The Coco-de-mer or the Double Coconut (*Lodoicea maldivica*): Myths and Facts

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Abstract

The Republic of Seychelles comprises 115 islands occupying a land area of 455 km² in the western Indian Ocean. It represents an archipelago of legendary beauty that extends from 4° and 10° south of the equator and which lies between 480 km and 1,600 km from the east coast of Africa. Of these 115 islands, 41 constitute the oldest mid-oceanic granite islands on earth while a further 74 form the low-lying coral atolls and reef islands of the Outer Islands. A unique palm [Lodoicea maldivica *(J.F.Gmel.) Pers.*]*, endemic to a couple of islands in the Seychelles group, has long been at the root of myths, legends, and unbridled speculation. Mature nuts of the palm, the largest seed in the world, have traveled by way of strong currents in the Arabian Sea to such faraway places like the Maldives, Ceylon (Sri Lanka), the Malabar Coast in India and beyond. Because very few people knew of its existence it has many names such as, Coco-de-mer (the coconut of the sea), double coconut, etc. The shape of its male and female inflorescences has given rise to many explanations. The Seychelles Islands transitioned from being uninhabited to being a temporary refuge of pirates, to a dumping ground for African slaves, and then in the possession of France, Great Britain, and finally a Republic with a Socialist Government. However, throughout this long period the Coco-de-mer palm did not cease to fascinate botanists, conservationists, ethnologists, and a vast number of just the curious. The nuts and their contents have been reputed to possess some medicinal and even aphrodisiac properties. In the past even the possession of a nut bestowed the owner certain powers. In this article I have attempted to open a window to the reader as to the mystery of this extraordinary plant species that is currently in dire need of preservation. Conservation efforts have been sporadic due to the relative isolation of the islands and their antiquity. Nevertheless, a dedicated group of botanists, conservationists, and nature lovers as well as UNESCO are making great efforts to make sure that the last remaining habitat of the Coco-de-mer palm is kept intact.*

Lodoicea maldivica (J.F.Gmel.) Pers. is a unique palm tree known by many names such as Coco-de-mer, double coconut, sea coconut, love nut, Seychelles nut, etc. The palm is the sole member of the genus *Lodoicea* in the family Arecaceae. It is severely endangered and is endemic to the islands of Praslin (about 4000 palms) and Curieuse (a few hundred palms) in the Seychelles Islands which is itself part of the

much larger Mascarene group. In the past the palm was also found on St Pierre, Chauve-Souris, and Ile Ronde (Round Island, an islet near Praslin) in the Seychelles, but has now become extinct on these islands. The name of the genus, *Lodoicea*, is derived from *Lodoicus*, the Latinized form of 'Louis', in honor of King Louis XV of France since these islands were in the possession of France before England defeated the French in an epic sea-battle in December 1810. After that not only the Seychelles, but also the islands of Mauritius, Rodriguez, and also La Réunion passed into British hands under the Treaty of Paris in 1814.

The islands of the Seychelles lie in the Indian Ocean (Latitude 5" S, Longitude 55" E) ca. 1800 km south of Sri Lanka and 1500 km east of Africa. The exceptional biological interest of these islands is due not only to their isolation but also to their extreme age. The archipelago is composed of over 100 islands, some of which are very low lying coral islands while others are composed of igneous rocks and are of much higher elevation. The Coco-de-mer grows only on the latter granite islands, and unlike the common coconut does not grow on sandy soils. The Coco-de-mer grows exclusively on red lateritic soil derived from granite fragments on hill sides. At sea-level it grows only on spurs of granite (Good, 1951). Attempts made by Sir William Hooker and others to establish a specimen of the Coco-de-mer at Kew Gardens in England by importing dozens of Coco-de-mer nuts proved futile as the nuts did not survive beyond germination stage even when transferred to the tropical palm hot house (Watson, 1890) which was constructed with iron and glass between 1844 and 1848 at Kew.

