PETROLEUM IN CUBA

By Pablo Ortega

Cuba is undoubtedly the first American country in which bituminous products, hydrocarbons, crude oil and asphalt, solid and liquid, were discovered. In 1508, fifteen years after the discovery of America, Sebastian Ocampa, according to the first historians of Cuba, found on the shore of Havana Harbor, a soft asphalt, called Maltha. The same deposit may be observed near the shore to-day. Ocampa used it for caulking his vessels and painting the bottoms. Owing to this incident the Bay was called "Puerto Carenas," by which name it was known until 1519, when the settlement of Havana, previously located on the southern shore, near Batabano, was transferred to the spot now occupied by the capital of the Republic.

This deposit on the shore of Havana Bay is mentioned by Olviedo in 1535, who speaks also of a field of asphalt along the coast of Camaguey, formerly Puerto Príncipe. At the beginning of the 19th century, Baron Humboldt visited the island and studied both its flora and mineral products. He mentioned the petroleum well of Guanabacoa ridge, near Havana, where the mineral baths of Santa Rita formerly stood.

Richard Cowling Taylor and Thomas C. Clemson, in a work published in 1837 on bituminous carbon, mentioned the petroleum wells in Guanabacoa that had been known for two centuries and were undoubtedly the same of which Humboldt spoke. Previously, in 1828, La Sagra described petroleum fields located near Havana, and in 1829, Joaquín José Navarro described several deposits of bituminous material in his report to the "Real Sociedad Patriótica."

Taylor and Clemson state that near the deposits described by them, and which two years afterwards proved to be solid asphalt that was employed in large quantities as a substitute for coal, they found crude petroleum filling cavities or cells in masses of chaledony, a few yards distant from the asphalt. The place referred to has been ceded to the mining companies of Hautey & San Carlos, not far from the town of San Francisco de Paula, twelve kilometers from Havana, and is evidently the same old mine known as Casualidad, referred to by Taylor and Clemson, where the original wells may still be seen. The same surface signs of petroleum may be observed in that part of the province.

In the report on bituminous products of the Island of Cuba by C. Moisant, civil engineer, there is a table of asphalt fields in Cuba, in which is mentioned a liquid asphalt or petroleum found in Madruga, a small town southeast of Havana, well known for its sulphur baths. This petroleum, according to investigations of recent date, flows from cavities in the serpentine rocks, found in considerable masses in Madruga and the surrounding towns.

In 1867 a claim called Abeja was registered for oil on the Las Minas farm, 18 kilometers east of Havana, in the district of Bacuranao, formerly east of Havana, in the district of Bacuranao, formerly known as Barreras. The owner of the claim purposed to extract the petroleum by sinking wells, since he had noticed oil indications in the cavities of the rocks on the surface. A well was opened which yielded some oil at a depth of 61 meters. This was sunk later to 129 meters but was afterwards abandoned. In recent times in the vicinity of the Santiago claim, several wells have been drilled that produced a considerable amount of crude oil.

In the year 1867 the asphalt mine known as Santa Teresa, formerly called Prosperidad, was registered for the purpose of investigating the existence of petroleum, but the work was in vain, as in the case of the Mina Abeja. We have been informed that a new well called Belencita located near Santa Teresa, 18 kilometers east of Havana on the road to Campo Florida, and not far from the town of Minas, will soon be sunk in search of petroleum.

We may also mention a claim called San José, located on the old Tomasita plantation, in the municipal district of Banes, west of Havana. This claim was examined in 1880 by the general inspector of mines, Pedro Salterain, who reported the presence of liquid asphalt, or a low grade of crude that flowed from a serpentine dike that cropped out. The product was used for lighting this plantation.

All the wells in Havana Province referred to above are located on lands considered by geologists as belonging to the cretaceous period, such as the districts of Guanabacoa and Banes. The same may be said of the oil lands in the Province of Matanzas, in Sabanilla de la Palma and Lagunillas.
In 1880 Manuel del Cueto drilled a well in search of petroleum on the San Juan de Motembo farm, near the Palma River. During years it had been noted that in many places in that locality, hydrocarbon gases issued from the soil, and this led Cueto to drill the well. After many vain attempts he discovered at a depth of 95 meters a deposit of very pure naphtha, which yielded 25 gallons daily. It is a colorless transparent liquid, very inflammable, leaving no perceptive residue after combustion. Cueto opened another well at a depth of 248 meters and discovered a deposit of naphtha which produced 250 gallons daily. Another well is now being drilled at the same place by a company recently formed in Cuba. According to Mr. T. Wayland Vaughan of the United States Geological Service, in the hills which surround these lands, such gases are plentiful.

