

## INFORMATION ABOUT PETROLEUM IN AMERICA PRIOR TO THE NINETEENTH CENTURY

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**Abstract.** The petroleum substances have been used a lot of centuries ago: bitumen has been used in Neolithic Period to fix head's hammer of stone and to set beads. The authors of this paper want to show the knowledge of bitumen and asphalt in South America until the 19<sup>th</sup> century through documents of Spaniards conquerors. Besides, we have done a comparative study between different words to design these petroleum products.

### 1. INTRODUCTION

Petroleum from natural springs was widely used by South American people long before the arrival of the Europeans. They covered their bodies with it to keep the dangerous and unbearable mosquitoes away and they used it for lighting and numerous medicinal applications. They extracted it from surface indications in the same way as Neolithic cave dwellers close to the Dead Sea or the inhabitants of Mesopotamia had done. Surface indications are the different chemical properties of gas, water, rocks and soil associated with nearby oil and gas occurrences or indicative of favourable conditions for their existence. They are classified into Direct Indications (originated by the presence in gas, water, rock and soil of disperse petroleum components, whether liquid, solid or gaseous) and Indirect Indications. Indirect Indications can be active (when the visible products on the surface are constantly renewed due to active underground circulation: this is the case of oil and gas sources and mud volcanoes) or fossils (when permanent renovation balancing losses due to surface oxidation does not exist. One example of this would be asphalt sand. Surface indications are what allowed petroleum substances to be discovered and used in numerous applications in ancient times. Then, as from the nineteenth century, surface indications constituted a valuable tool in the exploration of oil and gas strata (Mazadiego, 1994). Characteristic of these indications are their smell, gas bubbles in streams, irisation on the surface of water and asphalt deposits originated by the oil's heat-induced evaporation.

### 2. VENEZUELA

One of the first written references to the existence of petroleum products in America is due to Gonzalo Fer-

nández de Oviedo y Valdés (Madrid, 1478-Valladolid, 1557), the Spanish historiographer and writer. During his lifetime he made five journeys to the American continent, being appointed Official Chronicler of the Indies in the year 1532. After his second sojourn in America, he published his "*De la Natural Hystoria de las Indias*" (1526), a summary and foretaste of what would be his most well-known book: "*La Historia general y natural de las Indias islas y tierra firme del mar océano*", which tells the story of the discoveries made between 1492 and 1549. This book (Fernández de Oviedo, 1526), which went to 15 editions in a century, is a veritable encyclopaedia of anthropology and ethnography and, to some extent, is inspired by the works of Pliny the Elder.

Fernández de Oviedo wrote about petroleum after Juan del Junco and Gómez del Corral, two of his comrades-in-arms, told him of their experiences during the expedition of Jerónimo Lebrón up the river Magdalena in 1541: "*One day's distance from the village of Tora, where the brigs are going to land, there is a source of asphalt, a well which boils and runs out of the soil. It enters through the mountain at the foot of the sierra in large quantities. The Indians take it to their homes and cover themselves with it to relieve their tiredness and strengthen their legs whilst the Christians make use of it to caulk their brigues*".

When writing about Cubagua, also called Isla de las Perlas or Pearl Island, Fernández de Oviedo explains that it is a small, flat island and, after referring to some plants and animals, mentions that it has a good port to the North and that the island of Margarita is only a league away (Forbes, 1958). He describes the western end as follows: "*On the western tip there is a fountain of an oily liquor next to the sea, so abundant that the liquor or asphalt runs over the sea, leaving signs more than two or three leagues from the island and even from there comes the smell of this oil. Some of those who have seen it say that it is called "stercus demonis" by the naturals and others "petroleum" and others "asphalt" and those who call it in this latter manner do so because they believe that it is the same type as that from lake Asphaltide about which many authors write. They say that this liquor from Cubagua is much used in many things and for different diseases and from Spain it is requested with much insistence due to the experience had of it by the doctors and the persons who have used it to remedy their illnesses. I have heard it said that it is a very useful remedy for gout and other illnesses from the cold because they say that this oil is very hot*".

