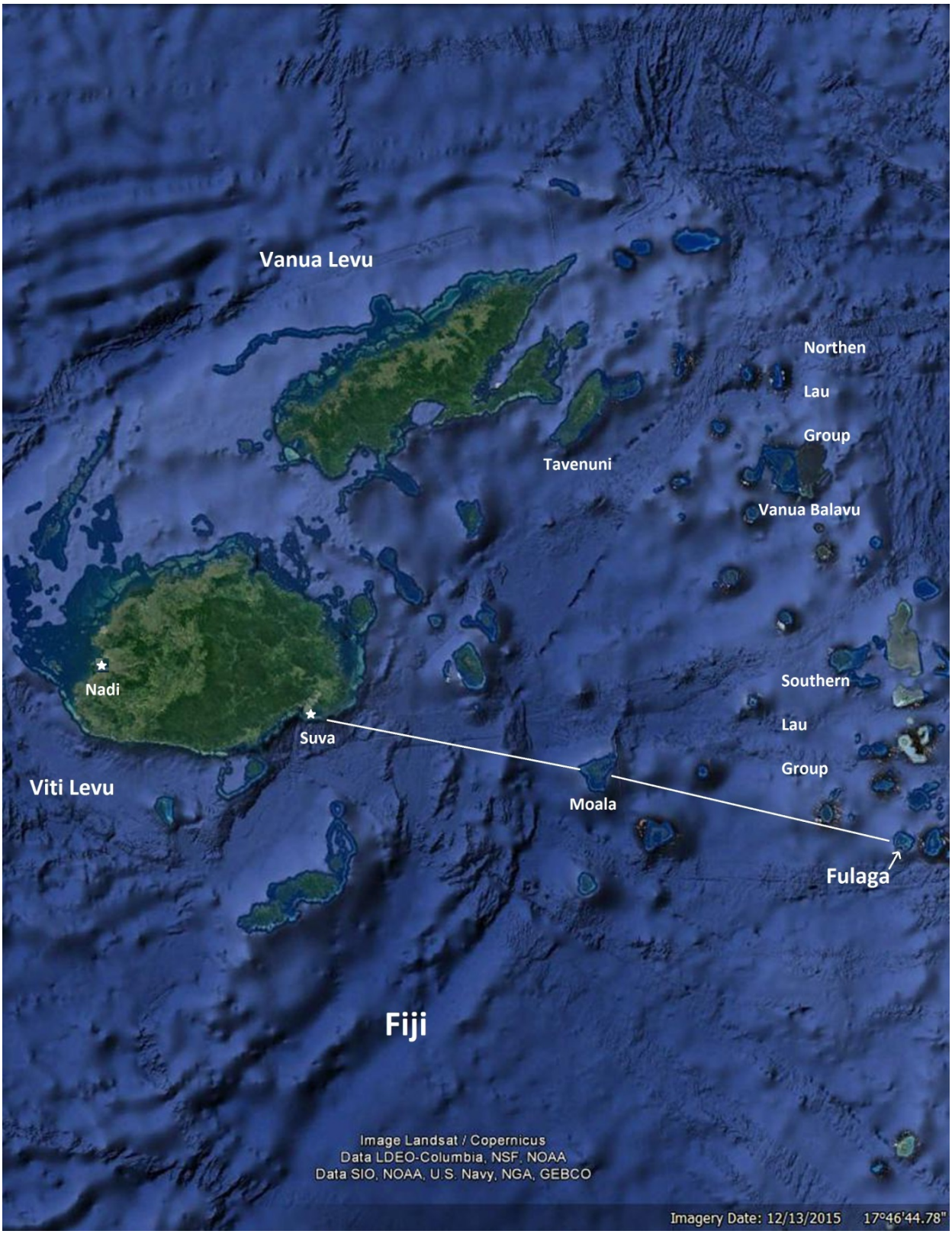
Pritchardia includes 28 species of short to tall, moderate, solitary fan palms confined to the Pacific—24 endemic species in the Hawaiian Islands (Hodel 2007, 2009a, 2009b, 2012) and four from the South Pacific (Fiji, Tonga, Cook Islands, French Polynesia) (Butaud and Hodel 2017; Hodel 2007, 2012; Hodel and Hodel 2009). The Hawaiian species occur from sea level to about 1,300 m elevation in dry to wet forests on volcanic soils while two of the four South Pacific species, *P. mitiaroana* and *P. thurstonii*, are restricted to moist forests on uplifted coral limestone and the third species, *P. pacifica*, is presumed to be from similar habitat (Hodel 2007). The fourth and recently documented and soon-to-be named South Pacific species, *P. tahuatana* from the Marquesas Islands in French Polynesia, occurs on volcanic soil (Butaud and Hodel 2017).