The granite islands are assumed to owe their origin to the break-up of Gondwanaland during the Jurassic period, making them the oldest oceanic islands anywhere in the world (Baker and Miller, 1963). Before the Portuguese mariners rounded the Cape of Good Hope and came into contact with the inhabitants of the Seychelles, the Maldives, India, Ceylon (now Sri Lanka), and Indonesia the Coco-de-mer was totally unknown to the Europeans (Jeffrey, 1969). The Seychelles and Rodriguez (Mauritius) islands were a favorite hideaway for pirates during the days of buccaneering. In fact, the local people believe there are several places just off the beaches where the pirates hide their loot to return to recover it later but due to various reasons never did. The Seychelles today still have a strong French influence in spite of the fact that just before independence in June 1976 they were ruled by the British. The early colonizers were French adventurers and traders that saw the possibility of establishing an outpost for promoting mercantile intercourse between Africa and middle-eastern trade and India and the Far East. The islands' subsistence farming, which was very successful for the last 200 years, has been steadily declining since 1971 when an international airport with a long 4-engine jet runway was opened. This led to tourism becoming the main source of income and livelihood for almost all inhabitants of the islands in one way or another. In fact, in January–February 1985, when this writer explored the Seychelles on behalf of the UN's Food and Agriculture Organization (FAO), the government

offered a good sum of money to all those who used to harass the tourists for alms. The scheme was a great success and not a single panhandler could be seen on any of the islands!

The human population of the Seychelles Islands right now consists of descendants of African slaves brought to the islands to work in the sugarcane, coconut, and tea plantations that the European colonizers developed. Later they were joined by Chinese and Indian indentured laborers. Due to the relaxed lifestyle (no part of these islands is more than one mile or two from the sea) there has been considerable mixing of the four races (viz., European, Chinese, Indian, and African) with the result that the people of Seychelles, the "Seychelloise", have very unique physical features all their own. Their culture and language is referred to as 'Creole', a mixture of French and African with a singsong tone unique to all islands in the Mascarene group which includes La Réunion and the Comoros Islands. The slaves had been originally 'Malagasy' which means that they were predominantly from Eastern African countries like Mozambique, Malawi, Tanzania, Zambia, and Nigeria. In addition, once slavery was abolished in America, whatever slaves that were at sea were set free on the Seychelles Islands. Cinnamon, vanilla, tea, and coconuts (for copra export) are the predominant commercial crops grown at present.

Over 35% of the flora of the Seychelles islands is endemic, and hence the United Nations Educational, Scientific and Cultural Organization (UNESCO) declared the Vallée de Mai on Praslin Island as a World Heritage Site in 1983. Also, the Seychelles is recognized as a genetic resources hotspot and a center of plant biodiversity by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF). It is surmised that plants and animals endemic to islands often grow to a much greater size than same or related species on the mainland. Amongst animals, gigantism has been noted repeatedly in such diverse groups as the insects, birds, reptiles, and mammals. Well-known examples include the various species of giant tortoise which occur (or did occur) on many remote oceanic islands such as the Galapagos group and the Seychelles. In fact, the last of the giant tortoise subspecies (*Geochelone nigra abingdoni*) from the Pinta Island (Puerto Ayora) in the Galapagos (Ecuador) died on 24 June 2012. There is probably no single explanation of why so many island species achieve a greater size than their mainland relatives (Whittaker, 1998).

The earliest scientific work on this unusual palm was by Durocher (1947) which among other things gives us a very good account of the mature root system and the method of germination. The Coco-de-mer is the most interesting species of the six monospecific endemic palms in Seychelles since it is the "only true case of island gigantism among Seychelles flowering plants, a unique

Lodoicea maldivica ***is a unique palm tree known by many names such as Coco-de-mer, double coconut, sea coconut, love nut, Seychelles nut, etc.***

feature of Seychelles vegetation" (Proctor, 1984). It is one of the most universally well-known plants and holds three global botanical records; the largest fruit of any tree or palm so far recorded weighed in at 42 kg; the mature seeds weighing up to 17.6 kg are the world's heaviest; and the female flowers are the largest of any palm. The weight of the seed ensures that the seed does not fall to the ground very far from the tree and the relative physical isolation of the islands for millennia probably accounts for the high degree of endemism seen on these islands. The tree grows to 25–34 m tall. The leaves are fan-shaped, 7–10 m long and 4.5 m wide with a 4-m petiole. It is dioecious, with separate male (Fig. 1) and female (Fig. 2) plants that grow close together, with the male plant being about 20 feet taller than the female one. Wind is the main factor for pollination but the black parrot, endemic to the Seychelles, also plays a role (Lionnet, 1970).