The first Spanish town to be established on American soil, New Cadiz, was built in the vicinity of this source of petroleum. There, the colonials established themselves to exploit the pearl fisheries. At its height, the revenue received by Spain from the pearl fisheries was similar to that supplied by Peru in gold. One year after the publication of the book by Fernández de Oviedo, Juana I 'The Mad', Queen of Castile (1479-1555), daughter of Ferdinand II of Aragon and mother of Charles I of Spain/Charles V, Holy Roman Emperor, addressed a letter to the Royal Officials in New Cadiz on the island of Cubagua, dated 3 September, which reads: "*Some people have brought to these Kingdoms the oil that is in a fountain on that island (...) and here it has appeared to be useful*", ordering all the vessels leaving Cubagua for Spain to load as much of the substance as possible. This command was faithfully followed as is corroborated in three documents, two dated in 1539 and the third one in 1540, currently deposited in the General Archive of the Indies in Seville. The first shipload of this product from Cubagua arrived at the Casa de Contratación (House of Trade) in Seville in the ship Santa Cruz, from where it was sent to the Queen. Apparently a further barrel of petroleum was received in December 1540. However, different natural phenomena, such as the tidal waves of 1541 and 1543, the destruction of the oyster beds and the death of the Indians who worked in them, led to the town and the island being completely abandoned by the Spaniards, although records exist showing that the island was populated for some time afterwards. Nevertheless, these geological phenomena accelerated the end of the petroleum trade with Spain. Some years later, in 1552, Francisco López de Gómara, the historian, included in his "*Hispania Victrix*" (*First and Second Parts of the General History of the Indies*) a comment on the petroleum of Cubagua, which some people looked upon as a simple repetition of what had previously been reported by Fernández de Oviedo.

In 1589, the priest Juan de Castellanos (1522-1607), as chronicler of what occurred in the kingdom of New Granada, wrote in his epic poem "*Elegias de Varones ilustres de Indias*" (Elegia XIII, Canto 1), referring to Cubagua, that "*Its dry beaches have a fountain/to the West where beats the sea/of a liquor excellent and proven/ in the common use of medicine:/which in the time of currents/can be seen above the sea/in a space of three leagues, with patches/that are usually strong and very wide*". Another of the places highlighted in sixteenth and seventeenth century documents is Lake Maracaibo. Alvaro Alonso Barba (1559-1662) mentioned in his "*Arte de los Metales*" (1640) ("*The Art of Metals in which is declared the Manner of their Generation, and the Concomitants of them*") that "*asphalt was known in these lands because it is abundant in the mountains of Los Chiriguanas. If no more is known about it, this is because it is in a hostile area where warring tribes live*". These mountains are situated near Lake Maracaibo and form part of Colombian territory although the deposits extend as far as Venezuela. In the middle of the sixteenth century, the pirates that reached American soil were in the habit of taking refuge in Maracaibo where they could mend their ships with pitch. The port where they moored was San Timoteo, who, with the passing of the years, ended up by being declared the patron saint of crooks and swindlers.

### 3. PERU AND ECUADOR

Information about petroleum outflows in the Santa Elena peninsula in Ecuador was relatively abundant. The members of Francisco Pizarro's expedition to Peru had already seen them and, in connection with them, Pedro Cieza de León (1520-1554) said that "*it was true that there were mines where very hot tar flowed*". The discovery of fossilized bones of Pleistocene fauna made some chroniclers, such as Father Agustín de Zarate or even Pedro Cieza de León, fall into the error of believing the natives' legends, according to which these bones belonged to cruel, godless giants, punished with a shower of fire. Nearly a century later, Antonio de León Pinelo (1595-1660), in his "*El Paraíso en el Nuevo Mundo*" (1655), backed this theory: "*At the tip of Santa Elena bones come out with the pitch from the deepest part of the Earth where they had been buried under the mountains*".

Agustín de Zárate, referring to the petroleum, wrote in his "*Historia del descubrimiento y conquista de las provincias del Perú*" (1555) that "*at a cape called Santa Elena by the Spaniards, there are some outflows of pitch or tar used by the natives to mend their boats*". Some years later, Father José de Acosta, who travelled widely through the Viceroyalty of Peru between 1569 and 1583, wrote in his "*Historia Natural y Moral de las Indias*" (1590): "*In a place on cape Santa Elena there is a fountain of pitch which in Peru they call "copey" and which sailors use to cover their rigging*". Fray Reginaldo de Lizárraga y Obando (Badajoz, Spain, 1540 – Asunción, Paraguay, 1615), referring to these organic compounds in Santa Elena, wrote in his "*Descripción breve de toda la tierra del Perú, Río de la Plata y Chile*" that they were commonly used by the natives to cure wounds, always provided when the nerves weren't damaged, which would appear to indicate that they were used to fixed fractured bones.

