

BILLIONS OF TONS OF IRON

Brazil's Mighty Ore Deposits to Be Developed by American Capital

Hundred-Million Dollar Syndicate. Where the Ore Beds Are—Equal to Lake Superior—A Talk With Dr. Orville Derby, the Famous Geologist—Passed Upon by the Experts of Our Steel Trust and the Krupps. Diamonds in Brazil—How Mined. Some Rich Finds—Prices of Precious Stones—Carbons and Topazes. Copyright, 1915, by Frank G. Carpenter.

RIO DE JANEIRO.

An American syndicate with a capital of about one hundred million dollars has been formed to develop the deposits of the central part of Minas Geraes.

I take this statement from a late publication authorized by the Brazilian government. It relates to some of the greatest iron beds yet developed. Minas Geraes is a great State a short distance back from the Atlantic ocean. It is separated from the Atlantic by the narrow States of Espirito Santo and Rio de Janeiro. The country is high, and it has many kinds of minerals, including diamonds. It has great beds of iron. In the central and southern parts of the State there are said to be more than two billion tons of ore in sight, and one block of iron that contains twenty million tons. The latter is 50 per cent pure. The Minas ores have been analyzed by experts from the United States Steel Company and from the Krupps, and they are known to be very valuable. So far fifty-two out-crops have been surveyed by the mining engineers of the Brazilian government, and their estimate is that they contain no less than twelve billion tons of high-grade ore. Minas Geraes has one small iron works that is now smelting six tons of metal a day at a profit of \$8 per ton. Experiments are being made to reduce the iron by electricity, and the government has charge of an electric furnace at Ouro Preto which has been recently erected at a cost of \$20,000. The great trouble is the lack of good coal for smelting, and it is a question whether any such can be found in Brazil.

Iron ore is found in every Brazilian State. One of the fields in Minas, which is more than fifty miles long, is crossed by the Central railroad, and the Leopoldino railroad passes by other great beds. In the State of Parana there is a great deposit of ore which is only three miles from a seaport, and ore in large quantities is known to exist in Sao Paulo and Santa Catharina.

The iron ores of Brazil are of two distinct types. The magnetite ores are found in several States. They are of small importance, occurring only as scattered deposits. The hematite ores are found chiefly in Minas Geraes. They occupy the south-central part of the State and the principal beds are within a territory 100 miles long and sixty miles wide. It is in this region that the electric furnace is operating and it is here that the enormous beds which I have referred to are found. The iron formation varies in thickness. In places it measures less than fifty feet and in others it is said to be more than 4,000 feet thick. The ore seems to be a true sedimentary formation laid down at the same time as the inclosing rocks, and the rocks and ore have the same dip. Some of the ore layers form the tops of hill or ridges and there are great cliffs of ore to be seen along the hillsides.

During my stay here I have had a chat with Dr. Orville T. Derby, who is at the head of the geological survey of Brazil, and who has been for many years the chief geologist of the country. Dr. Derby is a North American. He was born in the United States and received his education at Cornell University. It was away back in 1870, forty-five years ago, that he first came here with one of his professors in connection with the Morgan exploration expedition, sent out from the United States to do geological work in Brazil. He returned to complete his college course, after which he became professor of geology at Cornell. He had served but a short while when the Emperor of Brazil engaged him to come to Rio and take charge of the mineralogy department of the National Museum. He held this office for some years and then left to make a geological survey of the State of Sao Paulo. Since then he has done other geological work all over Brazil, having been continually employed in that pursuit up to the present. Dr. Derby for a long time has been at the head of the national geological survey of this country and he still holds that position.

