

Nypa in the Mangroves of Central America: Introduced or Relict?

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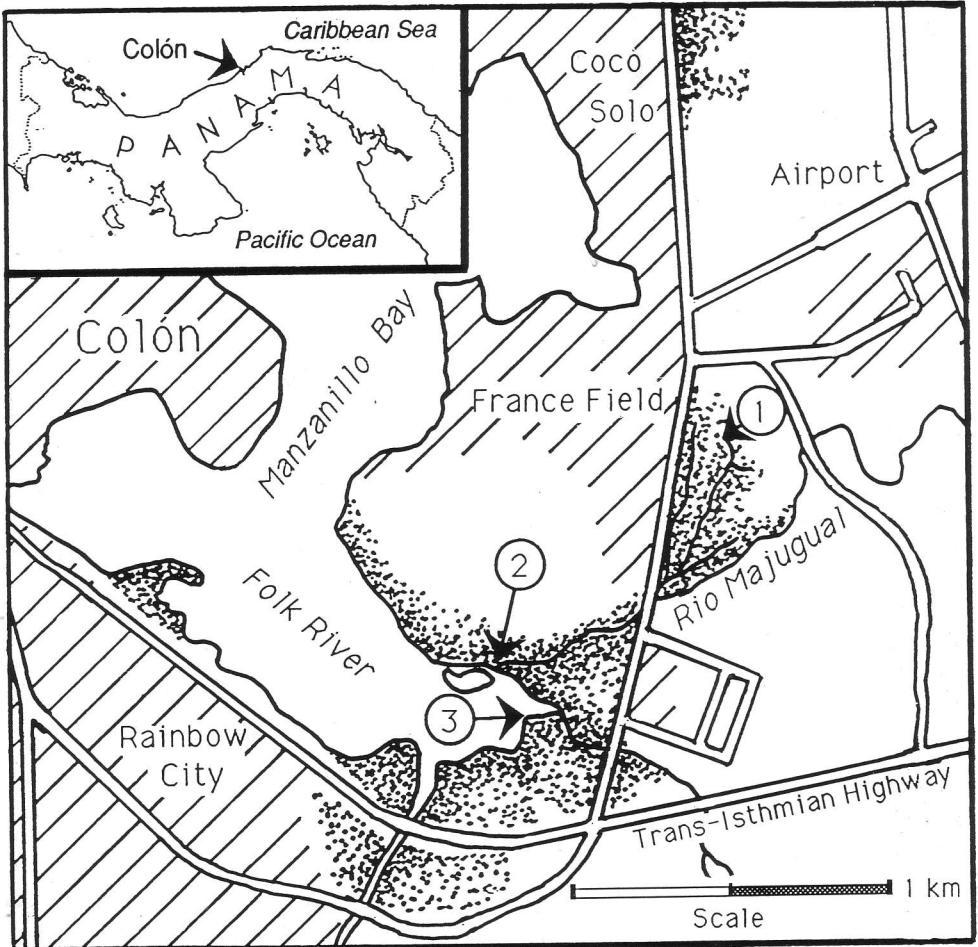
Nypa fruticans Wurmb. is well-known within the tropical Indo-Western Pacific region as the mangrove palm (Tomlinson 1986). It occurs there in protected, brackish, estuarine locations, and is distributed widely from Ceylon, the Ganges Delta, Burma, Indochina and the Malay Peninsula through Indonesia to New Guinea, northern Australia and the Solomon Islands, and northward to the Philippines and Ryukyu Islands.