Towards the end of the nineteenth century, in the year 1878, these surface indications were exploited by private Colombian and Italian investors until in 1909 they became the property of Carlton Graviile Dunne, who, in turn, sold them to other companies until in 1919 they became the Anglo Ecuatorian Oilfields. In 1921, the Ancon Number 4 well, was productive with 30 barrels a day and exploitation of these wells continued in Santa Elena until they were declared exhausted in 1962.

As defended by García Tapia in "*Del Dios del fuego a la máquina del vapor*" (1992), it would seem that in the coastal region the Indians obtained the asphalt from natural wells and then boiled it in pots to make it

more unctuous. They covered themselves with this product to protect themselves from the cold when diving in the cold waters of the Pacific Ocean. The Jesuit José Eusebio de Llano Zapata, who spent many years in Peru, refers in his work of 1759 to the medicinal uses given to petroleum. He says: *"Thus, in their state of simplicity and innocence, they enjoy an energetic virtue against poison, weak nerves, uterine suffocations, the effects of vermin and the suppression of menstruation. For these ills, they take, in wine, from 10 to 15 drops internally; and, externally, smeared on"*. As regards external use against mosquitoes, he says: *"No es esto sin misterio en aquellas gentes, pues por medio del olor fuerte que despiden el betún se defienden de los que, infestando aquellos países, incomodan a los caminantes."* (This is not without mystery in these people because by means of the strong odour given off by the bitumen they defend themselves against [the mosquitoes] which, infesting those countries, inconvenience the wayfarers". In 1789, Juan de Velasco, in *"La Historia del Reino de Quito"* points out that *"The Indians mix limestone with a type of asphalt already described by Gomara. This marvellous mixture is one of the Indians' many secrets and knowledge, which we have lost due to the carelessness of the first conquistadores. They use it to join stones firmly together"*.

#### 4. CUBA

The city of Havana was then called Carene because the boats went there to be *"careados"* (careened). Gonzalo Fernández de Oviedo y Valdés wrote of Cuba that *"on the island and not far from the sea, a liquor or bitumen, like pitch, flows out of a mountain in sufficient quantity to caulk chips. This material, which continuously enters the sea, forms large lakes or patches on the sea or quantities above the waves, from one part to another, depending on the winds' movement or how the sea on that coast moves and runs. Quinto Curcio, in his fifth book, says that Alexander the Great arrived at the town of Memi, where there is a large cavern or cave, in which there is a fountain that spreads a great quantity of bitumen, so it is easy to believe that the walls of Babylon were joined together with bitumen because there are also some like that in New Spain"*, adding that another had been found at Panuco, better than the one in Cuba. In 1565, Nicolás Monardes, the Sevillian doctor, mentioned in his *"Historia Medicinal de las cosas que se traen de nuestras Islas Occidentales"* that *"bitumen is a type of tar that abounds on the island of Cuba, with springs close to the sea"*, adding that there it was used for medicinal purposes, whereas the Europeans used it to caulk their chips. Along these same lines, Gerónimo de Huerta in his translation of Pliny's *"Natural History"*, wrote the following: *"The island of Cuba has two very notable things, which are a valley where a large quantity of stones as round as canon balls are produced, and a fountain, in Puerto del Principe, from which comes marvellous bitumen for caulking ships"*. In this connection, Bernal Díaz del Castillo (1492-1580) wrote in his *"Historia Verdadera de la Conquista de la Nueva España"* (1575) that *"we agreed that it was the captain Pedro de Alvarado on a ship supposedly called San Sebastián, owing to the fact that it was leaking, although not too much, that it should be caulked on the island of Cuba"*.

