

PALMS, PEOPLE, AND HEALTH

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Palms, with their long, delicate evergreen leaves waving in the warm breeze, typically conjure up images of lush tropical islands. In reality, the Palm family (referred to as Arecaceae or Palmae by botanists) is quite diverse in structure and habitat, with around 2,600 species found in nearly every type of environment, from rain forests to deserts. However, the vast majority of palms are found in tropical regions around the world. Few plants have played a more prominent role as a source of raw materials for consumption, building, and other functions of daily living for traditional cultures. The Food and Agriculture Organization of the United Nations lists two other families, grasses (Graminaeae) and legumes (Leguminosae), as the only other major plant families of similar utility to mankind.¹ Indeed, 17 years ago, as a U.S. Public Health Service physician assigned to service in the Eastern Caroline Islands of Yap in the Federated States of Micronesia, I (R.L.) witnessed the great utility of *Cocos nucifera*. This palm is probably most familiar to us in the West as a source of tasty coconut meat and coconut cream used in cooking, for example, the source of dried coconut used in recipes for macaroons.

As a Public Health Service physician, part of my professional obligation required service to the outer islands of Yap; these 20 island atolls were spread out over 800 miles of ocean. At that time, there existed no commercial airstrips for easy access for either inhabitants or medical personnel to travel rapidly back and forth to and from the main island of Yap. There was, however, a field ship that traveled from island to island cycling through—if all went well—on a monthly basis. If the field ship had mechanical difficulties, which was more often the case given its great age and need for regular maintenance, the ship would not reach the islands for several months. To those living on the atolls, these delays meant forgoing shipments of medicine, food, or building supplies. My role as a visiting physician was to triage critical patients for transport on the ship for more comprehensive care at Yap

General Hospital. I would work with the medical officer at the island's medical dispensary, evaluating selected patients whom he or she deemed necessary of further assessment. In general, fewer than 200 to 300 people lived on most of these small atolls. A day at each island was all the time I was allotted for a visit, the rest of the time was spent pushing through the vast Pacific Ocean on our way to the next stop.

On each voyage, I saw amazing examples of the ingenuity of these people to survive with the existing natural resources at hand, and to an outsider they seemed extremely limited. Because I had grown up in a very urbanized setting in San Francisco, these trips taught me a great deal about the utility of plants. I saw many uses for *Cocos nucifera* or the coconut palm, called *niiw* on mainland Yap or *lu* on the outer Yapese islands.² The trunks are used for building and fuel, and the fronds are woven into baskets and hats. The outer husks, with their brown fiber known as coir, are made into a very strong rope. The fine meshlike fibers found on the trunk at the base of each leaf is used as a natural cheesecloth. Plant medicine formulas are pounded and placed in the fiber and squeezed or rubbed over the injury, allowing the sap of the plant to drip on the skin. The syrup from the inflorescence of *C. nucifera* is tapped and made into an alcoholic beverage known as *tuba*—it ferments within hours because the sweet palm sap contains a naturally occurring yeast.¹ Years ago, even before my rotation to Micronesia in 1988, it was known by many physicians that in emergency situations, the water of young green coconuts could be used as an intravenous solution for dehydration because the fluid was sterile and rich in potassium and sugar (pH 5.4; sugar 1.1 gm/dL; 288 mOsm/L).^{3,4}

Today, many islands in the Pacific Ocean are more accessible by planes and tourist ships. The lifestyle of these islands has significantly changed; there is more energy available for lighting, and now kitchen appliances are to be found. It's

much easier moving supplies to and from the islands. Thus, the uses for plants such as the coconut palm are less critical than they were in the past; indeed, many of the young people on these atolls are not learning about the utility of these natural resources. Just how much has been lost was profoundly demonstrated in one of our ethnobotany classes at the College of Micronesia, a course attended by students from all of the island nations of the Federated States of Micronesia. As part of an exercise to evaluate the dynamic nature of traditional knowledge (eg, how it was changing in a modern world), we queried the students on the indigenous language names of the parts of the coconut palm. In English, there are of course leaves, stems, flowers, and fruits, with more technical terms such as pinnae—the leaflets deposited on each side of the large leaves. There are terms for all of these plant parts in the various Micronesian languages spoken in the region. At this particular class, a young man from Yap State approached us, and nearly in tears, said how embarrassed and upset he was that he did not know most of these terms in his native tongue. He blamed himself for seeking other forms of knowledge such as computer skills, and his parents for not insisting that he not forget his roots. The student promised that he would write down the names for the coconut palm and learn them when he returned to his island.

