A Glimpse into the History of Rubber

Latex-producing trees and plants grow naturally in many regions of the world. Yet the making of rubber products got its start among the primitive inhabitants of the Americas long before the first Europeans caught sight of the New World.

Moreover, it would be centuries after their "discovery" of America and subsequently becoming aware of rubber's existence before Europeans and others in the so-called "civilized" world awakened to the possibilities offered by such a unique substance.

Hevea brasiliensis (Willd. ex A. Juss.) Müll. Arg.

Long before the arrival of Spanish and Portuguese explorers and conquerors, native Americans in warmer regions near the equator collected the sap of latex-producing trees and plants and, after treating it with greasy smoke, fashioned it into useful rubber items. Among the objects they produced were rubber boots, hollow balls and water jars.

Finished rubber products of the New World's Indians were observed by Europeans possibly within the first two or three years after their discovery of America and certainly within the first 30 years. Yet most of civilized Europe continued to view rubber as a mere novelty with little commercial importance until well into the 18th century.

It's possible that Christopher Columbus himself may have seen rubber being used by the Indian natives of Hispaniola (now Haiti and the Dominican Republic).

Columbus, on his second voyage, dated sometime between 1493 and 1496, was rumored to have brought back balls "made from the gum of a tree" that he presented to his financial sponsors, King Ferdinand and Queen Isabella of Spain. The accuracy of that report is in question, however.

Earlier, a chaplain of the Spanish royal court recorded the eyewitness testimony of the secretary and trusted companion of explorer and Mexican conqueror Hernando Cortez, who described a game played by the Aztecs using balls "made of the juice of a certain herb." His account shows that in 1519, Spanish visitors to what today is Mexico City observed one of the first uses to which rubber was put.

Later explorers found massive athletic courts in which teams of native competitors strove to drive a rubber ball through a stone ring in a game similar to today's basketball.

In 1615, Spanish chronicler Juan de Torquemada described a more practical use for rubber. His report contains a description of the Castilloa elastica tree and the methods used in tapping its sap. The Spaniards of Mexico, he said, found the milk of the tree useful in covering their capes, making them marvelously adapted to shedding water-although the coating was prone to melt under the hot rays of the sun.

Curing raw rubber of its tendency to soften and become sticky when heated or turn stiff and unyielding when cold would not be accomplished for another two centuries, when Charles Goodyear would unlock the secrets of vulcanization in 1839.

Exactly who discovered rubber and how it came to be used remains a mystery. It's possible that interest in the useful properties of rubber might have resulted from chewing gum.

Human beings have spent thousands of years testing what can and cannot be eaten or chewed with satisfactory results. Every plant that exudes chicle or chicle-like substances that can serve as chewing gum also contains some rubber. The Spanish credited the extraordinary whiteness of the teeth of Aztecs to a gummy substance the Indians chewed.

Some have speculated that rubber technology began in what is now northwestern Mexico and the southwestern U.S. The Aztecs once lived in those regions where the rubber-producing guayule shrub grows. The guayule is a plant that will not bleed its latex and must be ground up and chewed to extract its gummy offering. The Indian words from which its name is derived mean "gum tree."


Hevea Brasiliensis

Regardless of the circumstances, the native American's prehistoric discovery and use of rubber is all the more remarkable considering it was nearly 300 years after the first voyage of Columbus that Madagascar's wild rubber was discovered and later still that similar substances came to light elsewhere in Asia and Africa.

The worlds leading rubber-producing tree Hevea brasiliensis, originally was found solely in the lands drained by the Amazon River and its tributaries in South America. As long as "wild" rubber dominated the world market, the most and best rubber came from the Amazon territory.

It was from those same Amazon jungles that foreign agents later smuggled the Hevea seeds that propagated millions of acres of Malayan, Sumatran and other Eastern Pacific plantations that today supply much of the world's natural rubber.

There are other rubber-generating trees, like the Castilloas, that grew in both North and South America. They could furnish large quantities of latex, but the natives' approach to extracting it usually entailed cutting down the tree. The Hevea, on the other hand, can be tapped live and milked again and again.

It was engineer Francoise Fresneau who, in 1847, found and identified the Hevea in French Guiana, naming it caoutchouc (meaning "weeping tree" in Indian dialect).

Small samples of caoutchouc (which is pronounced like "cow-chook") rubber were brought to Europe intermittently by returning explorers. There, Joseph Priestly, the British chemist-clergyman famous for discovering oxygen, observed that the intriguing material could be used to erase pencil marks. Priestly began selling small pieces of it for that purpose, thereby launching Europe's first commercial use of the substance and simultaneously giving it the name "rubber," most familiar to English-speaking people today.

