

## **Pamphlet # 27**

### **Science and Technology: Petroleum, Oil, Asphalt**

#### **1. Introduction**

Long before European contact, the peoples of the northeastern part of North America were using petroleum products for a wide variety of purposes ranging from skin lotions to sealants for canoes. Wooden posts used to stabilize the sides of oil pits in Pennsylvania have been carbon dated to 1415, but experts believe these pits were in use long before. The Iroquoian peoples used oil to light ceremonial fires as well as using it as a skin lotion similar to modern day petroleum jelly. Many groups believed oil to have healing properties as well and used it to help heal skin problems and flesh wounds.

In the American northeast and California regions, the lowest grade of crude oil, asphalt, was used for a variety of purposes. Naturally waterproof, asphalt was used as caulking for canoes, and as a sealant for waterproofed pottery and basketry. Additionally, asphalt was used as a glue to fasten points to arrow or spear shafts or to glue shell inlays into wood, bone or stone carvings.

#### **2. Rubber/Latex**

Latex is a tree sap that has been collected and used by the Native peoples of Central and South America since at least 1000 BC. The Olmec culture of Mesoamerica (1700 BC to 400 BC) is believed to be the first to discover the process of creating rubber. The manufacture of rubber products was also later adopted by the Maya and Aztec peoples and spread throughout the Mesoamerican region.

In its natural state, latex is not very useful,

however when treated, or "vulcanized" it takes on the characteristics we are familiar with today. The Olmec discovered how to treat latex to turn it into rubber by first boiling the latex sap then smoking it with a fire made of palm nuts. The smoke from the palm nuts contains certain chemicals that caused a chemical reaction in the latex turning it into useful rubber. An additional way of vulcanizing rubber was to mix the latex with the juice of morning glory vines which has a naturally high level of sulfur, the main chemical used in modern latex processing. After processing, rubber and latex was used to make waterproof clothing, shoes, bottles and containers, syringes, as well as rubber balls and rubber bricks used for trade.

Rubber was also used to make syringe bulbs and hoses for medical treatments hundreds of years before the practice was adopted by Western medicine.

The first European report of rubber comes from Christopher Columbus's second voyage from 1493-1496 to what is today Haiti where Columbus reported seeing "balls made from the gum of a tree". The familiar English word "rubber" dates to the 1700's when the gum of the tree was found to make a highly efficient eraser for lead pencils. However, rubber remained primarily a curiosity to Europeans until the 1890's when it was discovered rubber made much better tires for the newly popular bicycle.

#### **3. Mathematics & Astronomy**

Native peoples of the Americas were expert astronomers, architects, scientists and mathematicians. For example, the Olmec peoples of Mesoamerica developed the number zero and worked with a base 20 number system which was also used by the later Aztec and Maya peoples. As a result of these mathematical achievements, the Maya developed one of the most accurate calendars ever devised. The

Mayan calendar was based on the movements of the sun and contained 365 days divided into 18 months with each month having 20 days. Despite the lack of a telescope, the Mayan calendar was so precise as to be only 19 minutes off.

Many Aboriginal cultures in the Americas used astronomical observations and mathematical calculations to accurately predict events such as solar eclipses, the seasonal solstices and equinoxes. Such astronomical observations were very important as they marked such seasonal events as crop planting, harvest time, and seasonal religious ceremonies. Additionally, Native peoples throughout North and South America built structures and communities to align with the planets and the solstices and many, such as the Aztec, developed highly accurate lunar calendars.

Other groups in the Americas developed the "base 10" system for counting, like the one which we use today. The Algonquin, Iroquoian, Athapaskan, Salish, Sioux and Inca peoples all used a base 10 number system.

The Aztec developed a system of standardized weights and measures to ensure fair trade practices as well as developing complex systems of accounting for trade and taxation purposes. Additionally, both the Maya and later Aztec peoples used an abacus for solving mathematical problems. It is believed that the Maya began using the abacus between A.D. 900 and A.D. 1000. The Pomo people of what is now California using a base 20 system developed a form of currency using clam shell beads of equal diameter and thickness which were kept on strings. A Pomo trader could then simply measure the string of beads to determine its value rather than having to count each bead.

#### 4. **Technology & Engineering**

The Olmec of Mesoamerica, modern day Mexico, developed a lodestone (a lodestone is a magnetized rock also known as magnetite) based compass at least 3,000 years ago, approximately 1,000 years before the Chinese. Europeans did not begin to use the magnetic compass until 1178 A.D.

The Olmec are believed to be the first Americans to develop a plumbing system made of U shaped stone blocks covered with capstones to prevent water from evaporating. Such water conduits were used to provide water to individual buildings within Olmec communities. The Aztec peoples built extensive canals bringing water into their communities as well as building artificial islands by draining swampland and backfilling the area. Further, they converted Lake Texcoco from a salt water lake into a fresh water lake by engineering a complex system of gated dikes and aqueducts fed by a fresh water stream.

Many Native peoples of the Americas constructed massive engineering projects, the most well known being the pyramids, cities and road systems of the Aztec, Maya and the Inca. Less well known are the massive systems of canals through what is now Florida, the mound cities of the central Mississippi river valley, and the apartment complexes and irrigation canals of the Anasazi of the American southwest.

In Florida, the oldest canals were dug around 1,700 years ago and averaged 20 feet in width and 3 to 4 feet in depth. One canal is 7 miles long and allowed Native peoples to move between the interior of Florida and the both the Gulf of Mexico coast and the Atlantic coast without having to portage around rapids in the river systems. Some of the canals had lock systems enabling canoes to travel uphill. In addition to this complex system of canals, the

Native peoples along the Florida coastlines reclaimed land from swampy areas by using backfill made up of huge mounds of shells.

The Adena and later Hopewell and Mississippian cultures of the Mississippi and Ohio River valleys in North America began to construct huge earth works around 1500 B.C., ending about 1500 A.D. Many of these earth works, known as effigy mounds are in the shape of birds, snakes, bears, bison and eagles. The largest group of mounds, Cahokia, is attributed to the Mississippian culture, and covers almost 4,000 acres near present day St. Louis, Missouri. It is estimated around 20,000 people lived in the area on and around the estimated 120 mounds constructed. Modern day engineers estimate the people of Cahokia moved more than 50 million cubic feet of earth to construct the mounds.

Between 1000 and 1200 A.D. the Anasazi peoples of the American southwest began constructing systems of terraces, small dams and water reservoirs. In Chaco Canyon in modern day New Mexico, the Anasazi built a road system linking outlying communities with the central settlement of Pueblo Bonita. This road system was a series of arrow straight roads radiating outwards from the main settlement like the spokes on a wheel, the longest being 42 miles long. Additionally, the peoples of this region built adobe pit homes and later multi-story apartment like complexes, many of which still stand today. The pueblo at Pueblo Bonita was 4 stories high and had 800 rooms by the 11th century A.D.

Other technological innovations developed by Native peoples of the Americas that many people worldwide take for granted now are items such as snowshoes, canoes and kayaks, crampons (devices attached to the soles of footwear to prevent slipping on snow or ice), toggling harpoons, toboggans and hammocks.

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