

THE NEW EXPLORATION OF THE AMAZON RIVER,
BY PROFESSOR ORTON.—OVER THE ANDES.

No. 5.

ROUTES FROM THE AMAZONS TO THE PACIFIC.

Three routes are open to the traveler from the Marañon to the Pacific: 1st. Up the Huallága to Tingo Maria, a canoe voyage of a month or more, thence to Lima by mule *viá* Huancas and Cerro de Pasco. 2d. Up the Huallága from Yurimaguas to Chasuta by canoe, eight days, thence by mule to Moyobamba *viá* Tarapoto, one week. 3d. From Yurimaguas by canoe up the Parana-pura to Balsa Puerto, one week, thence on foot through the forest to Moyobamba, six days. From Moyobamba to Cajamarca, *viá* Chachapoyas, is a mule ride of twelve days; and a railway, nearly finished, comes up from the coast within one day of Cajamarca. The time here given is that of actual travel, but the delays in procuring canoes, peons, and mules more than double it.

We chose the Balsa Puerto route. Whichever route the traveller takes, he wishes he had taken another. We left Yurimaguas in a long canoe with five Indians, providing them with salt fish, plantains, and chicha, and ourselves with more civilized food, for a six days' journey. Descending the Huallága a short distance, we turned up the Parana-pura, one of its main affluents. The first day we had a comedy which might have been a tragedy. Our old "popero" or steersman fell overboard, dead drunk; another Indian tumbled out twice for the same reason, and a third dropped down into a heap in the canoe. A cold bath and a long sleep brought them to, and we had for the rest of the voyage an efficient crew.

A POLAR EXPEDITION AT THE EQUATOR.

Padles were of no use on the rapid Parana-pura, our Indians—four in front and the comical genius behind—poling the whole distance; and every night we camped on the sandy beaches, called "plaias," under palm booths. A few pueblos break the solitude of this river. At Lemón is the spacious residence of Mons. Jules Juan, built of chonta slats and surrounded with a great variety of tropical fruit trees. Here, too, on the edge of the forest; we found another Frenchman, who amuses himself in tracing correspondences between the Quichua and Sanscrit languages. He is the author of *Amérique Equatoriale*, published in Paris, in which he styles himself "Don Enrique Vte. Ouffroy de Thoron, Ingénieur, Enir du Liban par acclamation générale en 1840, Ancien Commandant ou Chef des Maronites, et Chef d'Etat, Major General de l'armée Turco-Maronite sous le Grand Vizier Izzet Mithomet-Pacha, Vice Roi de Syrie et d'Egypte."

Ascending the tributary, Cachi-yacu, we passed two large distilleries, provided with the finest apparatus we have seen in the country. On the sugar mills we saw the well known names of "Mirelees, Tait & Watson, New York." We arrived at Balsa Puerta, six days from Yurimaguas. This little village of four hundred Indians, dwelling in nailless bamboo huts, that went up without the sound of a hammer, is the chief port of Moyobamba. It manufactures nothing, and the state of society is expressed in fandangos by night and in street fights by day. During our stay, ten of the chief men sat down before forty-seven bottles of porter, and soon after we saw the drunken governor, Antonio Rios, knocked down twice before his own door. With such an official to aid us in obtaining peons to carry our baggage to Moyobamba, we were detained five days. The second day out, one of the Indians dropped his load and decamped, and two others afterward followed suit.

A TRAMP THROUGH THE FOREST.

Procuring others, we continued our toilsome journey on foot, picking our way through the thick forest, climbing over precipitous mountains, and wading across the furious Cachi-yacu and its tributaries seventy-five times. The road, notwithstanding the expenditure of \$200,000 upon it, is nothing but a foot path, and after a rain impassable; but it is the paradise of the botanist and entomologist. The geologist also finds employment, for he crosses the lofty Cerro de Icuto, consisting of saliferous red sandstone; while the streams bring down from some unknown source fragments of fossiliferous limestone, containing ammonites, brachiopods, etc. The sandstone appears to underlie immediately the Amazonian clay formation.

Nineteen days from Yurimaguas, we reached the city of Moyobamba. The situation of this city is surprisingly fine, built on an isolated plateau that stands in the midst of a luxuriant plain, through which winds the turbid Mayo, and around which rise picturesque mountains—the worthy beginnings of the Andes. With an altitude above the sea of 2,500 feet, and a mean annual temperature of 77°, the climate is delightful. Nature is so prodigal that anybody can get a living—except physicians. The oranges of Moyobamba are equal to the best Guayaquilian; while the coffee and cacao are praised in Lima. The ordinary ills, all due to impudence, are intermittent fever, erysipelas, and worms. The only case of drunkenness we have seen was that of a priest. We visited two mineral springs in the vicinity. One is a hot spring, slightly ferruginous, the temperature of which we found to be 106°, that of the air being 75°. On the slope of the Cerro, about three miles from the city, is a copious sulphur spring, forming a little lake thirty feet in diameter, with a temperature of 84°. Were this brought down to the city, and respectable roads made to Huallága and to the coast, Moyobamba would become the Saratoga of the south. At present, the city is poorly supplied with water, all coming from a few feeble springs at the foot of the plateau. It is a novel sight to see the long procession of women, who are the water carriers of the city, descending and ascending the deep barrancas at eventide, with pitchers

on their heads, while the young Lotharios lie in wait to make love to their Rebeccas.