In the Indian languages of Amazonia, the caoutchouc tree was called heue. Thus, in 1755, the French botanist Aublet named the genus Heuea. Later, at Kew Botanical Garden and Herbarium in London, the tree was given the full scientific name Heuea brasiliensis.

The native Hevea’s large size (up to 130 feet high and 12 inch girth) and the tree's unique ability to pop its seeds with almost explosive force probably made it next to impossible for the Amazon natives to ignore. The fact that these primitive people went on to devise and ultimately standardize a method for gathering its latex sap, then

coagulating and molding it into useful objects is all the more remarkable considering they had yet to perfect the wheel, the plow or the smelting of iron ore.

The technique used by the Indians was to gash purposely a series of trees, arranging a leaf or clay cup on each one to catch the drops of sap that bled from the wound. Later they would return in order to collect and pour the accumulated latex into vessel made from a hollow gourd.

The milky juice then was fashioned into a desired form or object by applying successive coats of it to a clay or wood mold and exposing them to dense smoke, while constantly turning the work until the shape of the object ultimately was built up

For their smudge-fire, the Amazon Indians came to rely exclusively on burning the nuts of certain palms and especially the urucuri nut. The thick, oily smoke was concentrated through the use of a clay cone. Such treatment gave the resulting item a strength and durability not found in rubber that merely had coagulated in the jungle heat. Thus, the Amazon Indian was both the first rubber chemist and first rubber product manufacturer.

The knowledge of how to gather latex and make usable rubber products was to prove both a blessing and a curse to the natives of this tropical region, as recounted by authors Howard and Ralph Wolf in their classic historical work, Rubber: A story of glory and greed, published in 1936.

The large Hevea trees tapped by natives were merely the survivors from among hundreds that had failed to germinate as seeds or perished as shoots in the relentless competition of the jungle. As a result, they averaged about three to four to the acre.

Gathering latex involved locating productive trees - often at considerable distances from each other - and tending them one by one. Thus traveling about to collect a usable quantity of latex was a labor-intensive operation. Enterprising Indians near Para, Brazil, in the lower Amazon region, began collecting and fashioning rubber into shoes and other products, which then were sold to merchants and shipped to the U.S. As this market grew in the late 1800s, rubber gathering came to be the primary activity carried out by the Indians of the Brazilian northeast.

Demand ultimately exceeded supply. And with the advent of steam-powered watercraft, the huge Amazon drainage system was opened to such rubber-gathering activity. Soon, according to the Wolf brothers' account, white colonists arrived and began enslaving the native population to carry out such work. Para became a headquarters for the slave trade and the center of a controversy between Jesuit priests and white colonists.

From as far as 1,000 miles up the Amazon, slaving parties brought down red captives "by the hundreds," the Wolf brothers wrote, "and the same decimation of aboriginal population went on at other points along the river."

In an effort to protect the hapless natives, Jesuit priests shepherded thousands into the safety of missions founded by Father Antonio Vieria. The good father aroused such enmity among the colonists in doing so they ultimately obtained his exile to Portugal, where he was imprisoned by the Inquisition on heresy charges. Nevertheless, the Jesuits continued to work with Indians and sold their products abroad.

A change of Portugal's king in 1750 also brought a new prime minister who had no liking for the Jesuits and stripped the priests of all temporal power in Brazil.

Meanwhile, a group of Amazon Indians, trained by Jesuits in the use of European arms, rose up against their colonial oppressors and troops from both Portugal and Spain had to be sent in to subdue them.

The Indian rebellion, plus a failed attempt to assassinate Portugal's king for which the black-robed society also was blamed, gave the prime minister plenty of excuse to expel the Jesuits from all Portuguese possessions. Ultimately they were expelled from all Spanish lands as well.

As a result, the Amazon's native population was plunged into "the worst state in history," according to the Wolf brothers. "Timorous, servile and helpless, the Jesuit converts clung to the former mission sites and became easy prey for traders and colonists." Others retreated up the various river tributaries, where their descendants raised in an atmosphere of abject hopelessness and incompetence, "fell even easier victims to the rubber men."

Cruel treatment and forced servitude swiftly reduced the Indians' numbers while diseases, including the fever that assailed them from contact with people from civilized settlements, swept away thousands more. A few who survived refused to work after they learned there were laws to protect them from forced servitude.

Indian labor became so scarce in some areas that black slaves were brought in to carry out the rubber-gathering work. Yet in some remote areas, such as the upper reaches of the Japura River beyond Brazil, "slave hunting by the rubber men" raged on into the 20th century, the Wolf brothers said.