#### 5. MEXICO

In ancient Mexico there is evidence of the use of *"chapopotli"*, a word made up of *"tzauc"* or *"tzacutli"* (cement) and *"popochitli"* (perfume), in the waterproofing of canoes and pottery and for adding to copal resins in religious ceremonies. Copal, an Aztec word deriving from *"copalli"*, is a plant which produces resin and even today is used to manufacture varnish. Bernal Díaz del Castillo referred to this mixture when, in connection with Yucatán, he said that *"on reaching the river Guazacualco (close to the present-day city of Veracruz) we entered"*

another river to which we gave the name of San Anton, and there a ship that was leaking heavily was caulked". This author's references to petroleum substances are numerous: "The chief came to talk to Cortes and asked him why we had returned (to the Yucatán Peninsula, an area with abundant surface indications of petroleum) and he said it was because a ship was leaking and he wanted to dress (adobar) it". With the word "adobar", Díaz del Castillo was describing the ship's caulking.

Fray Bernardino de Sahagún (1529-1590), the Spanish historian, lived in Mexico from 1529 studying the language, customs and myths of the Aztecs. In one of his books, "*Historia General de las cosas de Nueva España*" (1540) (General History of the Things of New Spain), he wrote that "the natives use staves, made with rattan, into which they introduce aromatic products, which they prepare by mixing bitumen, which they call "chapopotli", fungi and roses". According to Forbes, there were two types of bitumen: one used to perfume ceremonial sticks; the other, "tziictli", much appreciated by the women. The latter was mixed with yellow wax until a gelatinous mass was achieved which was chewed and which prevented caries. This "tziictli" was referred too by Juan de Cárdenas in his "*Problemas y Secretos Maravillosos de las Indias*": "This must be the reason why they chew this black bitumen, called by the Indians "tziictli", which takes their hunger away". Similarly, in "*Efemérides astronómicas arregladas al meridiano de México (1775-1783)*" the following can be read: "It was God, creator of all things visible and invisible, who on Friday, the 21st day of February of 1783, made us see on the water in the ditches, close to the Sanctuary of Guadalupe in Mexico, a sort of petroleum which in the future would be useful".

Ancient indication	Beginning of exploitation	Exploited after the nineteenth century?	Name of the petroleum product	First reference	Use
Island of Cubagua (Venezuela)	Pre-Columbian	Explorations carried out to assess the reserves	MENE	Gonzalo Fernández de Oviedo (1535)	Medicinal Caulking of boats
Lake Maracaibo (Venezuela)	Pre-Columbian	YES	MENE		Caulking of boats
Cape of Santa Elena (Ecuador)	Pre-Columbian	YES (up to 1962)	COPEY COPEI COPE	Agustin de Zárate (1555)	Caulking of boats Medicinal
Cuba	Pre-Columbian		CHAPOTE CHAPOPOTE	Gonzalo Fernández de Oviedo (1535)	Caulking of boats
Trinidad and Tobago	Pre-Columbian	YES (Royal Dutch Shell & Texaco)	PICHE	Sir Walter Raleigh (1595)	Caulking of boats
Yucatán and Veracruz (Mexico)	Aztecs Mayas	YES	CHAPOTLI CHAPOPOTE CHAPAPOTE	Bernardino de Sahagún (1540)	Caulking of boats Medicinal Religious ceremonies

Table 1. Some words to designate to organic's compounds in America

## 6. ISLAND OF TRINIDAD

The first written reference to the Pitch Lake or Asphalt Lake of Trinidad, dates back to 1595. In February of that year, Sir Walter Raleigh (1552-1618), the English explorer, courtier and writer, set sail from England in search of the fabled land of El Dorado. When he landed in San José de Oruña or St. Joseph, then capital of Trinidad, he went to reconnoitre a place called Parico *"where there is an abundance of a substance which the natives know as piche and which the Spaniards call pitch clay. There is so much of this pitch that the boats that come here from all over the world make use of it. We made some experiments to make sure that its use is good for mending boats, with excellent results, even more so because this pitch doesn't melt in the sun's heat as occurs with the pitch found in Norway"*. The lake covers an area of half a square kilometre and, in some points, has a depth of almost 50 metres. The pitch is made up of an emulsion of 40% oil, 30% clay and another 30% of water. However, it is thought that neither Raleigh nor Dudley, to whom Anglo-Saxon literature attributes the lake's discovery, ever actually saw it, intuiting its existence when they discovered pitch carried by water to the coast where they landed.