One of my first questions to Dr. Derby was as to the future of Brazil. He replied that he was not a prophet nor the son of a prophet, and went on to speak of the mineral resources of the country, saying:

"One of the great assets of Brazil is its iron. The country has enormous quantities of this metal and it will eventually supply a large part of the

iron used by the world. This fact is known to the iron and steel companies of other countries, and a syndicate was recently formed made up of Englishmen and Americans to buy certain parts of the iron beds and develop them. This syndicate had a bona fide capital of 25,000,000 pounds sterling, or \$125,000,000, and I have no doubt but that when matters become quiet once more its operations will be continued. At present the situation is such that no great undertaking can be entered into, and there have been troubles in connection with the concessions here in Brazil that will have to be settled before the syndicate will proceed with its work. I doubt not that the ore beds will eventually be developed and that they will result in a great industry."

"Where is this field of iron, Dr. Derby?" I asked.

"It is scattered over considerable territory," was the reply. "It lies in Minas Geraes. The eastern end of it is about 270 miles from the seacoast, and it is so situated that the way to the ocean is almost all down grade. Some of the beds farther back in the country will have to be hauled to the top of the ridge and then go on down to the sea."

"Can you give me some idea of the extent of the deposits?"

"I can only say that they are enormous. I recently estimated them at two thousand million tons, but in this I included only the high-grade ore that could be used for the manufacture of steel. That ore is equal to the best of our Lake Superior regions and of a higher grade than a great part of it. Some of the geologists of the United States, including professors of the University of Wisconsin at Madison, have stated that my estimate was a conservative one. Wisconsin professors, you know, have had much to do with investigating the Lake Superior fields."

"Can you tell me something about the owners of the fields?"

"Some of them are American capitalists who sent their experts down here to examine the territory after my statement as to the extent of the ore and its value. It was upon the advice of the experts that they bought large tracts of ore-bearing property from the original owners. These men include such well known persons as James J. Hill and others. There are also German and English capitalists who have bought tracts of ore lands. Some of the syndicate are men interested in shipping. The proposition is to a large extent a traffic one, for the ore will be carried down to the sea and shipped to the smelters of the United States and Europe."

"Could it not be smelted in Brazil?" I asked.

"So far we have not discovered coal fit for smelting in such quantities as are needed for that purpose. We have coal, but it is not of the right quality."

"How about smelting by electricity?"

"I do not think that is feasible. Electric smelting takes about one-third as much coal as smelting altogether by coal."

"Were these iron beds of Minas Geraes recently discovered?"

"No. They have been known for hundreds of years. The colonial records show that an exploiting party started out from the town of Sao Paulo in 1590 and discovered iron ore in the mountains which are about sixty miles to the southward. About one hundred years later the gold fields of Ouro Preto, where the electric furnace is now, were opened up and the iron fields were made known to the world. A large part of the gold in that district is found in connection with the iron although more than a hundred years went by before we have any records of the iron's being turned into use. Along about the beginning of the last century each gold mine was producing its own iron, some of them using the ordinary blacksmith's forge, and at that time a little smelting plant was established which turned out iron at a rate of about a hundred pounds per day. Later still the whole of the mining district was dotted with little furnaces and about the time of our civil war, 1864, as many as one hundred and twenty were still in operation."

It is Dr. Orville Derby who brought the great meteorite from the state of Bahia to Rio de Janeiro. This meteorite is the largest in any museum. It is more than seven feet long, almost five feet in width, and its weight when it fell was about 12,000 pounds. It was first discovered in 1784, and the following years an attempt was made to convey it to the town of Bahia by means of a truck built for the purpose. It took the men three days to load it, and eighty oxen dragged it a distance of 1,500 feet to the bed of a stream near by, where they had to abandon it. There it lay for about twenty-five years, when Mr. Mornay,

an Englishman, found it resting in a bed of rust.

Seven years later a few pieces were broken up by the aid of instruments and fire and some of these were taken to other museums. The largest piece is now in a museum in Munich. It was shortly after Dr. Derby came to Brazil that he concluded to get the meteorite to Rio de Janeiro. A railroad had been built in the meanwhile and a special truck was made to work on the rails. It took 126 days to get the meteorite to the railroad, and it was finally brought here to Rio de Janeiro in 1888. The meteorite was carried over a wild country and across a range of mountains which was 2,400 feet high.