A remarkable feature of young plants is the enormous size of their leaves and the great length of their petioles, these being

Figure 1. Coco-de-mer palm with the male inflorescence.

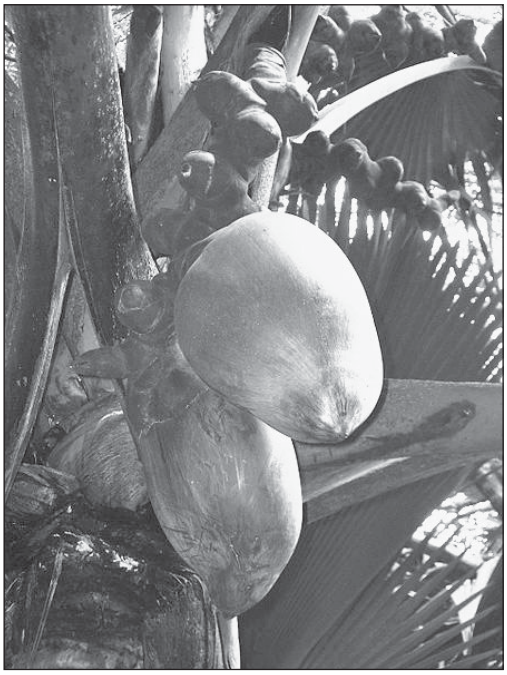

Figure 2. Coco-de-mer female palm showing the heart-shaped nuts.

especially elongated when growing beneath the canopy (Edwards *et al.,* 2003). As a result, juvenile plants can reach a height of 15 m and hold their foliage in the forest canopy. This capacity to produce such an enormous juvenile plant is related in part to the large food reserves in the gigantic double-lobed seed. The male flowers are catkin-like, up to 1 m long. The mature fruit is 40–50 cm in diameter and weighs 15–40 kg. The fruit requires 6–7 years to mature and a further two years to germinate. A double coconut tree attains maturity after 40–50 years. The tallest male Coco-de-mer plants on Praslin Island are over 100 feet tall and are reputed to be over 800 years old.

Botanists among the readers will notice that despite the name 'coconut' the Latin

The Coco-de-mer grows exclusively on red lateritic soil derived from granite fragments on hill sides.

name is not *Cocos*. In fact the palm is not too closely related to the coconut, *Cocos nucifera*. Among many differences include the fact the fronds are fan-leaf shaped and that there are both separate male and female trees. It is said female trees do not bear fruit until they are over 100 years old, making their conservation a long-term and difficult process. Ripe fruit is not firm and white inside like *Cocos nucifera*. The ripe interior of the double coconut is like jelly, pink in color, and is sweet and very tasty. It has been considered as an aphrodisiac. It must be noted that rare trees that exist in Sri Lanka (at the Peradeniya Botanical Gardens, Kandy), the Maldives, Thailand, and Indonesia were brought there by botanists and sailors as the fertile nuts did not drift there due to ocean currents as previously thought (Fig. 3). This is because the double coconut is very heavy and does not float in water until the outer husk has disintegrated and the nut inside has rotted enough to provide buoyancy. Such nuts would wash up regularly on the shores of Sri Lanka and the Maldives in the distant past due to strong monsoon currents during the months of June–September leading to a popular myth that there were entire forests of the palm under the sea! Such fancy stories were spread by none other than physician and naturalist Garcia de Orta, the Portuguese author of "Dialogues on India's Pharmacopaeia" (de Orta, 1563) in which he calls the palm the Maldive

Figure 3. A very old living specimen of Coco-de-mer palm at the (Royal) Botanical Gardens, Peradeniya, Sri Lanka (as photographed by the author) in October 1971.