Pritchardia frequently occurs in spectacular fashion, especially in the Hawaiian Islands, where they tenaciously cling to steep-sided or vertical cliffs several thousand meters high on all the main islands and stunningly, nearly to the exclusion of all other woody plants, on the top of the vertical, columnar sea stack, Huelo, off the northern coast of Molokai (Hodel 2007, 2012). In contrast to their Hawaiian counterparts, the South Pacific species are found mostly on lower and flatter terrain although *P. mitiaroana* on Makatea in the Tuamotu Archipelago in French Polynesia and *P. thurstonii* on Eua in Tonga sometimes inhabit steep, but relatively low cliffs (Hodel and Hodel 2009).

Pritchardia thurstonii, a distinctive species of special interest, is easily recognizable by its stiff leaf blades, long inflorescences and infructescences projected beyond the leaves, and small fruit. The lepidia (scale-like hairs,) arranged in distinct, parallel lines on the abaxial (lower) leaf blade surface, where they appear as stitching, are unique in the genus and diagnostic for the species (Hodel 2007). In Fiji *P. thurstonii* is restricted to the Lau Group (archipelago) to the east of the main Fijian islands, between 16 to 20°S and 178 to 179°E and about half way to Tonga (**Fig. 1**). In the Northern Lau it is found within the lagoon of Vanua Balavu on several medium to large, coral limestone islets (150 to 500 m long, 30 to 100 m high) where it sometimes dominates the vegetation on bare rocks within a few meters of the water's edge (Fuller and Jones 1999).

However, by far the most spectacular setting for *Pritchardia thurstonii* anywhere, and arguably for the entire genus if not the palm family, is in the Southern Lau within the lagoons of Ogea Driki and especially Fulaga (Fulanga, Vulaga) (**Figs. 2-3**), 325 km east-southeast of Suva, the capital and largest city of Fiji. On Fulaga it is frequent in the lagoon on small to moderate, undercut, mushroom-shaped, coral limestone islets where the "mushroom dome" can be only about 10 m tall and 10 m wide and held on a "stem" sometimes as slender as five m in diameter. The late A. C. Smith, authority on Fijian plants and author of the most recent flora of Fiji, provided an account of his early 1934 visit to Fulaga and illustrated one of the islets with a few palms on it although he erroneously referred to the palm as *P. pacifica* (Smith 1934).

For many years I was aware the *Pritchardia thurstonii* occurred in Fulaga but was unaware that it did so in such spectacular fashion. That changed in 2005 when I saw Dick Watling's superb book about Fijian palms (Watling 2005), which had on its cover an artist's rendering of one of these islets capped with *P. thurstonii*. Then I received a photo from Dick of one of these islets apparently taken from an amphibious plane. That did it. I put it on my "bucket list." I had to go. And thus began a quest to find my way to the most holy of the holy *Pritchardia* places, the Valhalla of the genus.



1. Map of Fiji and its islands, including the Lau Group, showing our route from Suva to Fulaga, about 325 km, with the mid-way refueling stop on Moala. (Adapted from Google Earth).