I asked Dr. Derby whether diamond pipes, such as exist in South Africa, would ever be found in Brazil. He would not prophesy. There is no doubt, however, that diamonds are still being found in this country, and no one knows whether diamond pipes may not yet be discovered. Until the opening up of the mines of South Africa most diamonds were found in the gravel of streams. This was the case with the diamonds of Brazil. They were known to exist almost 200 years ago and were used as counters by the gold miners before their value was known. As far back as 1732 no less than 30,000 men were searching for diamonds in the state of Minas, and during the following half century Brazil exported precious stones to the value of \$18,000,000.

During the eighteenth century the stones were sold in parcels by contract under government regulations, and the average price was only about \$2 per carat. Much of the work was done by slaves, and any slave that found a gem of eighteen carats got his freedom. Up to 1850 more than a quarter of a million carats of diamonds were taken out of two rivers, while from the river Cuyaba more than a million carats had been taken up to that date. Until 1871 Brazil held the first place in the world in the production of diamonds.

The first diamonds were discovered in the state of Minas Geraes, in a country which is about 500 miles north of Rio de Janeiro. So many were found that the country was becoming known as Diamantina and it is still identified with the diamond industry. Some of the fields are situated 250 miles from the seacoast and one can go to within several days' mule ride of them by railway. The country has an elevation of from 3,500 to 5,700 feet above the sea. Much of the diamond country is made up of ravines and the gems are found in a sort of blue clay deposit in beds a few feet in thickness. The diamond pipes of Africa consist of blue clay.

There are also diamond fields in central Bahia and many are found in the streams. Some of the gravels are in swampy districts, buried from 20 to 30 feet under water and mud, and some lie in streams on the bedrock below the gravel. There are also diamond fields in Matto Grosso, that vast province of central Brazil, but so far none has been found there which weighs more than five carats. Some of the mining of Matto Grosso is done by dredging, but not very successfully. Dredges are also employed in Minas Geraes.

Mining for diamonds in South Africa is done on a grand scale. The fields are owned by the diamond syndicate and the whole is in the hands of a great trust which hires the labor and fixes the prices. There no one can mine for diamonds without the consent of the trust and the government, and he cannot even buy or sell diamonds without government permission. In Brazil any one can get a license to mine diamonds, and the diamond fields are full of prospectors and small groups of men who have joined together to search for the precious stones. The work is done much like placer washing in the United States and all the tools necessary can be carried on a mule. Much of the work is done in the streams, the miners diving down from boats, taking with them canvas bags held open by iron rings. Each miner fills his bag with the gravel and then rises to the boat, where he empties it. After sufficient amount of gravel has been secured it is carried to the shore and the diamonds sorted out. Where the men have enough capital they sometimes dam the streams and turn the water so that the dry bed can be looked over.

The miners work only in the dry season. They go over the gravel again and again. Even the sand is sifted and sorted and at the close women go through the refuse and pick out the stones that may have been missed. If there are pieces of conglomerate they are broken up and explosives are used to get out the boulders blocking the stream. The diamonds are often found in pockets about or under such boulders.

The finest diamond ever discovered in Brazil is known as "The Star of the South." It weighed in the rough 255 carats and 125 carats when cut. The next was the Dresden green diamond, which weighed 119 1-2 carats, and another was the Star of Minas, which weighed 175 carats. Dr. Derby thinks that these three diamonds were of the same original form. Each was a combination of curved faces consisting of a dome rising from a plane surface. They were all found in Minas, on or

near the River Bagagem. In 1906 a stone of 500 carats was discovered not far from that river, but one of the miners tried to test it on an anvil with a sledge hammer and crushed it. The largest piece contained an eight-carat stone.