In June, 1893, the commercial agents of the United States Government in Cardenas, reported that petroleum of a superior quality had been found there and that it was more pure than any of the raw oils imported from the United States. In November, 1894, another commercial agent of the United States in Cardenas reported that the asphalt deposits near that city could produce from 1,000 to 5,000 tons yearly.

In 1901 Herbert R. Peckham, describing the asphalt fields east and south of Cardenas mentions the drilling of a well by Lucas Alvarez in search of water, which, at a depth of 78 feet, yielded a water so full of oil that it was undrinkable. A second well gave better results because the water had less oil. A few years afterwards Alvarez opened another well in search of petroleum, and at a depth of 500 feet pumped 100,000 gallons of petroleum, which was refined in his plant. This exhausted the supply.

In Sabanilla de la Palma, thirty miles east of Cardenas, he saw several places with signs of petroleum and reached the conclusion that seepages and wells indicated the existence of liquid asphalt of a varying density covering a district of 4,500 square miles. Near the city of Santa Clara there is a petroleum field called Sandalina, which oil was analyzed by H. M. Stokes, in 1890, who pronounced the oil very similar to the Russian petroleum.

In the neighborhood of Sagua and Caibarien, in the northern part of Santa Clara, petroleum fields have recently been discovered and also in the southern part of the Province of Matanzas.

We might mention places in the provinces of Pinar del Rio and Oriente, as in Mariel, Esperanza and Cayajabos in the first, and Guiza in the second, where attempts have been made to find petroleum, but with what has already been stated, sufficient evidence has been furnished to demonstrate that mineral oil in Cuba has been known since the beginning of the 16th century.

More recently, or in 1913, a well was drilled on the property of the Tropical Brewing Co., near Marianno, on the Almandares River. At a depth of 718 feet a great quantity of inflammable gas was found. This well was registered by the Company as the Compañía de Gas Natural y Petróleo of Havana, in the year 1916.

Since then many other similar deposits have been found in the provinces of Havana, Matanzas, Pinar del Rio, and Santa Clara.

To give an idea of the activity in this line, we give below a table showing the number of asphalt and petroleum claims in the Island with the number of hectares constituting each one. The greater part of these have been registered since the beginning of the mineral activity mentioned above. In addition to these concessions there are still may others not yet granted.

**Claims of Asphalt and Petroleum Granted in Cuba up to the 31st of December, 1917.**

<table>
<thead>
<tr>
<th>Province</th>
<th>Asphalt</th>
<th>Petroleum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of grants</td>
<td>Hectars</td>
<td>Number of grants</td>
</tr>
<tr>
<td>Pinar del Rio</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>4290</td>
<td>3623</td>
<td></td>
</tr>
<tr>
<td>Habana</td>
<td>52</td>
<td>35</td>
</tr>
<tr>
<td>1327</td>
<td>5956</td>
<td></td>
</tr>
<tr>
<td>Matanzas</td>
<td>38</td>
<td>13</td>
</tr>
<tr>
<td>1893</td>
<td>6003</td>
<td></td>
</tr>
<tr>
<td>Santa Clara</td>
<td>62</td>
<td>10</td>
</tr>
<tr>
<td>3044</td>
<td>1571</td>
<td></td>
</tr>
<tr>
<td>Camaguey</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oriente</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>299</td>
<td>442</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>88</td>
</tr>
<tr>
<td>11,405</td>
<td>17,595</td>
<td></td>
</tr>
</tbody>
</table>
It may be seen, therefore, that the numerous indications of petroleum discovered, together with the serious efforts now being made to find petroleum in commercial quantities, justify the assertion that within a short time this country will figure as one of the great petroleum producers of the Western Hemisphere.