However, while there are no records of extant natural populations bordering the tropical Atlantic or eastern Pacific Oceans, the palm was reportedly introduced into coastal Nigeria, West Africa (Russell 1968). There it was planted near Calabar in 1906 from the Singapore Botanic Garden, and then in 1912 it was also introduced to Oron, nearby. From there it spread naturally to the Cross River and the Delta of the Niger, where it has since flourished (P. de Saint-Palais and A. R. Drexler, pers. comm.). Such observations are extremely valuable because they tell us a lot about the biogeography of this palm, especially as regards its localized dispersal ability and its suitability for growing in different locations. However, a lack of other reports regarding similar introductions, or unusual occurrences, of this very distinctive mangrove, tells us that human interference has been relatively minimal (i.e., beyond the extant natural range described above). Therefore, the discovery of another well-established population, this time on the Caribbean coast of Panama, is of further

scientific interest. The present finding represents the only known occurrence of the palm in the Neotropics.

At the time of discovery, around April-May 1989, many palms were flowering and fruiting. Flowers were prolific and had a sickly-sweet smell which appeared to attract some flies, but the most numerous visitors were large stingless bees, *Trigona (trigona) amalthea silvestriana* Yachal (Apidae: Meliponinae). These are well-known in the region as an aggressive pollen collector, and it is probably the chief pollinator of the palm in this region.

The Panama population of *Nypa* is isolated and quite small in extent, although it comprises mature individuals up to ten meters tall, equalling those in New Guinea and Northern Australia (Covacevich and Covacevich 1978; Covacevich 1981). Initial investigations found about 100 mature palms alongside the Rio Majugual tidal stream, located near a busy main road and the city of Colón, the Atlantic seaport of the Panama Canal. Plants occurred chiefly in two or three monotypic stands of up to 40-50 palms, although their numbers appeared to be increasing rapidly, based on the large number of immature individuals. Furthermore, this increase was apparently aided by the asexual bifurcation of the large subterranean rhizome. In total, mature plants and seedlings ranged along more than one kilometer of this tidal stream. Upstream these were associated with *Laguncularia racemosa* (L.) Gaertn.f. and *Acrostichum* sp., while downstream they



1. The map locates the small, but well-established population of mangrove palm, *Nypa fruticans*, found in April 1989. The site was alongside a small tidal stream, Rio Majugual, close to Colón on the Caribbean coast of Panama. Mature trees carrying many seeds, and surrounded by numerous seedlings, were found at the upper tidal reach (site 1), while only immature trees were observed downstream from a road bridge, extending to the Folk River estuary (site 2 and 3). The map also shows the proximity of surrounding mangrove forests (stippled) and "built-up" areas (diagonal shading), including major roads and a civil airport.

were growing with *Rhizophora mangle* L. mainly, and *Avicennia germinans* (L.) L. occasionally.

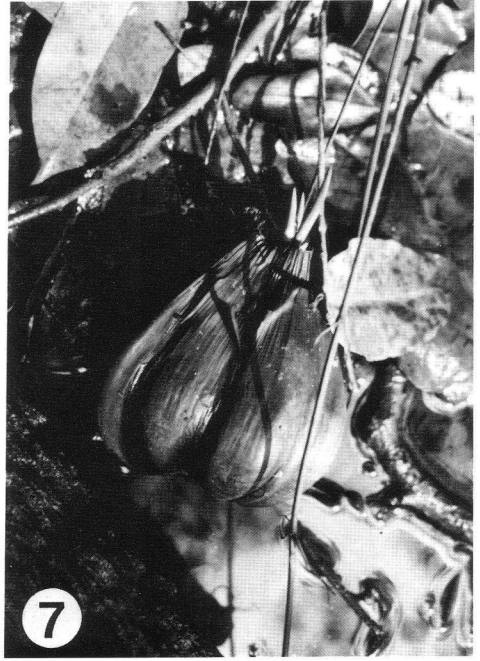
The relative numbers of mature and

immature plants of *Nypa* were not equal along the stream, suggesting that the population was expanding downstream. Thus, mature forms were found chiefly in the

2. A series of photographs illustrates some important aspects of this population. This photo shows a male flower with many Trigonid bees. Flowers of both sexes were common, and these bees were very active collecting and transporting pollen. 3. This photo shows the dense and luxuriant upstream stands of mature *Nypa* (site 1 on the map), with fronds reaching 10 meters, or more. 4. Further downstream from site 1 on the map, this photo



shows smaller isolated clusters, with newly matured individuals, growing under tall *Laguncularia* trees that formed a relatively thin over-canopy at around 25 meters. 5. Fruiting stalks were plentiful in upstream stands and this photo shows a well-developed one, still in its erect posture. Later as fruits mature, the stem bends over placing the head closer to the ground. Note also the expended and withered male flowers on associated stalks.