Ironically, with the rapidly rising price of gasoline, coconut oil is becoming a source of biofuel for cars. On Pohnpei, another island in the Federated States of Micronesia, there are many dozens of cars and trucks running on locally grown coconut oil. During our last field trip, we drove behind a coconut oil–fueled truck spreading an aroma more reminiscent of french fries than diesel fuel.

On the health front, coconut oil has recently received attention as a medium chain fatty acid that is “healthy.” Fatty acids can be classified as saturated, monounsaturated, or polyunsaturated. Saturated



The oil palm fruit

fats have no double bonds, a monounsaturated fat has one double bond, and a polyunsaturated fat has more than one double bond. Fatty acids can also be classified as short chain, medium, or mid-chain fatty acids. All oils fall into one of these three categories. Some fats are now recognized as healthy, for example, omega-3 fatty acids, whereas others are considered detrimental, for example, saturated fats from animal products. Medium chain fatty acids consist of fats that are carbon strings of 12 or less. Fish oil and flaxseed oil are carbon strings of 20 or higher. Coconut oil consists of fatty acids that are eight to 12 carbons in length. Coconut oil's length is so short that it can be readily absorbed by the intestines into the systemic circulation without a "carrier" mechanism—this is different from how fish oil or other longer oils (flaxseed, safflower, corn oil, etc) are metabolized. Those who have trouble with gastrointestinal malabsorption syndromes, such as premature and ill infants, have been given medium and short chained fatty acids to reduce the work of the GI system in absorbing needed lipids for energy. Coconut oil is 92% saturated, and because of its saturation, until recently has been assumed to be detrimental to health. The saturation of coconut oil makes it more stable and less susceptible to becoming rancid or spoiled. In contrast, unsaturated, monounsaturated, or polyunsaturated oils are readily susceptible to becoming

spoiled. Oils that are unsaturated have double bonds. Examples of these types of oils include olive, soy, corn, safflower, and canola oils, as well as others. Approximately 52% of coconut oil is made up of medium chained fatty acids. Lauric acid, a 12-carbon structure, is the major fatty acid found in coconut oil, followed by myristic (14 carbons) and palmitic acids (16 carbons).⁵ Lauric acid is present in human (5.8%) and bovine milk⁶ (2.2%) and has been recognized for its antiviral⁷ and antibacterial⁸ functions.

Saturated fats in general have been recognized as major contributors to coronary artery disease by elevating the LDL cholesterol, or bad fraction of the cholesterol profile. Coconut oil has been implicated both favorably and unfavorably as affecting LDL cholesterol.⁹ In an animal study, coconut oil was thought to increase atherogenesis or plaque formation in the arteries by increasing inflammatory cytokines known as tumor necrosis factor-alpha and IL-1 beta, rather than by specifically elevating plasma lipoproteins or cholesterol.¹⁰ However, in another animal study, rodents fed virgin coconut oil as compared with copra oil or processed coconut oil showed significant lowering of total cholesterol, triglycerides, phospholipids, LDL cholesterol (the bad fraction), and increased HDL cholesterol (the good fraction). The investigators suggested the virgin coconut oil contained biologically active polyphenol components or antioxidants that may have provided the

beneficial effects.¹¹ This later study emphasizes an important point, that processing natural oils may result in the leaching out of beneficial antioxidant polyphenols or other natural constituents that confer health benefits. A clinical trial comparing a high saturated fat diet, low saturated fat diet, and polyunsaturated diet showed that lipoprotein (a) and tissue plasminogen activator antigen were lowered in the arms given a high-saturated and low-saturated fatty acid diet. These two arms used coconut oil as their saturated fat source. These results suggested that coconut oil may favorably affect the fibrinolytic system, a component that when elevated, contributes to cardiovascular disease by increasing clotting in the blood and additionally increasing inflammatory changes that accelerate coronary artery plaque formation.¹² Several studies looking at populations where coconut fats are consumed in larger quantities have not found higher rates of coronary artery disease or elevated cholesterol levels.¹³ Thus, it seems that coconut oil, although not entirely unhealthy, is not as bad or excessively favorable as some would suggest. Other claims suggesting that coconut oil can make you lose weight, control diabetes, or significantly enhance the immune system have not been substantiated.¹⁴

Another palm common in the Pacific area is the Areca palm or betel nut palm (*Areca catechu*). This palm bears a nut that is the size of a large almond. When the nut is fully developed, but still green, it is harvested and chewed by splitting it in half, wrapping it with a betel pepper leaf (*Piper betel*), and combining it with powdered lime. The betel nut has a stimulant effect derived from the alkaloid components, which have cholinergic action. The cholinergic effects of betel nut have been reported to improve psychotic symptoms in patients with schizophrenia.¹⁵ However, those who chew betel have increased salivation with a characteristic bright red color that is permanently staining if it lands on clothing. Chewing betel nut is not only common in the Micronesian area but also in India and other parts of Asia. Unfortunately, betel nut chewing is correlated with increasing rates of oral cancer and gingivitis.¹⁶