2. Map of Fulaga Island showing its lagoon, which is about eight km long and five km wide, and the concentration of coral limestone islets in the western central and southern sectors. (Adapted from Google Earth).

3. By far the most spectacular setting for *Pritchardia thurstonii* is in Fulaga lagoon where it occurs on mushroom-shaped, coral limestone islets.

For several years I made inquiries and contacted air and boat services in a futile attempt to arrange practical, feasible passage to Fulanga. No regularly scheduled passenger service, either by air or sea, served the island. Arranging passage on a yacht or supply ship plying that part of the Pacific Ocean was a possibility but would have been impractical because of the time involved, at least a month or longer, time I did not have. I could have taken a once-a-week flight to Lakeba in the central Lau and then hired a small boat to take me over 100 km across the open ocean to Fulaga; again, I did not have the time to say nothing of the small, open-boat, treacherous ocean voyage that would be uncomfortable at best and dangerous at worst. Charter boats and flights were extremely expensive, the least expensive I could find was a whopping $US 23,000, money I did not have. I was greatly discouraged and temporarily gave up on the idea of visiting Fulaga.

In February 2017, about six months after my last futile inquiry, and by which time I had relegated a pilgrimage to Fulaga to the back of my mind, I received an e-mail from HeliPro, an air ambulance and medivac helicopter service, asking if I was still interested in going to Fulaga. I had forgotten that I had contacted them but, nonetheless, I responded with a definite yes. A

few days later Michael Barbieri, HeliPro's project director, called me, providing the flight details and price of a six-hour helicopter round trip from Suva to Fulaga. The trip of a lifetime was on!

I departed Los Angeles at 11:20 pm Friday night, June 2, on the 11-hour flight to Nadi, Fiji. Accompanying me were my wife Marianne and adult children Robert and Christina. Losing a day crossing the International Date Line, we arrived in Nadi on the west side of Viti Levu, the largest and main island of Fiji, Sunday morning, June 4, and caught a short 45-minute, cross-island flight to Suva, which would be our headquarters for six days. After settling into our hotel, I called HeliPro to let them know I was in town and to give them my contact information. We decided we would meet at the HeliPro office Monday to introduce ourselves properly and finalize our arrangements.

Monday morning the four of us took a cab to the HeliPro office, met the staff, and worked out the details of our flight to Fulaga. As it turned out, the 325 km from Suva to Fulaga was at the extreme range limit of the helicopter and several adjustments were necessary to make the round trip possible. To reduce weight, the inside of the helicopter was stripped down to its bare bones. The co-pilot's seat and all medical equipment were removed, leaving only the pilot's seat and a short, narrow bench upon which we could strap ourselves. Much to our chagrin and also because of the weight limitations, only three people plus the pilot could make the trip. We were profoundly disappointed but Marianne graciously and generously decided to stay at our hotel while my children and I made the flight. We also learned that we would stop on Moala, an island about half way to Fulaga, to refuel on the outbound leg and then again on the return to Suva (**Fig. 1**). Thus, our schedule was set: Suva to Moala about one hour, 45 minutes to refuel on Moala, Moala to Fulaga one hour, 20 minutes hovering and circling in Fulaga's lagoon to photograph the palms, and then an hour back to Moala, 45 minutes to refuel on Moala, and another hour back to Suva. HeliPro was adamant about the 20 minutes for photography at Fulaga; deviation from the allotted time was impermissible because of safety concerns, primarily making our way back to Moala to refuel.