The Reverend Griffith Hughes (1707-1758), a British naturalist and author, included in his *"The Natural History of Barbados"* (1750), some notes on St. Joseph, previously the capital San José de Oruña, founded by the Spaniard, Antonio Sedeño. This island was discovered in 1498 by Christopher Columbus and, in 1802, became part of the British Empire. The following can be read in this book: *"A bituminous exudation can be found in the hills of St. Andrews, close to St. Joseph, that is a dirty black. The method by which they obtain this product is to make a hole in the ground or a pit near the point where it filters through. Then it is concentrated by gravity, with a thin film being obtained which is distilled on the surface. It is then when it is gathered in pots. The months of January, February and March are the best period of the year for doing this. It is so inflammable that it can be used in lamps. In addition, it has excellent medicinal properties, being used with success in disorders of paralysis and of a nervous type and to cure eruptions of the skin. It is also used to pour over horses when they are exhausted"*. In 1789, Alexander Anderson wrote in *"An Account of a bituminous Lake or Plain in the Island of Trinidad"* about a bituminous lake or plain, known by the name of Pitch Lake or Asphalt Lake; by the French people called La Bray, *"from the resemblance to, and answering the intention of, ship pitch"*, describing the areolae formed on its surface and stating *"I take this bituminous substance to be the bitumen asphaltum Linnaei. A gentle heat renders it ductile; hence, mixed with a little grease or common pitch, it is much used for the bottoms of ships, and for which intention it is collected by many, and I should conceive it a preservative against the Borer, so destructive to ships in this part of the world."* The borers are marine molluscs that, in larva state, cling to any submerged wood object, boring tunnels of up to 30 cm long.

The German scientist Alexander von Humboldt (1769-1859), also referred to this lake in a letter addressed to the minister of Saxony in the Court of Madrid, baron de Forell, dated in 1800: *"This clay is so poor in native salt that it can barely be seen under the microscope. It contains more than 0.3% petroleum and is the origin of the pitch in Trinidad, in Buen Pastor on the coast of Paria and in the same gulf of Carraca, a gulf formed, according to the geological tradition of the Guaiguerys Indians, by an earthquake and which still appears to be in communication with the volcanoes of Cumucata, which throw up sulphur, hydrogen and hot, hydro-sulphuric water."* He obtained these data during one of his journeys to Venezuela, Cuba and Trinidad. On the other hand, the natives were of the opinion that the origin of the lake's asphalt was linked to alligator excrement as both were found in bogs and swamps.

## 7. WORDS TO DESIGNATE OIL'S SUBSTANCES

Most of the surface indications used first by the natives and then, centuries later, by Europeans were either exploited commercially or at least investigated by oil companies. To an extent, they are the most tangible example of the information that indicates, in the initial stages of a fossil fuel exploration campaign, the existence of these filtrations at surface level.

The words used to designate these products are numerous and characteristic of the different geographical areas where the surface indications appeared. One of the most frequently repeated, particularly in Central America, is *chapapote* (pitch, tar, asphalt). The first definition of *chapapote* can be found in "*Historia General de las cosas de Nueva España*", a codex by Fray Bernardino de Sahagún: "*Chapopotli is a bitumen that comes out of the sea, and it is like Castilian pitch, easily separated, and the sea throws it in with the waves (...) and those who inhabit by the sea go pick it up from the shore*". The word "*chapopotli*", from the Nahuatl culture, is made up of the words "*tzacutli*" (cement, adherent) and "*popochtli*" (perfume) and is used to refer to the thick and strongly smelling bitumen. The words *chapapote* and *chapopote*, very common in parts of northern Spain, derive from *chapopotli*.

"*Mene*" is another of the most frequently used words in America, particularly Venezuela, to the point where there is an abundance of places or geographical accidents close to bituminous or asphalt lakes with this name. Another very common word in America is "*copey*" (or "*copei*"). This word of the indigenous Taino people, was initially used to refer to the resin of a tree. Starting in the sixteenth century, it was also used to describe the petroleum or *petrae oleum* that comes from natural springs. Subsequently, this word was transformed into "*copé*".

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