Since gas was found at the Elviria, the name of the old Tropical well, many companies have been formed with the object of registering claims and boring for oil. In 1915, when oil was discovered on the Santiago property, speculation assumed considerable proportion, and up to the present, 50 companies have been formed and large amounts of stock issued, with the consequent doubt and mistrust on the part of the public.

This, however, is not surprising, since the same thing has happened in other countries where mineral oil has been discovered. In the United States, for example, when petroleum was discovered in 1880, in a well near Titusville, which produced 1,500 quarts daily, 317 companies were immediately organized, representing a capital of $200,000,000. All the region between Titusville and Oil City was drilled.

In Cuba, although on a smaller scale, and in spite of the difficulties created by the world war, some fifteen companies are drilling and many wells have been sunk without definite results, due perhaps to inadequate machinery, inefficient workmen and to lack of knowledge of the geology of the districts.

Another cause that has prevented finding petroleum in commercial quantities is the fact that most companies have limited their respective wells to a depth of 1,000 feet. In very few cases have they reached 3,000 feet, and many have been opened in districts, the geology of which, little or nothing was known. Hence the greater part of them can be justly classified as "wildcats."

**WELLS DRILLED.**—In regard to drillings made in recent years, the following may be said:

In the provinces of Oriente and Camagüey no indications of petroleum have been found. We will, therefore, review the work done in the other provinces. In the city of Santa Clara a well was drilled near the railway line, varying in depth from 700 to 2,500 feet, passing through a mass of asphalt seven feet in thickness, but no petroleum was found.

In the San Juan claim of Motembo, three wells were drilled many years ago; the first, 950 feet, where a little naphtha was found at depths of 205 and 764 feet. In the second, 30 meters distant from the first, naphtha was found on reaching 590 feet. In the third, naphtha was met at depths of 295 and 764 feet. The rocks encountered were principally of serpentine and diorite.

In 1906 the Cuban American Oil Company drilled a well of 1,350 feet near well No. 1 in San Juan, but in 1911 the work was abandoned. The three wells yielded gas and naphtha at various levels, one of them producing 90 gallons of naphtha a day. In 1915 one of the three wells produced enough gas for use in the kitchen of the farm, and well No. 3 yielded 10 gallons of naphtha daily, according to Mr. E. de Golyer, expert in petroleum.

In Anton Díaz, near La Esperanza in Santa Clara Province, a well was drilled in 1904, reaching a depth of 1392 feet, and a second well in the year 1905 was bored down to a depth of 743 feet.

In the Province of Matanzas the Cuban Oil Company drilled a well on the Menendez farm in 1915, reaching a depth of 2,385 feet, without obtaining any results.

In the claim of Felicidad of Lucas Alvarez, before referred to, the original owners drilled five wells, one of which produced 100,000 gallons at a depth of 500 feet and then failed.

In Sabanilla de la Palma, near the Strauss well belonging to the Cardenas-Sabanilla Petroleum Company, the Cuban Oil and Mining Corporation is drilling a well which has already reached a depth of 1,036 feet. On reaching 120 feet a layer of asphalt four feet in thickness was penetrated and petroleum was found in small quantities at two other levels. At 1,037 feet they found petroleum of a higher grade than in its above levels. The company plans drilling to a depth of 1,000 feet if necessary, with the idea of finding richer deposits.

A few months ago work was begun on the grant called America, west of the City of Matanzas, in a district whose geological formation is analogous to that of Bacuranao, in the province of Havana, and signs of petroleum have been found.
About two kilometers west of Caimito de Guayabal near the boundary of the province of Havana, Mr. Shaler Williams has drilled several wells, one more than 1,570 feet, which yields oil and gas in small quantities.

The Antillian Corporation, owner of two large grants of petroleum in the Province of Havana, the Georgina and Antillana, east of the capital, between Bejucal and Guines, in the Candela Hills, has opened a well of 3,006 feet with no results. This well will be extended to a depth of 4,000 feet. The company purposes drilling another well in the Antillana grant, near the town of Managua, 24 kilometers from Havana. This well will be sunk to a depth of 3,000 feet.

There are other companies who have started exploration in search of petroleum, mostly in the Province of Havana, with negative results so far. Some of them have suspended work owing to lack of capital, others, through inefficiency of machinery.

