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South America: An Outline of Its Physical Geography: Discussion

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The CHAIRMAN (Colonel Sir Thomas Holdich, Vice-President): It is with very much regret that I have to state that through illness our President will not be here to-night. His absence is all the more to be regretted because he is personally familiar with that country about which we are to hear. It is, as it were, his own happy hunting-ground, and his remarks and criticisms on the paper that is to be read would have been most valuable and interesting to us.

I have to introduce Colonel Church. No introduction is really necessary, for he is a very old friend. As a traveller and explorer who has wandered, as he says, through pretty nearly every mule-track of South America, and as a gallant soldier who led a brigade at the early age of twenty-seven during that war which some of us may remember—the Civil War of America—he is always a welcome addition to our circle here. To-night, I claim your attention to him as a traveller and as a very close and faithful observer of men and things. I will not waste further time with any preliminary remarks. I will call on Colonel Church to read us his paper.

After the reading of the paper, the CHAIRMAN said: There must be several gentlemen here who are more or less acquainted with those regions of which Colonel Church has just been telling us, and we hope they will add to the interest of the evening by assisting in the discussion.

Mr. E. J. PAYNE: I think the first thing we should do is to join in the feeling to which you gave expression in your opening remarks at the absence of our learned President. Sir Clements Markham, I believe, received his first stimulus to geographical study in his early travels in Peru, and we all regret that he is not here to say what we should have been glad to hear him say on the paper. Sir Clements Markham has studied the Andes in all their aspects; he has travelled through every part of Peru; he has studied the language; and we shall all, I am sure, join in your regret, Mr. Chairman, that he is not present to give us the benefit of his criticism on Colonel Church's paper. But I do not think there is much in the way of criticism to be said. We have all listened to the paper with a feeling of admiration and of wonder at the immense amount of knowledge which Colonel Church possesses of the South American continent. There is not a mountain, there is not a river, there is not a plain, there is not a portion of the sea-coast, there is not an estuary in the South American continent, of which Colonel Church is not prepared to give us full particulars. He can tell us how many tons of silt every river brings down; he can tell us the height of the tides at every part of the coast, as well as the heights of all the mountains; and I am sure he has thrown the greatest interest over every feature he has put in his paper. I have sat at his feet for years, and I have listened to-night with deep interest to his lucid and eloquent exposition of the physiography of South America. I believe he was the first to explain in the *Journal* of this Society the way in which the Caribs explored the northern coasts of South and Central America, the West Indian islands, and probably ascended the Mississippi. He also discovered and communicated to the Society the ancient Moxos lake and the Pampean sea, the shore of which we believe to have been the original dwelling-place of the Incas; in fact, there is no part of this portion of the world on which Colonel Church has not thrown great light, and I am sure we have been deeply interested with his very lucid explanation of the geographical configuration of the continent. Never having been in South America myself, I do not feel that I can usefully add anything to what he has said in his paper. I am sure we are all looking forward to seeing the palæontological remains which have been brought here for our inspection, and I think we shall be anxious to shorten this part of the proceedings as much as possible in order to hasten to see them.

The CHAIRMAN: I think we are honoured by the presence of the Bolivian Minister, Señor Aramayo. Perhaps he will kindly favour us with a few remarks.

Señor ARAMAYO: I am not prepared to make any criticisms on the interesting address we have heard to-night; but I avail myself with much pleasure of this opportunity to acknowledge the admiration with which I have listened to Colonel Church's exposition of the geography of South America, of which he has acquired such extensive knowledge during his long stay and repeated travels, having at his command a rare spirit of scientific observation and the most commendable perseverance. I wish to express more particularly my thanks to him for having brought to the notice of this learned Society his knowledge of the topography and resources of that portion of the South American Continent which is comparatively so little known, and which is my own country—Bolivia. I am sure there are very few Englishmen or Americans who know that country so well as Colonel Church, but since the time of his visit a good deal has been advanced in the way of scientific investigation, and I have the satisfaction of informing the President that in the course of a few days I shall have the honour of presenting the Society with a map of the northern part of Bolivia, which is the result of various explorations carried out under the auspices of the Government. This map has been prepared by General Pando, the President of the Republic, who personally explored the region crossed by the rivers Madre de Dios, Inambari, Tambopata, Heath, and others. I may add that the present Government of Bolivia are making every effort to extend their explorations to all those parts of the national territory which are still unexplored, which will contribute to make the country better known in the scientific world. The military expedition to the River Acre, lately carried to a successful issue, will throw a great deal of light on that valuable territory. Another expedition is now ready to start from Pará to the sources of the Javary with Mr. Satchell, an English engineer in the service of Bolivia, as the technical chief. In the month of November last an exploration was also made, at the expense of the Bolivian Government, on the river Paraguay as far as the Laguna Gaiba, with satisfactory results, by Captain Bolland of the English Navy. All this will show that we are contributing our share and making every effort to forward a knowledge of these unexplored regions of South America.