What remained to work out was which day we would go, which depended mostly on the weather. We had four days from which to choose: Tuesday, Wednesday, Thursday, and Friday. We were scheduled to fly out of Suva to Nadi and back to Los Angeles late Friday night, June 9. We had selected June primarily because it was the dry season in Fiji and major storms and rough weather, especially cyclones (hurricanes,) were extremely rare at that time. Unfortunately, an atypical, unseasonal, more or less stationary frontal boundary and an associated area of low pressure were parked near Fiji, producing much inclement weather. Indeed, during our six days in Suva it was constantly raining, drizzling, or cloudy; we did not see the sun for the six days we were there. The system was even producing inclement weather in the Southern Lau. HeliPro sent us twice-daily weather reports and Tuesday and Wednesday

proved to be unsuitable due to the inclement weather. We began to worry because we had made a major financial investment to travel all the way to Fiji and dearly desired to get to Fulaga. Much to our relief, late Wednesday afternoon we received encouraging news from Graeme Hedge, HeliPro CEO, that the weather at Fulaga was improving and Thursday looked good for our trip.

We were elated but at the same time I was full of nerve-wracking anticipation and worries about the trip to Fulaga. We had invested much time and money to get to Fulaga for just 20 minutes of photography and we wanted it to be a success. I was worried about whether the conditions would be good for photography (no wind, light or no cloud cover were best), would I be able to take unobstructed photographs from the helicopter, could we get the helicopter down sufficiently low and close to the mushroom-shaped islets for good photographs, and especially could we even find the small islets with palms in the large lagoon and have decent photographs within the allotted 20 minutes. I was mostly concerned about the weather, especially the nearly ever-present southeast trade winds that could turn the lagoon into a choppy, white-water mess, and distort the palms' canopies, pushing all the leaves to one side, making for an unattractive sight.

For distraction from my worries, Tuesday and Wednesday Marianne and I had hired a car and driver and, despite the inclement weather, made some short trips around Viti Levu to look for easily accessible native Fijian palms, like *Metroxylon vitiense* and *Veitchia joannis*, while Christina and Robert went scuba diving and zip lining.

Early Thursday morning was, as usual, cloudy and drizzling in Suva as Robert, Christina, and I, with great anticipation and no small amount of anxiety, made our way to Nausori Airport just east of the capital to meet the HeliPro team. Randall Todd, HeliPro's chief pilot, met us at the airport and took us to their flight operations hanger. There, John Slater, our pilot for our trip to Fulaga, met us, introduced us to the aircraft, gave us the flight details, and reviewed the safety procedures. We strapped ourselves on to the bench seat, Robert and Christina on the outside and I in the middle (**Fig. 4**). We had head phones and microphones so all four of us could communicate over the roar of the twin-turbine jet engines. We were off, soaring up and away to the east, passing over the Rewa River delta and its towering stands of *Veitchia joannis* and out over the open ocean at about 130 knots for our one-hour flight to Moala, our first stop and refueling station. About 15 minutes east of Fiji the overcast skies became broken with occasional sun and blue skies, a reassuring sight. Also reassuring were the few or no white caps in the ocean, indicating that the southeast trade winds had yet to develop or were unusually weak. So the weather was cooperating, which was one less thing to worry about.

4. The three intrepid *Pritchardia thurstonii* hunters strapped on to their narrow bench seat for the helicopter flight to Fulaga. Left to right: my daughter, Christina Hodel; I in the middle; my son, Robert Hodel. (Photo by Christina H. Hodel).

5. My son Robert, pilot John Slater, and my daughter Christina pose with our helicopter during our refueling stop on Moala Island.

6. Pilot John Slater and ground assistant refuel our helicopter at Moala Island, about half way to Fulaga. They are dispensing fuel from canisters flown in the day before especially for our flight. Refueling will be repeated upon our return trip from Fulaga to Suva.