The Brazilian diamonds are of various colors and they are said to be 50 per cent better on the average than those of South Africa. A red diamond, almost ruby in color, which weighed two and three-fourths carats, brought \$15,000 in London in 1899. A vivid green one of two and one-half carats was found in 1906, and two blue-white ones of twenty-one and thirty-six carats were discovered about the same time. The Irish crown jewels, valued at \$250,000, are made up almost entirely of Brazilian gems. In 1909 there were 456 diamond claims in Diamantina alone, scattered over an area of about 600,000 acres. They produced one million dollars' worth of diamonds that year. Altogether it is said that up to 1903 Brazil had exported a total of something like four tons of diamonds, in addition to its carbons and other precious stones.

There is a great deal of money in the carbons of Brazil. Carbons are in pure diamonds of a black or brown color. They are very hard and are used to make boring machines and for polishing hard substances. They are found in all sizes from some as big as a grain of sand to others that weigh hundreds of carats. We buy thousands of dollars' worth of these carbons every year. One was found some time ago that weighed 3,000 carats. It was sold in Bahia and sent out to Eprope, where it brought \$25,000; another, weighing 975 carats, was sent to Paris, where it sold for 100,000 francs.

During my stay in Rio I have visited many of the jewelry stores. They have magnificent diamonds, but I am told the prices are about the same as those of other cities. Senor Brill of the Avenida Central sells rough diamonds up to one-fourth of a carat from \$5 to \$12 each, and from one-fourth carat to one carat in size from \$15 to \$25. Rough diamonds, which weigh from one to two carats, bring \$25 and upward. Above two carats there are no fixed rates. Cut stones are far more expensive than the stones in the rough.

Among the other stones sold which are especially beautiful are tourmalines, aqua marines and topazes. One of the most beautiful topazes ever discovered came from Brazil. It was originally given by the Emperor Don Pedro to Pope Pius IX, who gave it to the King of Naples. Upon this was engraved a figure of Christ, so delicately that it took twelve years to make it. The price asked for the stone was \$200,000. In the National Museum here there is a topaz which weighs four and one-half pounds, and Dr. Costa Senna, director of the School of Mines at Ouro Preto, has a bluish-white stone that weighs forty-eight grammes. A ruby-red topaz of twenty-four carats sold in the nineteenth century for \$25. A white one in the Portuguese crown jewels weighs over 1,600 carats.

FRANK G. CARPENTER.

ON LONG AUTOMOBILE TRIP.

J. A. Harps and Family Have Covered 15,000 Miles.
Memphis Commercial-Appeal.

J. A. Harps, a wealthy manufacturer of Greenfield, Ohio accompanied by his family, arrived in Memphis in a big touring car and registered at Hotel Gayoso. Mr. Harps is finishing a transcontinental trip in his auto. The party consists of Mrs. Harps, Fae, Ted R. and Alexander Harps, his three sons, and Charles Morley, mechanic. "Bob" Scott, of San Antonio, Texas, is also with Mr. Harps' party, having joined them in Texas. Mr. Scott is touring the country on a motorcycle. He is the son of a wealthy ranch owner in Texas and is taking this method of seeing the country.

Mr. Harps left home July 10. Since then he has traversed Indiana, Illinois, Iowa, Nebraska, Wyoming, Colorado, Utah, Nevada, California, Arizona, New Mexico Texas Arkansas, a part of Mississippi and incidentally dipped down into old Mexico.

He will take his family to see the great Tri-State Fair and probably resume his journey. He will go to Birmingham, Atlanta and up the coast to Washington, thence back home. He will have traveled between 12,000 and 15,000 miles by the time he gets back to Greenfield.

Mr. Harps said that he adopted this method of educating his boys as to the wonders of their native land. The best way to see it, he said, was to tour it in an automobile, and he wanted his boys to see it. The party crossed the Rocky Mountain range three times, visited the expositions at San Francisco and San Diego, went through the Grand Canyon and saw all of nature's marvels in the West that lie along the Lincoln Highway and the Santa Fe trail.

In the total population of the United States more than two-fifths of all persons—over three-fifths of all the males, but considerably less than one-fifth of the females—were engaged in gainful occupation in 1910. In the population of 19 years of age and over more than one-fifth of all persons—over four-fifths of the males but less than one-fourth of the females—were gainfully occupied.