Transportation to and from the city is difficult beyond description. Nearly all exports and imports come from or go to the east; and everything must be carried on the backs of Indians over the horrible Balsa Puerto road and in canoes on the Parana-pura. The Indians do not care for money; so that when a traveler or merchant wishes peons, he notifies the governor, through the sub prefect, who orders the police to seize such as they can find and compel them to bear the burdens. The route to the coast *viá* Chachapoyas and Caxamarca is traveled by mules, but these are difficult to hire. There are no duties on foreign goods entering Peru by the Amazons; but the freight is enormous, the loss on liquors being two hundred per cent and on other goods twenty-five. A box of flour from the United States weighing 80 lbs. sells for twenty-two soles, or thirty cents a pound; while a roll of bread weighing three ounces costs ten cents. English butter is worth one dollar a pound; Colgate's soap, of which 6,000 lbs. are used annually, brings 50 cents a pound, and iron, of which 500 lbs. are sold yearly, sells from twenty to forty cents a pound. Beef comes from Chachapoyas, and is sold for ten cents; cattle are kept in the surrounding chacaras, but neither for beef nor milk, but for the pleasure of owning them. A few sheep are raised, but solely for meat, not for wool. Of home productions, pork is worth twenty cents; lard, thirty cents; coffee, \$2 an arroba; tiles, \$50 a thousand; brown sugar ("chaucaca"), five cents, refined, twenty-five. There is not a plow in the whole province; but almost everything that is planted yields beautifully in three months. August is the usual time for planting. Coffee, cacao, rice, maize, mani (peanuts), oranges, pine apples, bananas, and sugar cane are grown, but only for home consumption. Grapes (a small black kind), sarsaparilla, vanilla, rubber, and copal, grow spontaneously, but are not gathered. Abundance of fine timber (especially cedar and "moyna") covers the slopes of the cerras, with plenty of water power at hand; but there is neither a saw mill nor a chimney west of Iquitos. The Moyobambinos, 9,000 in number, are content to dwell in mud hovels, tiled or thatched. Boards are cut out with Collins' axes, 10,000 of which are sold annually; the only fault found with them (by the merchants) is that they are too good and last too long. The value of a day's work, from six to six, is twenty cents and food, or \$5 a month. There are seven foreign merchants in Moyobamba, of whom Mr. Sisly, the chief, has sold as much as \$40,000 worth of goods in eight months. Trade at present is very dull, as the hat business has declined.

The Department of Loreto, of which Moyobamba is the capital, stretches from the eastern cordillera to Tabatinga, and has a population of 60,000. The main villages west of the Huallága are Tarapoto (8,000), Lamas (6,000), Chasuta (1,500), and Jevéros (1,000). The main exports are straw hats, tucuyo (coarse cotton cloth), salt, aguardente, tobacco, beans, coffee, and limestone. The tucuyo is made in Tarapoto for the Indians solely; and an imitation is now manufactured in England, which sells at the same price (twenty cents) and is preferred by the natives. It takes six days to spin one pound of cotton thread, and eight days to weave one yard of tucuyo. The principal salt mines are at Callana-yacu, near Chasuta, Pillnana, and Cachi-yacu, near Balsa Puerto. They are situated in red sandstone, along with gypsum, and supply the whole Marañon region. Aguardente is made wherever the sugar cane grows. The best tobacco comes from Jevéros; and limestone boulders from up the Huallága are shipped from Yurimaguas at \$40 a ton.

MOYOBAMBA AND THE MANUFACTURE OF STRAW HATS.

But the great business of Moyobamba and the surrounding villages is the manufacture of "straw" hats. These are made of the same material as the so-called Panama hats of Ecuador and New Grenada. It is the undeveloped leaf of the "bombonaje" (*carludovicia palmata* of science), which is a screw pine rather than a palm. The trunk of this plant is only a yard in height, but the leaf stalks are two yards in length. The bark of these leaf stalks is woven into baskets, and the expanded leaves are used for thatching. It is the leaf before it has opened that is prepared for the manufacture of hats. It then consists of a bundle of plaits about two feet long and one inch in diameter. The green outside of this "cogollo" or bunch is stripped off; and then by an instrument called a "picadera," resembling a pair of compasses, with legs set half an inch or less apart, according to the fineness of the straw required, the leaflets are made into strips of uniform size with parallel sides. The cogollo is then boiled to toughen the fiber, and hung up in the sun to dry and whiten, when the leaflets run up into cordlike strands, which are then ready for use. The longest straw which can be procured from the bombonaje is twenty seven and a half inches. It takes sixteen cogollos for an ordinary hat, and twenty-four for the finest; and a single hat is plaited in from four days to as many months, according to texture. We saw a fragment of one begun which, if finished, would bring \$500 in Lima. Fortunes have been made in the hat trade; but a change of fashion in Brazil, Europe, and the United States has reduced the number exported from 100,000 to 50,000, and the price from \$40 a dozen to \$15.

