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Lister's Palm, *Arenga listeri*, on Christmas Island: A Rare or Vulnerable Species?

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Christmas Island lies in the eastern Indian Ocean (10°25'S, 105°40'E), 190 nautical miles from Java and 850 nautical miles northeast of the northern coast of Western Australia. The island is built around a core of volcanic rock—thought to be the summit of an extinct submarine volcano which rises steeply from the floor of the ocean—some 14,500 feet below the existing sea level. The oldest known sedimentary rock is a bed of Eocene limestone located on the beach at Flying Fish Cove. This has been succeeded by a series of basaltic flows and palagonite tuff, which is then capped by Miocene orbitoidal limestone. In post Miocene times, atoll conditions are thought to have prevailed. During this time detrital limestones were laid down and deposits of phosphate were formed.

From sea level the terrain rises steeply in a series of wave cut terraces and limestone cliffs, reaching a height of about 700 ft. Beyond this elevation the topography is more undulating with several minor "hills" only about 150 ft higher. The island's highest point is Murray Hill, located in the western area, which has an elevation of 1,175 feet. Forming an almost unbroken feature around the entire island are 50-60 ft sea-cliffs. They are absent from the immediate vicinity of Flying Fish Cove, which is the island's only safe anchorage.

Dense rain forest covers most of Christmas Island. Superficially it resembles other tropical rain forests like those in southeast Asia and northeast Australia, but the

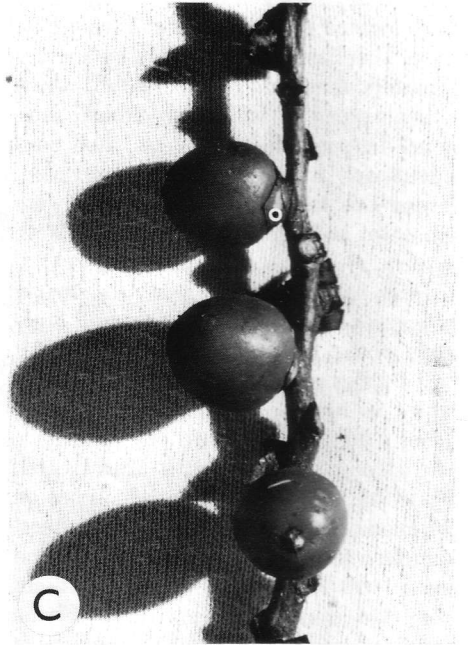
island's long isolation and unusual geology are stamped on its finer structure and composition. The Christmas Island rain forest is unique. It is composed of an incredibly diverse flora including about 185 species of flowering plants in the stable, climax community rain forest (Ridley 1904). Structurally the forest is more open than any of the Malayasian or Indonesian lowland forests, for in most parts it lacks any complex understory shrubbery. Only on the low terraces is access impeded by thickets of *Pandanus*.

* Writing on the botany of Christmas Island, Ridley (1905), who had visited the island the previous year, listed 34 species of plants as being endemic. This number has been reduced by almost half, due to increased knowledge of the flora in the Southeast Asian region. Most of the island's flora has recently been re-collected by Powell and H'ng Kim Chey in 1980-81. Included in the material sent to the Royal Herbarium, Kew, were fruit and flowers from *Arenga listeri*.