In the world outside, the American Civil War increased the market for rubber goods. By 1870, demand again exceeded supply. Into the Amazon poured adventurers from many nations who clamored upriver to claim possession of the most promising rubber territories. Soon they descended on the native villages, offering liquor and factory-made trinkets in order to lure the inhabitants into rubber gathering.

Duly encouraged, the naive Indians often would run up such a bill to be paid off in rubber they would be reduced to slavery for life.

On the job, these natives died like flies, being literally worked to death. By habit, they had not been cultivators of the soil; for generations, they had been hunters and fishermen. Under confined labor they simply could not hold up.

For some Europeans, meanwhile, the booming market for rubber brought great riches.

A prime example was Portuguese trader J.G. Araujo, who became the "king of kings" in Amazonia, having ships, trading posts and agents up all the rivers. Araujo bought rubber from the little "kings" along the tributary rivers and sold them the niceties of civilization, such as champagne, mirrors, music boxes and construction materials for their mansions.

A similar situation occurred in Africa, soon after latex-yielding plants were discovered in Madagascar during the 1760s. Prior to that time, rubber had not been used by the African natives. However, once the demand for it was made known by white traders on the coast, word quickly spread into the African interior with predictable results.

The capture and selling of slaves had been going on in Africa since the middle of the 14th century, as ship after ship carrying black captives departed its shores for the

New World. But during the latter half of the 19th century, Africa's most troubling slavery problem was an internal rather than an external one.

The "Amazon River" of Africa is the Congo, the world's second-largest flowage in terms of volume and area drained. King Leopold II of Belgium was among the first to recognize that region's economic potential - and ultimately the most notorious in exploiting black labor in the gathering of rubber.

With nowhere to expand in Europe, Belgium's king turned his attention to undeveloped Portuguese East Africa. In 1876, he convened an international African conference of geographers and explorers in Brussels. The event gave Leopold the chance to present himself as a great humanitarian, one seeking to bring civilization, progress and Christianity to the "dark continent."

Out of that gathering came the short-lived Association Internationale Africaine, dedicated to converting the natives of central Africa to Christianity and spreading trade and industry among them. There was, of course, to be an "international commission" with Leopold as its president.

Acting on his own behalf, Leopold then formed an organization known as the Comite d'Etudes du Haut Congo and persuaded the widely known and highly regarded English newspaperman Henry M. Stanley to meet with and persuade native kings and tribal leaders to sign treaties stripping them of their sovereignty and property rights.

By early 1885, the crafty Belgian monarch had sewn up nearly 1 million square miles of the Congo region for his own use and profit. With no army or navy backing him up and with no previous Belgian toehold in Africa, King Leopold had cut himself in for one of the richest million miles of that continent a triumph of adroit wire-pulling and wholesale propaganda. Within a year, he had issued a decree declaring all "vacant lands" property of the state-and for all practical purposes Leopold alone was the state.

Native people of the Congo suffered greatly under Leopold's domination. Over the years that followed, their numbers decreased by as much as 10 million and their lives were made miserable by outrageous taxes and punitive regulations.

To assure his will in this Congo Empire, Leopold impressed able-bodied men into an army of ruthless tax collectors and enforcers. Even children were sent to "camps of military instruction," where they learned to become soldiers under the direction of Belgian Army officers.

In response, the Congo's natives rebelled; and many were stout fighting men who, even with crude weapons, sometimes gave the Belgians more than they could handle.

The conflict began with river tribes who refused to gather and deliver rubber, ivory and foodstuffs unless compensated with desirable trade goods. It spread inland as Leopold's oppressive tax-collecting system and ruthless management was expanded into other regions. The fighting and dissatisfaction raged on throughout his rule.

On soldier- and labor-recruiting raids, Leopold's undisciplined black troops often beat defenseless natives with gun butts and sometimes finished up with cannibal banquets. On punitive expeditions they wreaked vengeance on villages negligent in supplying rubber to Leopold or food for his gunmen, wood choppers, laborers and station slaves.

Nor were the white supervisors of Leopold's rubber-gathering stations without guilt. There, station slaves sometimes were forced to eat rubber that had been badly

prepared. A Congo court once ruled that the subsequent illness and death of such victims couldn't be attributed to those disciplining practices.

During Leopold's regime, the taking of hostages was also practiced as a means of increasing latex production. The idea was to capture and hold tribal chiefs and the family members as a means of forcing workers to rescue them by bringing in increased amounts of latex, no matter what the difficulties involved.

Although Leopold initially had thought ivory would be his primary path to riches, it was rubber that ultimately furnished the greedy Belgian ruler with the cash he so desired. The increased demand for rubber in Europe caused prices to soar on the Antwerp market. And on the completion of a 206-mile railroad around the lower Congo's cataracts in 1898, the region's rubber operations got under way in earnest.