We landed at Moala (**Fig. 5**) and were immediately the center of attention, a large group of school children and adults coming out of nearby buildings to greet us. While pilot John and a ground crewman refueled the helicopter, using fuel in 40-liter cans that had been flown in especially for us the day before (**Fig. 6**), Christina, Robert, and I spoke with the villagers, used a restroom, and stretched our legs before climbing back into the helicopter. Prior to strapping ourselves in I donned a harness, which would be useful once we arrived at Fulaga. Before departing John briefed us on our procedures for Fulaga. Upon arrival, Robert would attach the harness securely to an eyebolt in the helicopters fuselage, I would unbuckle my seat belt, Christina would slide open the side door, and I would sit in the opening, legs and feet dangling out, camera strapped around my neck, and take photographs for 20 minutes while we circled and hovered. Finally, we were ready and buckled ourselves in, taking off for the most holy of the holy *Pritchardia* places.

The hour flight to Fulaga gave me plenty of time to worry about finding the islets with palms and getting good photographs. I tried to relax but I felt the immense weight of this somewhat tenuous, uncertain, 20-minute trip of a lifetime with a rather large financial investment bearing down heavily upon me. Finally, John announced that Fulaga was on the horizon and in a few minutes we approached from due west, flying up and over a low, long, north-south, dark green, heavily vegetated ridge and suddenly found ourselves in Fulaga lagoon (**Fig. 7**). A little over eight km long and five km wide (**Fig. 2**), the lagoon is spectacular with its cerulean and turquoise waters heavily studded with countless, coral limestone islets, all capped with dark green vegetation (**Fig. 8**). They varied in size from just five m tall and wide to as much as 15 m tall and 40 m long, but many were on the small side.

Most of the islets are in the western central and southern part of the lagoon and any doubt I had about finding islets with palms quickly evaporated because even from a km away the palms could be clearly seen, thrusting their canopies above the low, surrounding vegetation, and nearly all the islets had palms (**Fig. 9**)! The challenge now was finding the best islets out of perhaps a hundred or more to photograph.

Mindful of our limited time, I swiftly directed John to potential islets to photograph, with the 20-minute clock rapidly ticking down in my head. I would state, “islet at 2 o-clock, John,” and he would quickly fly to the islet, expertly maneuvering the helicopter to position it with the open side door and me facing the islet, the sun directly behind us. Then he would slowly and deliberately fly sideways directly toward the island while I was taking photographs one after another in rapid succession. Periodically he would pause, giving me ample opportunity to try multiple camera settings, before again approaching close and low to the islet, only about 10 m above the lagoon surface, before rising slightly and drifting directly over the islet and its palms, so close I felt like I could reach out and touch them (**Figs. 10-15**).

7. Approaching from the west, we flew up and over a low, long, north-south, dark green, heavily vegetated ridge and suddenly found ourselves in Fulaga lagoon.

8. Fulaga lagoon is spectacular with its cerulean and turquoise waters heavily studded with countless, coral limestone islets, all capped with dark green vegetation, and nearly all had palms.

9. The palms were conspicuous on nearly all the islets, thrusting their canopies above the low, surrounding vegetation.

10. We selected an islet and then approached it, making periodic pauses for multiple shots, before drifting up and right over its palms. This photograph is the first in a series (Figs. 10-15) showing this methodology as we approach from a distance only about 10 meters above the lagoon surface.

11. The same islet in Fig. 10 only closer. Note how it is severely undercut.

12. Same islet in Fig. 10. We are even closer but starting to rise ever so slightly.

13. Same islet in Fig. 10. We are rising to pass over it.

14. Same islet in Fig. 10. We are beginning our low pass directly over it.

15. As we drift directly over the same islet in Fig. 10, the palms seem so close I feel like I can reach out and touch them.

All the while Christina and Robert were clicking away with their cell phone cameras, capturing photos of the lagoon, islets, and of me doing the same (**Fig. 16**). Not only had the weather cooperated, but we seemed to have timed our arrival in Fulaga perfectly, at low tide, so that the mushroom-shaped islets and their slender-stemmed bases were exposed to the maximum for the most dramatic effect. Indeed, access to these islands would be difficult, even at high tide, because of the manner in which they are undercut by lagoon wave action for several meters or more. This inaccessibility undoubtedly is largely responsible for preserving these palms.