But Moyobamba is as famous for its execrable roads as for its hats. The traveller who survives the journey from Moyobamba to the Amazons or the Pacific will remember the road longer than the city. Three regions intervene between the Great River and the Great Ocean: the Montaña, extending from the Huallága to Chachapoyas; the agricultural valley of the Upper Marañon; and the mining district between the western cordillera and the coast. The lower

part of the Montaña is covered with a rich forest, but from Moyobamba westward the road, or rather mule path, for the most part winds over boggy valleys, bleak paramos, and barren mountains. The distance from Moyobamba to Chachapoyas is forty leagues; for one hundred miles of which on a stretch, there is not an inhabitant, so that the traveler must carry bedding and provisions and sleep in cheerless tambos.

CROSSING THE CORDILLERAS.

The highest point on the road is the Puna Piscognañuni (meaning "the place where the birds die"), rising 11,000 feet above the sea. Geologically, it consists mainly of black slate, in which we discovered hosts of ammonites. It is this range which divides the waters of the Upper Marañon from the affluents of the Huallága, and which, meeting the more westerly sierra, forms the terrible cataracts above the Pongo de Manseriche.

Ascending and descending many a rocky staircase and winding through a deep and picturesque ravine beside the rushing Ventilla, and between towering treeless mountains of red sandstone, the weary traveller suddenly and as gratefully finds himself in the city of Chachapoyas, of which I will speak in my next. JAMES ORTON.

Improvement in Diving Apparatus.

An interesting series of experiments has been carried out in the Medway, off Chatham dockyard, by the officers and men of the Royal Engineers, under the direction of Major E. D. Malcolm, the head of the torpedo department of the School of Military Engineering for the purpose of testing the merits of an invention by Mr. Maudlin Vinter, for enabling divers, when employed at any depth, to hold conversation with those at the surface of the water. Hitherto an insuperable difficulty has been experienced by divers, in being unable to communicate verbally with the attendants above, the principle usually adopted by divers when carrying on their operations being to give preconcerted signals by so many pulls on a single line. This, however, according to *Engineering*, appears to have at length been overcome by Mr. Vinter in the invention submitted by him to the Government. In the trials just completed in Chatham Harbor, Corporal Falconer, an experienced diver of the Royal Engineers, equipped in the Siebe and Gorman improved diving apparatus (which has gained the prize medal at Vienna), made the descent; and during the whole time he was under water was enabled, by means of the new apparatus, to converse freely with those above, every word spoken by him being distinctly heard and understood. Mr. Gorman, who was present during the experimental trials, stated that the invention would be further improved upon so as to facilitate its use in all diving operations connected with harbor works, and for laying stone blocks, etc., in connection with subaqueous operations. The apparatus can, it is stated, be easily applied to any description of diving dress. The value of the invention will be readily understood and appreciated by every one interested in the science of diving, from the simple fact of the great confidence a diver will gain from being, in his isolated position, enabled to speak directly to those in whose hands his life, for the time being, is literally placed.

Tilghman's Sand Blast.

Some new and interesting applications of this invention were lately described at a meeting of the students of the Polytechnic College, Philadelphia, Pa.:

Samples of raised lettering on marble, also of ground uncolored and of stained glass ornamented by the process were exhibited. Samples of thick plate glass, perforated by the sand blast with well defined holes $\frac{1}{4}$ inch in diameter, were shown. The holes for the axles of the glass plates of electrical machines can be safely cut in this way.

The lettering of the block of marble had been done by first grinding and polishing one of its surfaces, attaching the stencils (letters of the size and shape required cut out of plate metal), and then blowing sand, by means of a jet of steam, on the surface, until, where unprotected by the stencils, it is cut away to the required depth, leaving the letters in bold relief. The stone to be cut is placed upon a small struck, and then removed backward and forward upon a horizontal table, directly under the nozzle through which the sand is blown. The nozzle, which stands vertically over the table, has the pipe for the sand, entering the upper end, passing in the line of its axis, towards its lower opening. The pipe from the steam boiler enters through the side of the nozzle near its upper end, so that, when in operation, steam surrounds the tube through which the sand runs. The latter is connected by a rubber pipe, with a box of sand set about it. The machine is in operation daily at the stone yard of Messrs. Struthers & Son, who are cutting by the sand blast the sculptured design on the blocks of Cleveland stone for the walls of the grand staircase leading from the entrance hall of the new building for the Philadelphia Academy of Fine Arts, now erecting on Broad street. The design on each stone is about 20 inches by 10 inches, representing foliage, and is cut to the depth of five eighths of an inch in ten minutes. When cutting glass, the sand is compelled by a current of air from a reservoir, kept under pressure by a small blowing engine. In such a case, the stencils need not be of metal. Rubber, and even thin muslin, will protect the glass.

ELECTRICAL GAS REGULATOR.—Mr P. Mulzinger, gas engineer of the Pascal Iron Works, Philadelphia, Pa., has devised a system whereby the flow of gas from the works into the mains can be regulated and controlled automatically by establishing electrical connections between any point of the gas main and the works where the gas is manufactured.