PRODUCING COMPANIES.—We will now consider the work realized by the three petroleum companies that have obtained results.

The Union Oil Company since 1914 has been successfully exploiting the Santiago claim near Bacuranao, some ten miles east of Havana. During the last two years this company has drilled ten wells with varying results. One of these reached a depth of 700 feet, producing three or four barrels of superior petroleum per day, but this was afterwards abandoned. Nos. 1 and 3 were abandoned at a depth of a few feet because rock was encountered too difficult to penetrate. No. 4 at a depth of 560 feet produced 10 to 15 barrels daily. No. 5 at 1,016 feet has produced up to 400 barrels daily. No. 6 was abandoned at 1,912 feet without showing any oil. No. 7 yielded petroleum at 1,000 feet and was abandoned. No. 8 was drilled to 1,009 feet and produces quite a good supply of oil. No. 9 arrived at 1,009 feet and is producing oil, while No. 10, sunk to a depth of 1,012 feet, produced a little oil at 272 and 1,000 ft. The ten wells have been drilled in a restricted area of 300x300 meters, all within the perimeter of the Santiago well.
The Union Oil Company uses a Star Drill No. 30 and two standard machines of the California type. Two iron tanks are installed at the mine, one with a capacity of 1,000 barrels and another of 2,000 barrels, while still another is located on the railway at Minas with a capacity of 1,000 barrels. A steam pump is used to force the oil through a two-inch pipe 14,000 feet in length, from the deposits at the mine to the station. The petroleum coming from the Union Oil Company's wells is of superior quality, the analysis showing a content of 13% of gasoline and 30% of illuminating oil.

The quantity of petroleum sold from the month of December 1916 to June of this year inclusive has been 1,740,051.78 gallons, as per the tabulation below:

<table>
<thead>
<tr>
<th></th>
<th>Gallons</th>
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<tbody>
<tr>
<td>December</td>
<td>1,740,051.78</td>
</tr>
<tr>
<td>January</td>
<td>11,653.00</td>
</tr>
<tr>
<td>February</td>
<td>16,828.00</td>
</tr>
<tr>
<td>March</td>
<td>7,200.00</td>
</tr>
<tr>
<td>April</td>
<td>5,950.00</td>
</tr>
<tr>
<td>May</td>
<td>43,071.28</td>
</tr>
<tr>
<td>June</td>
<td>123,640.88</td>
</tr>
<tr>
<td>July</td>
<td>179,788.40</td>
</tr>
<tr>
<td>August</td>
<td>128,368.31</td>
</tr>
<tr>
<td>September</td>
<td>104,028.96</td>
</tr>
<tr>
<td>October</td>
<td>114,375.36</td>
</tr>
<tr>
<td>November</td>
<td>34,073.38</td>
</tr>
<tr>
<td>December</td>
<td>114,375.36</td>
</tr>
<tr>
<td>January</td>
<td>151,058.64</td>
</tr>
<tr>
<td>February</td>
<td>174,461.08</td>
</tr>
<tr>
<td>March</td>
<td>189,639.48</td>
</tr>
<tr>
<td>April</td>
<td>192,805.16</td>
</tr>
<tr>
<td>May</td>
<td>114,555.12</td>
</tr>
<tr>
<td>June</td>
<td>54,501.19</td>
</tr>
</tbody>
</table>

Total.......................................................................1,740,051.78

This crude oil was first sold at 10c a gallon to different merchants who bought it by the barrel, but after the pipe line was installed nearly all of the product was sold to the West India Oil Refining Co. of Havana at the rate of 12c per gallon. The Union Oil Company is the only one of its class that has so far paid dividends to its stockholders. In the latter part of July they began to open well No. 11.

North of the Santiago well is the "Jorge" claim, where the Cuban Petroleum Company, recently merged into the Compañía Petrolera y Refinadora Cuban y Pan-Americana, is exploring for oil. The Jorge claim seems to be a very promising field in which to drill for oil in that particular district. So far this company has sunk three wells, one of 840 feet, which at first produced 25 barrels daily but afterwards dropped to two barrels, although still yielding a great quantity of gas. Well No. 2 was sunk to 1,100 feet, and oil was found at 540 feet, and the well was abandoned. Well No. 3 produced 210 barrels the first day, but has since dwindled to an average of 100 barrels a day. In the month of June, 1918, 3,385 barrels of oil were produced, with a large amount of gas, which is used for fuel for the two furnaces of the company. All of its petroleum is bought by the West Indian Refining Company of Havana. A Star Drill No. 3 and a Standard are used by this company.