6. This photo shows an immature plant in a downstream site near the Folk River (site 2 on the map). It was doing very well there, in association with *Rhizophora mangle*. 7. Propagules and germinating seedlings were found all along the Rio Majugual leading upstream to the tributary draining the dense mature stands. This photo shows a newly fallen propagule, about 15 cm long, with emergent fronds. There were no visible roots, as these would appear later alongside the fronds. This represents the most active dispersal phase.

upper reaches, delimited by land reclamation and sealed, built-up roads, while immature palms were concentrated downstream to the edge of the open estuary. Dispersal downstream presumably took place in several stages, probably during periods of localized, record flooding (J. Cubit, pers. comm.). Nevertheless, the lower stands now appear poised to broadcast their progeny to other Caribbean sites.

The origin of this New World population of *Nypa* is unknown, but it seems to have been introduced. This view is supported by its small size, a lack of others nearby, its occurrence in such a busy place, and the preponderance of immature plants displaced downstream. If this is the case, its propensity to spread (notably, via water of its tough, buoyant propagules) and its suitability for this environment, makes its dis-

persal throughout the region inevitable. In addition, this dispersal is expected to be further accelerated when local people discover the many uses of this palm (note Tomlinson 1986). In Panama, durable palm fronds are sought-after for roof thatching, an already important local industry. Such factors may explain why *Nypa* was introduced in the first place, although there was no evidence of this stand being used in any way. If it was introduced, the size and extent of the mature stands suggest that this took place at least 30 years ago.

One important piece of evidence, however, may confound this explanation of the palms origin in Panama. Tomlinson noted that "*Nypa* has had a much wider distribution outside its present range because fossil fruits are known from the Paleocene in Brazil . . .," and many other places in



8. A small, isolated cluster of immature palms face the estuary of the Folk River (note site 3 on the map), across from the junction with the Rio Majugual. These were backed by larger trees of *Rhizophora mangle* and *Laguncularia racemosa* which normally border the estuary.

New and Old Worlds (also note, Biosca and Via 1987). Therefore, while local extinction was believed to have occurred during drier climatic conditions, this assumption must now be re-assessed. For the moment however, it is difficult to believe that this characteristic and prolific palm could have escaped detection until now, if it had been in the region since the Paleocene. That is to say, during that time, surely it would have again flourished, recovering quickly once conditions returned to the present day wetter climate. In this, it was assumed that fossil and extant forms represent the same species, based on a lack of convincing morphological evidence separating them (Tralau 1964, Biosca and Via 1987). In either case, present data clearly favor the notion that this population, like that in Nigeria, was introduced.

Acknowledgments

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NEWS OF THE SOCIETY

Palm Research: The Palm Flora of Vanuatu

Research toward the compilation of a Palm Flora of Vanuatu is being undertaken by John Dowe (Editor, member of the Publication Fund, Palm and Cycad Societies of Australia) and Pierre Cabalion (ORSTOM, Research Unit on Natural Substances of Biological Interest, Paris). The authors are seeking information in regards to Vanuatu (formerly New Hebrides) palm collections contained in numerous herbaria throughout the world and those species presently being cultivated in either private or public gardens.

The Palm Flora of Vanuatu will include a number of new species, the descriptions of which are now in preparation. Field study is needed to obtain complete samples for study and to clarify the status of a number of taxa. Funds are being sought for this purpose.

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