Coconut because he was of the opinion that the palm trees were submerged when the Maldives were separated from the Indian subcontinent caused by a tsunami. He also attributed several medicinal properties, real and imaginary, to the Coco-de-mer such as remedy for colic, paralysis, epilepsy, antidote for poisons, etc., when the water from the coconut with a little bit of kernel is drunk. He died in Goa in 1568 and is buried there.

In fact, the king of Maldives used to keep aside all the nuts that were washed ashore to give as gifts to visiting dignitaries. Due to its mythical properties in folklore as an

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aphrodisiac, the nuts whenever they were washed ashore in Sri Lanka were taken by the finders immediately to the king, so that he may partake of the jelly like substance within the nut and the finders suitably rewarded.

Another popular myth, especially among the Seychellois is that since the male and female plants are so distinct with their reproductive parts somewhat similar to humans that on a stormy night in the islands when the palms rub against each other, they produce a distinct sound which the natives say are the double coconut trees mating! The unique double coconut closely resembles a woman's buttocks. This association is reflected in one of the plant's archaic (from 1805) botanical names, *Lodoicea callipyge* Comm. ex J. St.-Hil., in which *callipyge* is from Greek words meaning 'beautiful buttocks'. Other botanical names also used in the past include *Lodoicea sechellarum* Labill. (Good, 1951) and *Lodoicea sonneratii* (Giseke) Baill.

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Albert-Auguste Fauvel was a Frenchman much devoted to travel and public service and a great naturalist. He spent nearly 20 years doing research on all botanical and historical aspects of the Coco-de-mer and produced a monograph that was published posthumously in 1915 (Fauvel, 1915). However, it falls on British General Charles George Gordon of Khartoum to have written the most absurdly romantic account of the Coco-de-mer. General Gordon was slain by the forces of the Mahdi Mohammad Ahmad at Khartoum, Sudan, in January 1885. A gallant and fearless soldier, a devout Christian, and a remarkable administrator and explorer, his adventures during the Crimean war, in China, and in the Sudan made him a legendary figure not unlike Lawrence of Arabia. But, for our purposes here it seems he visited the Seychelles in 1881 when he was commanding a detachment of Engineers for the British army at Mauritius. Gordon found the Coco-de-mer palms extremely fascinating. He was an ardent student of the Bible and put forth a theory that the Garden of Eden was none other than the island of Praslin! Like all others before him, Gordon was struck not only by the suggestively-shape of the Coco-de-mer nut and the male inflorescence, but also that the nut was enclosed in a heart-shaped fruit which represented "the true seat of (human) carnal desires". He added that "It is this unique tree which I think is the Tree of Knowledge of Good and Evil" (Lionnet, 1970). Gordon was a prolific writer and his manuscripts although rare do exist but were never published. As an aside, while in Seychelles Gordon also designed the country's coat-of-arms, which has the Coco-de-mer at the center of it and a modified form is in use till today!

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Formerly, the Coco-de-mer was known as Maldive coconut. Its current scientific name, *Lodoicea maldivica*, originated before the 18th century, when the Seychelles Islands were uninhabited. In centuries past the coconuts that fell from the trees and ended up in the sea would be carried away eastwards by the prevailing monsoon sea currents. The nuts can only float after the germination process, when they become partially hollow. In this way many drifted to the Maldives where they were gathered from the beaches and valued as an important trade and medicinal item (Romero-Frias, 1999).

Marine archaeological excavations on the sea-bed at Sadana Island on the Red Sea coast of Egypt revealed a single seed of the double coconut among the cargo of a wooden ship of about 90 tons and 50 meters long from around 1765 that sank there during the Ottoman period. Obviously the seed of *Lodoicea maldivica* was picked up when the ship made a stop of water and provisions for the crew in the Seychelles (Ward, 2001). The general cargo of Chinese porcelain, resins including frankincense, coffee beans, spices, glass bottles, etc. showed that during that period ships originating in China and India traded further than the ports of Mecca and Jeddah which were thought to be the terminals of such marine transport of cargo. Ships typically picked up cargo in China and Southeast Asia, and transshipments regularly took place in the port of Surat, India.