Finished with that islet, I would quickly say, “islet at 9 o’clock, John,” and he would bank the aircraft sharply so we were looking nearly straight down at the lagoon or up to the sky and we were off to the new site to repeat the process, which we did several times (**Figs. 17-22**). John was clearly a master of his domain, an expert at his craft. His impressive ability to maneuver the helicopter deftly to enable me to get the best shots was uncanny and extraordinary. I had good angles and no water spray kicked up from the lagoon surface by the helicopter to obscure my views, further evidence of John’s astounding piloting skills.

16. Christina and Robert clicked away with their cell phone cameras, capturing photos of the lagoon, islets, and of me doing the same, strapped into my harness and sitting in the open door of the helicopter with my legs dangling out. (Photo by Robert M. Hodel).

17. This photograph is the first of another series (Figs. 17-22) showing the approach and fly over of what might be the most spectacular islet of them all.

18. Same islet in Fig. 17 only closer.

19. Same islet in Fig. 17 but here we are hovering just off its side before starting to drift up and over it.

20. Same islet in Fig. 17 as we are drifting over it. Note the abundant palms with little other vegetation.

21. Drifting over the same islet in Fig. 17, the palms are so close.

Not only did the islets vary in size (**Figs. 23-24**), they also varied in shape and composition of the vegetation capping their tops. Some were long and narrow while others were round (**Figs. 9, 14, 19, 23-24**), but all were undercut, sometimes severely so. Most had a mixture of palms and non-palm vegetation like *Pandanus* and shrubs and small trees (**Figs. 14-15, 24-26**). Some of the islands had only a few palms while others had mostly palms and little non-palm vegetation (**Figs. 20, 23, 26-27**). All the islands, especially on their perimeters, had bare exposed areas marking the wave splash zone (**Figs. 24-25**), and the nature of the coral limestone rock, rough, uneven, fissured, pitted, and sharply angled and ridged, was clearly evident (**Figs. 27-28**). This substrate is the type of coral limestone rock I had encountered many times before in my worldwide quest to document palms in habitat.

Plants, including the palms, on an islet's perimeter or edge must be subject to tremendous amounts of salt spray and even inundation of their roots with salt water during high tides and stormy, windy conditions. All age and size classes of palms were visible, from young seedlings 30 cm tall to mature trees eight m tall or slightly more, indicating that successful regeneration was occurring and that rats had not yet gained access to the islets.

22. On the same islet in Fig. 17, we are close to the palms, right at the edge just above the water.

23. The islets varied in size. Here is a small, round one with only a few palms on it and nearly no other vegetation.

24. One of the larger islets has a mix of abundant palms and non-palm vegetation. Note the bare, exposed perimeter.

25. The islets varied in shape; here is one that is trapezoid shaped. Note the bare, exposed perimeter.

26. This islet is rectangular in shape and is covered densely with palms and little other vegetation.

27. The rough, harsh nature of the coral limestone islets was clearly evident on the islets.

28. The coral limestone substrate of the islets is uneven, fissured, pitted, and sharply angled and ridged.

It seemed that the 20 minutes expired in a flash. I was nearly so occupied taking photographs that I had little time actually to admire, appreciate, and take in this breathtaking, awe-inspiring, stunning, and unique sight. My children, despite being jaded by over 30 years of frequently intense palm trekking with me, were similarly moved. Even John, who was in Fulaga for the first time, proclaimed that what he was seeing was beyond his wildest imagination. We were unanimous that Fulaga and its lagoon of mushroom-shaped, palm-studded, coral limestone islets was easily worthy of designation as a World Heritage Site. We mostly sat in reverential, stunned silence at the astounding, powerful, emotive sight we had just witnessed, only occasionally breaking into excited but poignant discussion to recount the just completed pilgrimage, as we reluctantly but necessarily headed back to Moala and Suva.

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