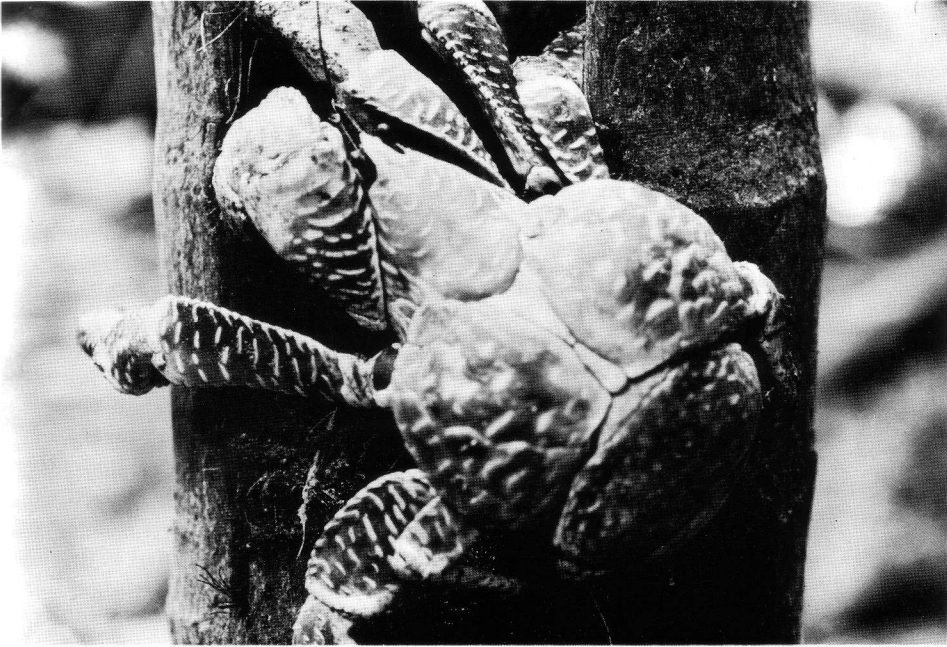
The Palm

It was at Flying Fish Cove that J. J. Lister, naturalist on board H.M.S. "Egeria," under the command of Captain Pelham Aldrich, landed to make his collections in September 1887. In the ten days he spent on the island Lister collected extensively and recorded several new species of animals and plants, including the endemic palm, *Arenga listeri*.

This palm occurs occasionally but not



1. A. *Arenga listeri* in the National Park on Christmas Island. B. Flowers. C. Fruit of *Arenga listeri*.



2. *Arenga listeri* has a terminal inflorescence. After the tree dies the trunk begins to rot. When this happens Robber Crabs eat the soft sugary mulch inside.

uncommonly throughout the rain forest on the main plateau. It is more common on the terraces, but only where slips and faulting have exposed the underlying volcanic profile. In these areas, where the soil has been directly formed from the weathering of these volcanics, the densest stands of palms flourish. A "preference" for this particular type of soil profile inhibits the distribution of the palm, a problem compounded by the island's large population of land crabs and by its human population. Both the Red Crab, *Gecarcoidea humei natalis* and the Robber Crab, *Birgus latro* scavenge beneath the palms collecting any fallen fruit. Robber Crabs are most noticeable, for they gather in large numbers around the base of a palm, waiting for the ripening fruit to fall. This process is often hastened by two or three crabs climbing the palm to gather the fruit directly. Because they lack dexterity, a

large proportion of the "picked fruit" falls to the ground. There it is seized, crushed, and eaten by crabs, so that only a very small proportion of ripe berries fall into inaccessible spots and escape destruction. Should such seeds prove viable, they have to survive further depredation, for cotyledons form another part of the Robber Crab's diet. The ripe fruit of *Arenga listeri* is also a major item on the "bill of fare" for the Christmas Island Imperial Pigeon, *Ducula rosacea whartoni*. These birds obviously transport the seed, which probably accounts for its random distribution within the main rain forest.

Most Christmas Islanders are aware of the irritant nature of the fruit and avoid contact with it, knowing that even the juice will cause a lasting and painful itch. However, Robber Crabs are attracted to the coarse fiber found in the stem as well as in the fruit, and local fishermen use

knowledge of this habit to their advantage. They fell a palm and then split open the stem leaving the exposed pith to be found by the crabs. A few days later, when requiring bait for fishing, they return to the site and collect the crabs that are feeding on the fibrous pith. The palm is probably no longer cut to obtain the cabbage, but before fresh vegetables were readily available on the island, some members of the labor force were known to collect the palm's center for food. Ridley (1904) writes "we felled an *Arenga* Palm for the sake of the refreshing cabbage of the bud." Other members of the genus *Arenga* occur in southeast Asia, New Guinea, and north-eastern Australia (McCurrach, 1960).

Threats to Survival

Christmas Island supports a multi-million dollar phosphate mining industry. Current production is set at over one million tons per annum by the miners, the Phosphate Mining Company of Christmas Island.

At this level of exploitation the island's high grade phosphate reserves will be depleted in another five to six years. By then, about 20% of the island will have been completely cleared and mined. High grade reserves and thus present mining are concentrated on the island's main plateau, the area least favored by *Arenga listeri*. The future of the palms is, however, by no means secure despite the fact that they are concentrated in areas of weathered volcanic soils on the island's terraces, where phosphate reserves are of lower grades.