On the 24th of July well No. 4 was started with a Star machine and drilled to a depth of 20 feet, but was soon abandoned. In another section of the Jorge property, the Republic Petroleum Company drilled to a depth of 2,200 feet, finding petroleum at 995 feet.

East of the Santiago property the Bacuramo Oil Company drilled a well to 1,009 feet, which produced 12 barrels per hour during several days. This company has contracted with the
Union Oil Co. for the delivery of its petroleum over the pipe line, at the rate of one cent per gallon.

The borings made by these four companies on the Santiago, Jorge and Jorge Candido properties are all grouped in an area that does not exceed 20,000 square meters. Nearly all have produced petroleum at a depth of approximately 1,000 ft., most of them in small quantities, but they still can be considered as producing on a commercial basis a product which is salable at a good price. Certain it is that we are very far from producing the enormous quantities of the wells of the United States, or even those of Mexico, but the results obtained in Bacuranao are very encouraging, especially as the explorations so far have been confined to moderate depths, and we have greater depths still waiting, which up to the present is a field unexplored.

PETROLEUM FIELDS.—Many theories which we need not recall here have been advanced in regard to the origin of petroleum. From the geologist’s viewpoint, petroleum is found in many different geological formations. In Pennsylvania it is found in the Devonic and Carboniferous; in Canada in the Silurian; in the State of Colorado, in the Cretaceous; in Virginia, in bituminous coal lands; in South Carolina in the Triassic; in Venezuela in the mica rocks; in the Caucasus, in cretaceous rocks.

No fixed rule, therefore, can be alleged in regard to geological formations. In Cuba petroleum has been found in small quantities in strata belonging to the cretaceous period, corresponding to the secondary age.

A remarkable fact, observed by all geologists who have visited the Island, is that petroleum is always associated here with igneous rocks. So far all the oil has been found in the serpentines or in the contact of serpentine with sedimentary rocks. Wells drilled in sedimentary strata far from intrusions of serpentine have not yielded results which would throw any light on its existence in sedimentary strata of anticlinal structure.
L. G. Huntley maintains that the anticlinal between Guines and Bejucal where the Geogina and Antillana wells are situated, together with the seepages of oil found near the towns of Jamaica and Madruga, furnish an excellent basis to recommend the continuation of exploration.

E. de Goyler believes that the oil found below the serpentine or at the point of contact between the serpentine and the sedimentary, has its origin in the Jurassic limestone, which forms a large part of the mountains of Pinar del Rio. The igneous rocks to which the serpentines belong penetrated the cretaceous rocks after the strata had been deposited, and Mr. de Goyler is confident that the asphalt and petroleum fields found in the serpentines are filtrations from deposits far below the surface.

This last statement agrees with our observations made in the wells of Bacuranao, where the drill perforated a great depth of serpentine before finding the petroleum bearing strata.

Frederick C. Clapp, in a paper on the structural classification of petroleum and natural gas fields read before the Geological Society of America in 1917, stated that there undoubtedly exist in Cuba oil deposits which he classifies as a subdivision of sedimentary strata in contact with intrusive masses of rocks or lacoliths, an unusual form of deposit observed in the Furbero field of Mexico, where the oil bearing strata lie both above and below the lacoliths.

In Bacuranao the same conditions may be observed in the mass of serpentine which constitutes the intrusive rock in contact with the highly disturbed cretaceous beds which form the terrane.

But whatever may be the origin of petroleum in Cuba, and in spite of the pessimistic opinions of some of the experts who have examined our petroleum districts, we, in view of the recent explorations in the neighborhood of Bacuranao, strongly believe that through scientific soundings at depths of three to four thousand feet, a zone may yet be discovered that will rival those of the best petroleum producing countries in the world.

Havana, July 25th, 1918.