From 1898-1908 Leopold's most lucrative years-rubber exports totaled $80 million, compared to just $25 million for all other Congo products. World pressure to end the Congo atrocities ultimately forced Leopold to hand over control of the Congo to the Belgium government in 1908. He died a year later.

In 1910, worldwide production of "wild" rubber hit an all-time high of 83,000 tons. Of that total, the Amazon region contributed more than half, the continent of Africa one fourth and Mexico most of the remainder.

The story of rubber in Southeast Asia - and ultimately the cultivation of rubber- began in the 1790s with the swing of a cutlass in Penang, an island off the coast of the Malay Peninsula. There, an exploration party was cutting through arm thick vines that were blocking its way through the forest.

One particular vine spurted a milky white liquid, some of which dried on the blade. James Howison, a surgeon and member of the group, inspected the coating and was surprised to find it had many of the properties of the American caoutchouc latex.

The vine in question later was christened Urceola elastica. It ultimately found limited commercial use as did several other latex-producing plants native to the region that included Sumatra, Java, Borneo, Singapore and Burma.

However, none of these plants produced latex to rival that of the Hevea brasiliensis tree native to the Amazon region.

All such Asian rubber brought less than a third of the price of the American product on the world market.

Thus was born the idea of transplanting and cultivating the American Hevea rubber tree in the tropical areas of Asia and elsewhere. Many articles were written at that time about the potential of doing so. One well known advocate of this was Thomas Hancock, today regarded as the father of England’s rubber industry.

Hancock's idea was to try cultivating the Amazon tree in the West and East Indies. And as early as 1855, his friend, Sir William Jackson Hooker, director of the Kew Botanical Garden in London, pledged assistance to anyone willing to undertake such a venture, which likely would involve snatching the seeds from under the noses of the Brazilian government. However, it was Sir William's son and successor, Sir Joseph Dalton Hooker, who years later was to make good on that pledge.

A decade earlier, Clements Markham, assistant secretary of England's India office, was knighted by Queen Victoria for having supervised the similar kidnapping of

the cinchona or "quinine tree" and its successful introduction into British-controlled India and Ceylon.

That particular caper brought Markham little popularity in Columbia, Peru and Bolivia, where the tree was native and a source of revenue. Nor was a similar snatch of the Hevea tree expected to be greeted with approval by Brazilian and other Amazon authorities.

Nevertheless, Markham enlisted the aid of government officials, including Hooker, and the consul at Para, Brazil, was instructed to obtain the necessary Hevea seeds.

Apparently, secreting such seeds out of Brazil initially proved no great difficulty. For by May 1873, Kew Garden in London had possession of approximately 2,000 seeds-some said to have been quite fresh. The conspirators had acquired them for a mere $27.

However, only about a dozen seeds germinated, and half of the resulting seedlings were taken to Calcutta. There, India's climate didn't prove suitable to these first Hevea trees, which ultimately died.

Kew Garden then contacted Henry A. Wickham, a planter on the Amazon, asking him to send more seeds. Wickham suggested sending seedlings inasmuch as the previous seeds had lost their germinating power so quickly. Nevertheless, he promised to furnish additional seeds for $50 a thousand.

Kew Garden received a limited number of seeds from Wickham in July 1875 and a few more in August of that year.

All failed to germinate, however. Between these shipments, the India Office acquired some 378 more seeds through its own channels and passed them on to Calcutta. Their fate was the same.

Then in 1876, Wickham arrived in Kew Garden with a larger number of Hevea seeds. He had chartered a ship that was returning to England and gathered seeds with the help of Indians. Then, with some difficulty, Wickham had gotten them out of Brazil and to the Royal Botanical Gardens just in time. Within a fortnight, Kew Garden officials welcomed the sight of some 2,397 young Hevea trees.

Most of the seedlings were sent to Ceylon to be cultivated and propagated for distribution to Burma and other hot, moist districts of the Indian empire.

From Ceylon, seedlings went to other favorable areas, such as India, Burma and Singapore, Malaya and British Borneo.

Ultimately. the industry spread to the Dutch East Indies, French Indo-China and elsewhere. It was a long time doing so, however.

In the history of wild rubber, much attention is paid to the Hevea tree because it initially accounted for nearly all of the world's "wild" rubber and supplied as much as half during the boom years when the forest trees and vines of the Americas and Africa were pouring their latex into the world market.

Under subsequent plantation auspices, the Hevea has been developed to a point where it accounts for more than 90 percent of current natural rubber production.

Article taken from C. Slaybaugh
More information: http://www.hort.purdue.edu/newcrop/duke_energy/Hevea_brasiliensis.html