Across the world in Africa, another palm, *Elaeis guineensis*, native to West Africa, provides an oil of major use. This oil is known as palm oil, and it is obtained from the fruit of the African palm tree. Palm oil is also com-

monly referred to as red palm oil in its unrefined state. Palm oil contains 50% saturated fat in the form of palmitic acid, and 40% unsaturated and 10% polyunsaturated fats.¹⁷ Palm oil also contains vitamin E in the form of tocotrienols and tocopherols.¹⁸ It is also rich in carotenoids, as a source of vitamin A. Vitamin A deficiency has been an enduring health issue in many parts of the world, including Asia, the Middle East, and some parts of Africa, and palm oil has

been proposed as a way to supplement vitamin A in those who are deficient.¹⁷ However, when sold on the local and international markets, palm oil is often bleached to remove its dark reddish-orange color (the fraction containing so many important nutrients) in an attempt to make it appear similar to most other plant oils. Palm oil is often confused with palm kernel oil. Palm kernel oil comes from the same palm fruit but is derived from another part of the fruit—the

kernel. Palm kernel oil is 88% saturated fat—twice as much as palm oil—and for this reason is considered unhealthy. Palm kernel oil also requires solvents to be added for processing, which also adds to its health concerns.

Palm oil contains no cholesterol because it is a vegetable oil; the high saturation makes it a stable oil that does not spoil easily. Traditionally, palm oil is used as a cooking oil, and the tree is a source of palm wine, and there are many other uses for this important tree.¹ The research evaluating the effects of palm oil on increasing cholesterol is mixed. Other research suggests that palm oil may lower blood pressure.¹⁹ A derivative of palm oil, palmolein, has been reported to increase platelet aggregation.²⁰ The antioxidant-rich palm oil containing tocotrienols has been shown to reduce inflammatory cytokines.²¹ Palm oil is naturally semisolid at room temperature, making it attractive to the food industry because it requires no hydrogenation to make it solid. Thus, palm oil contains no trans-fatty acids. Palm oil is also used for manufacturing cosmetics, soaps, toothpaste, waxes, lubricants, and ink.²²

In the last decade, acai from the acai palm (*Euterpe oleracea* Mart.), a palm native to South America, has captured the attention of the Western world. The acai berry, which comes from a slender palm that grows to 25 meters, provides a deep purple fruit the size of a grape. The berries have been used by indigenous healers to treat a variety of digestive disorders. To the traditional Coboclo populations in the Amazon region of Brazil, the acai fruit represents up to 42% of the diet by dry weight.²³ Furthermore, the demand from the West is providing positive economic impact for rural farmers interested in tapping forest products for export.²⁴ In the 1990s, surfers on the coast of Brazil recognized that drinks made from this berry generated lots of energy and the ability to sustain physical activity for long periods of time without having to eat; thus, the drink became a popular beach beverage.²⁵ The nutrient content of the berries reveals a high antioxidant content. The composition of berry pulp is comprised of 49% lipid, 13% protein, and 27% fiber by dry weight. Furthermore, the fat contained in acai is 71% oleic acid—a monounsaturated fat also found in olive oil and considered to be health promoting.²⁶ The antioxidants found in great abundance are anthocyanins and polyphenols, with a small amount of resveratrol. Anthocyanins are considered to be cardiopro-



Acai berries

tective antioxidants²⁷ and are also being investigated for cancer-reducing properties.²⁸ The antioxidant capacity is estimated to be 10% higher than blueberries and cranberries.²⁹ Thus, the acai pulp represents a nutrient-dense fruit of great nutritional value.

The date palm is considered to be one of the oldest domesticated palms, with recorded use dating back as far as 5,000 to 10,000 years.¹ The palm branch was a symbol of triumph and victory in Roman times. In Judaism, the palm represents peace and abundance. In the Quran, the palm is mentioned 22 times and in the Bible more than 30 times,³⁰ reflecting the inextricable links we have to plants and the palm specifically.

One sage quote, in particular, most succinctly states the value of this particular plant. This comes from the late Queen Salote of Tonga (1900-1965). She was a reigning monarch greatly respected by her people for fiercely preserving Tongan values and a sense of identity. Over the course of her reign, she noted that many aspects of her culture were being eroded by economic considerations and thus found every opportunity to prevent her subjects from mindlessly adopting foreign ways.³¹ When asked one day why she wouldn't allow a supermarket in her islands, she remarked, "Palm trees are our supermarkets."³²

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