

glaciers and glacier-dammed lakes occupied the valleys. Stone Age man hunted now-extinct animals; Druids performed strange rites in their leafy temples; Welsh tribesmen hurried past in their successful defense of Wales against the legions of Caesar, Hadrian, the Danes, the Normans; plows and cultivated fields appeared; and, finally, a paleontologist with his hammer and chisel.

While breaking up piece after piece of the Tremadocian shale, the scientist discovered *Angelina*, very nearly ruined by the vagaries of Nature. *Angelina*, we blush to relate, has even lost her shell; for, as the valley was cut closer to her bed, the slowly moving water always present just below the ground had dissolved it. What we see of her now in Skiff Hall is only a distorted cast of the shell's lower side. Almost destroyed, she is still recognizable as a member of the species to which J. W. Salter, in November of 1864, gave the name *Angelina sedgwicki*.

Soon after her discovery, *Angelina* was set on her travels, her first since the Caledonian Revolution had moved her original burial place. Eventually she arrived in Rochester, New York, at Ward's Natural Science Establishment, and in 1891 came to Chicago as a member of the first collection of fossils in what was then the Columbian Museum. Since that time *Angelina* has been blandly ignoring the stares of countless visitors. She will ignore you too, if you go to see her.

A UNIQUE AMERICAN PALM, VEGETABLE IVORY

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Normally ivory, the hard dentine-containing substance found in the teeth of most mammals, is secured from the large teeth of elephants, walruses, hippopotamuses, and narwhals. Although it has no structural counterpart as such in the vegetable world, the fruit of some tropical American palms contains a remarkably hard, creamy-white substance resembling the consistency and appearance of true ivory to such a degree that it is called "vegetable ivory." The generic name of these palms is *Phytelephas*, meaning "plant elephant," because of the obvious resemblance between the ivory of the elephant and that of the plant. The Spanish name, often applied to fruit of this palm, is "marfil vegetal," which means "vegetable ivory."

About a dozen species of vegetable ivory palm are known. Although most of them occur in South America in Venezuela, Colombia, Ecuador, Peru, and Brazil, some extend as far north as Panama. They are usually vigorous palms having a short stout erect trunk topped in plume-like fashion by long dark green feathery fronds. These leaves may attain a length of twenty feet, each leaf segment measuring up to three feet in length and two inches in width. A single leaf may have 160 segments.

The leaves are used as thatch in much the same way as those of other palms, but are considered inferior because of their limited durability. In very young plants the leaves appear to arise directly from the ground, whereas the trunk becomes thicker and more elongated as the plant grows older. Even in mature plants the height of the stem does not exceed ten or fifteen feet. The plants grow in tropical or subtropical rain forests from near sea level up to an altitude of 3,500 feet, usually inhabiting damp areas, such as valleys, banks of streams, and moist slopes near rivers. Probably the species best



VEGETABLE IVORY AND PRODUCTS

Various toys and ornaments carved from the seeds of the vegetable ivory palm. In the center two of the seeds are shown with their wrinkled exterior. Inset: The fruit of the palm. It consists of a compact head of single fruits, each containing from four to six seeds, some of which are shown sectioned.

known is *P. macrocarpa* of Ecuador, Peru, and Brazil. During my explorations of the quinine forests in southern Ecuador this palm was often seen at elevations of 3,000 to 3,500 feet, occurring nearly at the lowermost limit of growth of the quinine forests.

In Ecuador the plant itself is called "cadi," and the seed, which contains the hard white ivory-like substance, is known to the inhabitants as "tagua" or tagua-nut. The trees are often cut down by local people for the tender whitish heartmeat found within the growing tip below the leafy crown. This may be eaten as a salad, which is quite delicious when mixed with some kind of dressing, or plain with only salt added to flavor it, or cooked like any other vegetable. It has the rich meaty quality peculiar to most palms. As is well known, many other palms are commonly used for food. It is a wasteful practice to destroy such large plants for the sake of relatively small amounts of food, though such delicacies constitute for the people a real change in the otherwise monotonous daily diet limited to rice, beans, potatoes, and tortillas (corn cakes).

Actually it is a time-consuming as well as laborious task to cut down one of these palms for the heartmeat alone, because the trunk is very hard and tough. A man may spend half an hour or more whacking away at one of these trunks with his machete before felling the plant. In Ecuador, for

example, the halves of the trunk are severed with the machete, and the leaves are then laboriously cut near the base of each thickened leaf-stalk or petiole. As these overlap with one another and surround the central core of the stem in a spiral manner, each leaf-stalk must be chopped off separately from the main trunk. Finally, the growing point is encountered on the inside and the delicious white interior can be taken out. It consists of the bases of the unexpanded leaves and petioles.

Aside from the use of this plant for food, its most interesting and profitable part is the hard ivory-like portion of the seed. In the vegetable ivory palm, the sexes, contained in the flowers, are found on separate plants, some of the plants bearing only male flowers, others female flowers. The fruits, found only on the female palms, consist of clusters of six or seven large drupes, the whole mass becoming the size of a man's head. At first these clusters are erect, but later, owing to the increasing weight of the ripening fruits, become pendulous.

When ripe, these clusters may weigh about 25 pounds. The outside of the fruits is marked by dark brown woody wrinkles or convolutions. The inside consists of a hard white portion containing the seed. At first, the inside of the young fruit consists of a clear tasteless liquid, often drunk by the inhabitants as a thirst-quencher. Gradually, the liquid assumes a milky color and solidifies into a hard ivory-like substance. This solid portion, vegetable ivory, has great commercial importance. The inhabitants of Ecuador carve from it all kinds of ornaments, toys, ash trays, rings, reels of spindles, knobs of walking sticks, etc.

USED FOR BUTTONS

But far more important than these are the hundreds of thousands of tons of buttons that are made from this material. Large quantities are exported to Europe and North America, as well as to various South American countries. As early as 1840, quantities of 150 tons were imported into England. The buttons are very durable and, until a short time ago, were as commonly used, if not more commonly, than ordinary pearl buttons. Now, with the introduction of plastics, the button industry that uses vegetable ivory is meeting greater competition. In Ecuador alone, the exportation of tagua nuts occupied fifth place in that nation's exports, nearly 65,000,000 pounds being shipped annually. Most of the shops manufacturing buttons are in the towns of Manta, Guayaquil, and Ambato.

Ecuador is believed to possess the highest grade of vegetable ivory found anywhere. Thus far, attempts to establish plantations of this palm in other countries have been unsuccessful. An exhibit showing the natural fruit and various articles carved from vegetable ivory may be seen in Case 7 of Hall 25 (Food Plants and Palms).



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