The future of the Phosphate Mining Company of Christmas Island beyond the late 1980s is not known but it seems reasonable to assume that mining may be shifted to poorer quality phosphate and thus down to the terraces. For this, new roads will be necessary, another pressure on populations of *Arenga listeri*. Combine these two factors with the existing pres-

ures imposed by crabs and fishermen and the future for *Arenga listeri*, a species confined to an isolated oceanic island of only 54 square miles, looks very shaky indeed.

Vulnerability?

Concepts of rarity and vulnerability have been discussed by Kubitzki (1977) and in the IUCN Red Data Books (e.g., Goodwin et al., 1972). Egeria Point National Park was gazetted in 1980. This affords protection to about 12% of Christmas Island. It is obvious that, although *Arenga listeri* is not under threat of immediate extinction, it is 'vulnerable' by any standards. Gazetting of more national parks will ensure its survival along with other unique elements of Christmas Island's biota.

Cultivation

The seeds of *Arenga listeri* germinate in 60 ± 4 days in Cairns, tropical Queensland, Australia. Here mid-summer temperatures are high on average (23.6–31.3° C) and winters are mild (mid-winter average 16.7–25.4° C). Like other *Arenga* spp., young *A. listeri* thrive in rich soils but grow slowly. In two years since germination seedlings have attained a total height of 40–45 cm under optimum (in the sense that they resemble the natural habitat) conditions of warmth and moisture.

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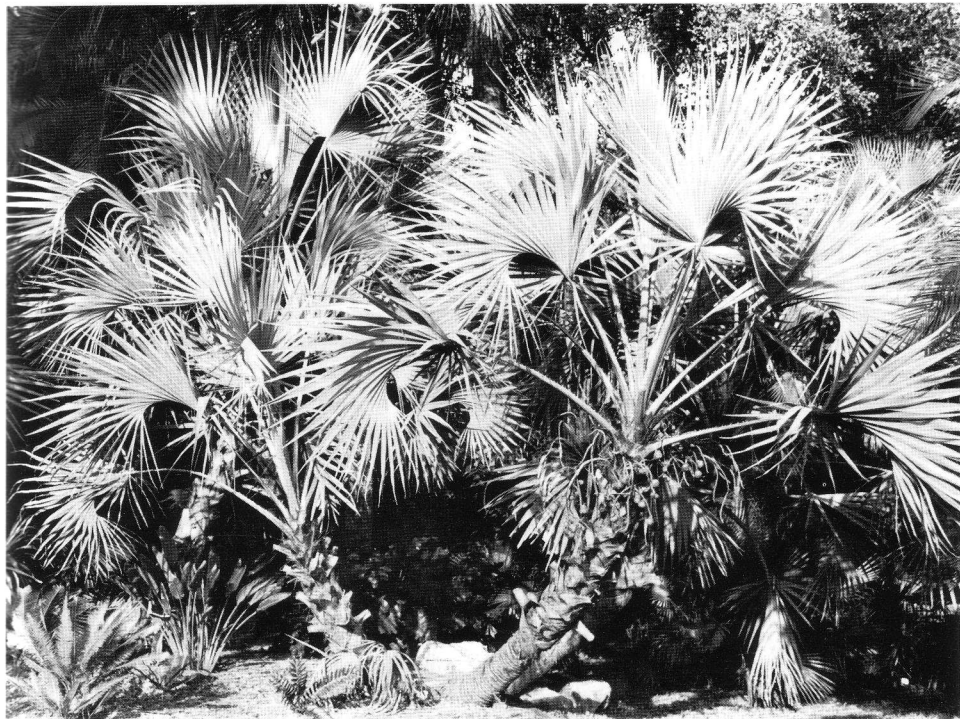
(*Eds. note: see the next issue of Principles for more about palms and robber crabs.*)

NEWS OF THE SOCIETY

1982 Biennial Meeting—Florida

For the many Californians who attended the 1982 Biennial Meeting of The Palm Society, the first event of the meeting was looking out the window of a jet liner to admire the exotic Florida landscape below. Upon arrival at the rendezvous in Tampa, Palm Society members from all over the world boarded the tour bus to begin the adventure.

Our first stop and one of the highlights of the tour was at the garden of Dr. U. A. Young, in Tampa. Dr. Young's garden was of particular interest to northern California members because like many of our own gardens it is prone to occasional winter frosts. It was inspiring to see so many species considered to be frost-tender growing so beautifully. One fine specimen of *Hyphaene* (Fig. 1) is perfectly staged against a backdrop of lush tropical foliage to create a striking effect. The next stop



1. *Hyphaene shatan* in Dr. U. A. Young's garden, Tampa.