Until the true source of the nut was discovered in 1768 by one Marion Dufresne to be in the Seychelles, it was believed by many to grow on a mythical tree at the bottom of the sea. European nobles in the 16th century would often have the shells of these nuts polished and decorated with valuable jewels as collectibles for their private galleries. However, this European discovery (because I am sure the islands were visited by Arab traders or pirates much before) of the Coco-de-mer has disastrous consequences for conservation! For just a year later, in November of 1769, Captain Duchemin who was second in command of the ship "La Digue" in the Dufresne's expedition and who was therefore aware of the discovery of the Coco-de-mer sailed to Praslin quietly by himself on a small sailboat the "L'Heureuse Marie" and harvested so many nuts from all the islands that he almost destroyed entire forests! He sailed to Bombay, India where he sold all the nuts at great profit (Fauvel, 1915). Subsequently, John Horne, the Director of the well-known Pamplemousses Botanical Gardens of Mauritius visited the islands in 1874 and found the havoc created by Duchemin and raised such an outcry that the British Government immediately provided the Seychelles with adequate funds to purchase and preserve for posterity the few remaining places with the Coco-de-mer

palm that we see today (Lionnet, 1970). The Coco-de-mer tree is now an extremely rare and highly protected species.

The seeds of the double coconut have been highly prized over the centuries; their rarity caused great interest and high prices in royal courts, and the tough outer seed coat has been used to make bowls and other instruments (see Fig. 4). The history of exploitation continues today, and the poaching of nuts has virtually stopped all natural regeneration of populations with the exception of the introduced population on Silhouette Island. Habitat loss is one of the major threats to the survival of remaining populations. It has been reported that there have been numerous fires on the islands of Praslin and Curieuse, and today only immature trees remain over large parts of these islands.

Figure 4. A container made from Coco-de-mer (double coconut) kernel in Burma (Myanmar) depicting Burmese temple dancing girls with two peacocks on the top and a pair of elephants on each side and a Chinese dragon in the middle at the base. Photo (from Lionnet, 1970) through the courtesy of owner Alf W Kemp.

Together with the double coconut, the Seychelles black parrot, or Praslin parrot or Kato Nwar (*Coracopsis nigra barklyi*), which is a somber-colored, medium-sized parrot endemic to the Seychelles is also endangered. It is the national bird of the Seychelles. The parrots' diet is principally tropical fruit, both wild and cultivated, as well as flowers and buds. Wild foods include the fruits of the endemic Arecaceae palm *Vershaffeltia splendida* H.A. Wendl, growing along the river valleys, as well as the male flowers of the Coco-de-mer. Cultivated fruits ingested by the parrots include guava, papaya, mango, and especially, bilimbi (*Averrhoa bilimbi* L.) crops, for which the birds have been persecuted by native orchardists on the islands much to the horror of ornithologists! The fate of the double coconut and the black parrot are closely linked.

Acquiring a double coconut nut or tree today is almost impossible. When this writer explored the Seychelles in 1985, it was observed that the entire economy of the Seychelles Islands was based on tourism and these amazing nuts which are well guarded from being exported or being smuggled out of the country. Only polished replicas in various sizes are available in the shops on the main Island Mahé and elsewhere on Praslin Island. In fact, the conservation value of this rare habitat is threatened

by invading alien plant species and the limited regeneration due to long process of the endemic species (Fleischmann *et al.,* 2005).

In the Chinese pharmacopaeia, the edible endosperm of *Lodoicea maldivica* (copra) with the common name of Coco-de-mer is used for treating cough. The seeds of *Lodoicea maldivica*, if at all found commanded very high prices for centuries due to its scarcity in India and China (Fig. 5). The palm's leaves provide an excellent twining material and many artifacts have been made from them. The broad fan-shaped leaves are also used for thatching huts on the islands. In the past, hollowed out Coco-de-mer nuts were exported to Mauritius where they were used as scoops for measuring rice and sugar in shops. Until mid-1960s, a few nuts were exported mainly to India and Southeast Asian countries where the kernel is still used as a tonic, an aphrodisiac, and an antidote for poisons. Their polished shells made black bowls for fakirs and also was used by Mohammedan pilgrims to Mecca to eat their food, since it is said that on this holy pilgrimage they are only supposed to eat food from utensils produced by nature and not metal or glass (Lionnet, 1970). The export of nuts since 1970 is strictly prohibited.