The CHAIRMAN: There is another gentleman present who has considerable acquaintance with South America, I think—Mr. Howard Saunders. Perhaps he will favour us with his views.

Mr. HOWARD SAUNDERS: I am afraid that I can say little of importance about the very interesting lecture that we have heard, except to express my great admiration for the manner in which Colonel Church has given us his opinion upon the general configuration of South America, and the channels for communication and trade with the interior. He has not alluded this evening to a subject upon which he made a considerable mark a few years ago at the meeting of the British Association at Bristol—a vast estuary or lake which ran, at one time, nearly to the headwaters of the Paraguay. If Colonel Church did allude to it, I unfortunately missed it; but it is an interesting fact that an immense estuary existed, and Colonel Church has distinctly proved that it covered a very large portion of the headwaters of the Paraguay. Only a very small tide went up the lower portion of the estuary, which we now know as the La Plata, and there is a remarkable fact connected with its existence, in the coincident localization of a water-bird, the "rayador," which is well known in South America. It has this peculiarity, that the under mandible is very much longer than the upper portion. There are five species of these skimmers (*Rhynchopinae*): one found in Asia, one in Africa, one in North America, one on the Pacific coast of South America and along the Amazon valley, and then this one, which is found only, as far as we know, in this great inland sea, or over the rivers which now drain what was the great inland sea.

With regard to the traffic and communication, I fully agree with Colonel Church in what he has said about the impracticability of carrying out any important communication over the Andes from the Pacific. Nobody who has not crossed the Andes can realize the difficulties of traversing those mountains. They are widest in about lat. 20°, and to the northward the ranges are exceedingly steep, and there are no roads. In crossing the Cordillera you have to dodge the two wet seasons, and these do not coincide. The object is to cross the western range at the time the rains are nearly over, and then reach the second range before the rains commence there. Then of course comes the question of getting down the rivers, which is always a very difficult one. I am glad to hear that steamers have actually reached the foot of the Pongo de Manseriche in Peru, because that is the place to which I directed my attention a good many years ago, being anxious to find out whether that obstacle to navigation could be blown up, and if so, how far navigation could be carried beyond it. I quite satisfied myself that on the Marañon, above that fall, there were so many more rapids that, even if the main Pongo were blown up, very little advantage would follow. There is little more to say, except to express my great esteem for Colonel Church's paper.

Colonel CHURCH: In view of Mr. Saunders' remarks will you excuse me if I take up one more minute of your time? [Here Colonel Church gave an outline of the Amazonas lake, the Mojos lake, and Pampean sea as described in his paper, pp. 385 and 387.]

The CHAIRMAN: More than ever do I echo the sentiments expressed by Mr. Payne of regret at the absence of our President to-night, and deplore my own ignorance of the geography of South America; but I must, however, acknowledge the efforts that have been made by Dr. Moreno on the part of Argentina, and Señor Bertrand on the part of Chile, to correct those deficiencies. I hope to know something more about it in time. There is, however, one point on which I can challenge Colonel Church's conclusions. He has spoken of Lake Titicaca as the highest lake in the world. Now, as the self-constituted champion of Asia, I know of one lake which bears the name of our late beloved Queen which is at least a thousand feet higher than Titicaca, and I think I know others that may be higher; but they all bow their heads to Lake Victoria. These, however, are matters of detail, and I think we can all agree to join in a cordial vote of thanks to Colonel Church for the lecture which he has delivered, not only in an interesting, but in a most attractive, manner. I trust that hereafter we shall hear something more of South America from him.

NOTE ON TOPOGRAPHICAL WORK IN CHINESE TURKESTAN.

By Dr. M. A. STEIN.

IN June last I was able to start, with the assistance of the Indian Government, on a tour of archæological exploration in Chinese Turkestan. The necessity of fixing accurately the position of ancient sites and of collecting fuller materials than hitherto available for the study of the historical topography of this region brought surveying operations into close connection with my immediate task. But from the first I was anxious also to utilize whatever opportunity the journey might offer for topographical work of a more general character. In