Lakes Poopo and Titicaca

Les Lacs des hauts Plateaux de l'Amerique du Sud by M. Neveu-Lemaire

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misfortunes which followed in quick succession. The wholly unnecessary discomforts of the voyage of the *Mercedita*, so amusingly described by the author, are typical of all the troubles that came afterwards. There can be little doubt, however, that, had funds been available, the railway would have been built in spite of every obstacle.

The couple of hundred miles of the Rio Madeira that form the background of the story have an evil reputation, which is difficult to realize on the spot as the wonderful panorama of smooth, broad river and luxuriant forest, with intervening tracts of rocks and tumbling waters, passes before one's eyes. Much of the illness has always been of a preventable character, and with our present knowledge of malaria and the methods of dealing with it there should be no difficulty in constructing the line, which, under a contract with the Brazilian Government, has now been once more commenced.

Mr. Craig has some difficulty in understanding how malaria can exist in a region where there are usually no human inhabitants to act as intermediate hosts to the germs. The difficulty disappears if the local belief that monkeys suffer from the disease be well founded, and it is possible that other animals are also susceptible.

When in 1879 the courts decided that the enterprise must be abandoned, the workmen, already weakened by disease, were left destitute of funds and resources, far from civilization, in the heart of the continent, and in their pitiful efforts to return home still further additions were made to the long death-roll of the expedition. Ultimately those who remained were brought home by the contractors.

Out of 719 persons, mainly Americans and Italians, who arrived at Santo Antonio, some 140 are known to have lost their lives, and this does not include all of those who died on their way back, or the eighty who were drowned in the ill-fated *Metropolis* on their outward journey. One would have liked to have heard more of the seventy-five who perished in an attempt to reach Bolivia overland; what route they took, and how they met their death.

The book is well illustrated with photographs and maps.

J. W. EVANS.

LAKES POOPO AND TITICACA.

'Les Lacs des hauts Plateaux de l'Amerique du Sud.' By Dr. M. Neveu-Lemaire. Paris: Imprimerie Nationale, Librairie H. Le Soudier. 1906. Price 7 fr. 50.

The author was one of the *personnel* of the "Mission française" that recently carried out a topographical and geological survey of a portion of Bolivia. He spent the greater parts of the months of June, July, and August, 1903, in the study of the two great lakes of the Bolivian tableland. The specimens collected were subsequently examined in Paris.

Little attention had previously been paid to Lake Poopo, though it presents features of great interest. It is extremely shallow, for, though it has a length of 55 miles and a breadth of 25 miles, only a small portion is more than 4 feet deep, and 13 feet was the greatest depth observed. It is, therefore, a mere film of water covering the lower portion of the plain. It has no outlet, and its level is slowly sinking, so that it may, at no distant date, resemble the South Bolivian lakes that only exist as such in the rainy season. The water contains 2.35 per cent. of solid matter in solution, about two-thirds of that in sea-water. Of this 1.68 per cent consists of sodium chloride, and the remainder mainly of sulphates.

Lake Titicaca is in many ways a complete contrast. The greatest depth observed was 892 feet, and a considerable portion of its basin lies at a lower level than that of Lake Poopo, into which its waters overflow, and whose surface is 400

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feet lower. As a result of this outflow the water is comparatively fresh, containing only 0.11 per cent. of solid matter in solution. The salts from the catchment areas of both lakes are therefore accumulating in the basin that lies at the greater height. An interesting feature is the uniform temperature below the surface, almost exactly 11° C. at the time when the observations were made. Alexander Agassiz, on the other hand, who made similar observations in the summer, found a rather higher temperature to prevail—about 12°·5 C.

The sediment dredged from the centre of the lake contained 17 per cent. of organic material, 78 per cent. of inorganic mud almost free from lime, and 5 per cent. of sand. On the other hand, near Chililaya, in the small area separated from the remainder of the lake by the Straits of Tiquina, there was 59 per cent. of calcareous, and 13 per cent. of non-calcareous mud, 12 per cent. of organic matter, and 16 per cent. of sand. Under the microscope small coal-like grains, sponge spicules, diatoms, and material of volcanic origin were observed. Near the north-east shore, in the neighbourhood of Huaicho, the lake-bottom consists of fine sand, including rounded quartz grains closely similar to those of the Sahara.

The transparency of the water in the centre of the lake was found to be practically the same as that of the Lake of Geneva, while, curiously enough, in the small Chililaya basin it was considerably greater.

It is probable that the lakes were once united, forming a narrow inland sea of considerable area, at a somewhat higher level than that of Lake Titicaca. There is, however, no evidence that its waters ever flowed outwards, as the author suggests, by the way of the Rio de La Paz to the basin of the Amazon.

The fish obtained from the lakes were determined by Dr. Jacques Pellegrin. They belong to two genera—*Orestias* (*Cyprinodontidæ*), peculiar to the Andes, but closely allied to *Empetrichthys* of the desert of Amargosa, on the borders of California and Nevada, and *Trichomycterus* (*Siluridæ*), a Southern American genus found both at high and low levels. They include a new species, *O. Neveui*, Pellegrin. One fish only is found in Lake Poopo, and this is believed to be identical with *Orestias Agassizi*, C. & V., var. *inornata*, Pellegrin, of Lake Titicaca.

The author has himself described the fish parasites, while the molluscs are dealt with by Monsieur A. Bavay. The latter include a species, *Paludetrina poopoensis*, Bavay, peculiar to Lake Poopo, and *Ancylus Crequei*, Bavay, which does not resemble any previously described South American species. The crustacea, some of which are new, were determined by Monsieur Ed. Chevreux, Dr. Edward A. Birge, and Dr. C. Dwight Marsh. One species of Copepoda, *Boeckella poopensis*, Dwight Marsh, is only found in Lake Poopo; another, *B. occidentalis*, Dwight Marsh, is common to the two lakes.

The book is well illustrated by maps, drawings in black and white and colours, and reproductions from photographs.

In conclusion, it may be noted that there are numerous smaller lakes in the high tablelands of the Andean tract, which are of considerable interest, but are not dealt with in the present paper.

J. W. EVANS.

THE ARGENTINE REPUBLIC.

‘Modern Argentina, . . . with Notes on Uruguay and Chile.’ By W. H. Koebel. London: F. Griffiths. 1907. Pp. xvi. and 380. *Illustrations*. Price 12s. 6d. net.

When a man attempts to portray the social, economical, commercial, and political conditions of a country so advanced in the scale of the world's nationalities as Argentina in the space of one comparatively small volume (which also includes references to similar conditions in Chile and Uruguay), his work must necessarily