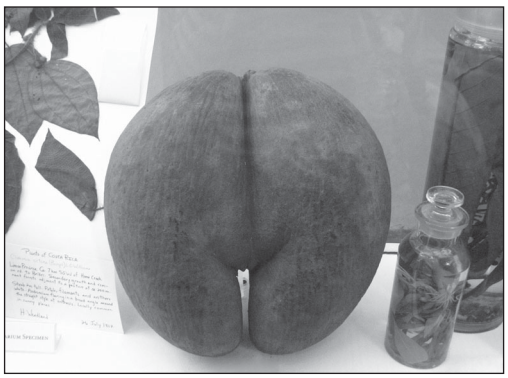

Figure 5. Coco-de-mer used as a medicinal plant.

As mentioned at the outset, the double coconut is endemic to the islands of Praslin and Curieuse. Trees on Curieuse differ in growth and morphology from those of the Praslin populations. These phenotypic differences, however, were not mirrored in the genetic structure of the populations which remains identical. All populations were relatively genetically diverse with remarkably little differentiation among populations. This suggests that the capacity of *Lodoicea* to dominate across a range of habitats on these islands is because of high phenotypic plasticity. Given the uncertainty about the extent of underlying adaptive variation, it is recommended that conservation and restoration projects avoid transferring seeds between island populations (Fleischer-Dogley *et al.,* 2010).

To conclude, I cannot emphasize more the need to conserve *Lodoicea maldivica* palms and their remaining habitat. What took millions of years to evolve should not be allowed to be destroyed in a couple of hundred years or so. According to Bailey (1942), in the early part of the 20th century much of the habitat was destroyed by natives due to slashing and burning to clear land for agriculture as the human population increased from a few hundreds to over 85,000 today. Right from the time of the arrival of the French on these Islands

in 1758, the palms have been exploited right until the present time. The unique seeds, after dehusking, have been sold each year by the Seychelles Ministry of Environment, Natural Resources and Transport. For example, in 2007 and 2008, over 800 seeds fallen on the ground were collected and sold. These collections are done to discourage poachers although some poaching of immature coconuts from the upper reaches of the palm has been going on in recent years due to high demand (Rist *et al.,* 2010). A very small number of seeds, after having fallen on the ground, regenerate in-situ, whereas only about 50–80 seeds, out of those collected from the ground are germinated in a nursery and returned to the forest when they are about 4–5 m tall and a large frond has emerged. Experts say that due to the extremely long maturity period of these palms, the rate of rejuvenation of the population needs to be stepped up considerably to be sustainable (Rist *et al.,* 2010).

But all is not as grim as it may seem. The Seychelles Islands Foundation (SIF) was established as a public trust in 1979, with the President of Seychelles as patron. Its board of trustees is appointed by the President and has 14 members. With the enactment of a new law recently with regard to the protection of the Coco-de-mer there was a distinct need for an authoritative person to enforce it. Currently, Dr Frauke Fleischer-Dogley heads a team which safeguards two prestigious World Heritage sites in Seychelles, viz., Aldabra (nominated in 1982) and the Vallée de Mai on Praslin (1983). The study and research which she carried out between 1998 and 2006 earned Fleischer-Dogley her doctorate and Seychelles a wealth of more detailed information on one of the most extraordinary and interestingly shaped nuts in the world. The fate of the black parrot, of which I believe only 160 birds are in existence, is inter-linked with that of the Coco-de-mer. For the sake of humankind we hope she is successful; the Coco-de-mer nut, in its pristine beauty, is as startling to one who lays eyes on it for the first time today as it was to the inhabitants of the Maldives, Sri Lanka, and Indonesia when they must have picked them up on their seashores many centuries ago.

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