

SOUTH AMERICA.

'Notes of a Botanist on the Amazon and Andes.' By Richard Spruce, PH.D. Edited and condensed by Alfred Russell Wallace, O.M., F.R.S. With a biographical Introduction. *Portrait, 71 Illustrations, and 7 Maps.* Pp. 518 + 542. 2 vols. London Macmillan. 1908. 21s. net.

The second title of this work is as follows: "Being records of travel on the Amazon and its tributaries, the Trombetas, Rio Negro, Uaupés, Casiquiari, Pacimoni, Huallaga, and Pastasa; as also to the cataracts of the Orinoco, along the eastern side of the Andes of Peru and Ecuador, and the shores of the Pacific, during the years 1849-1864."

Richard Spruce is well known to the botanical world as the author of a classical monograph on the Hepaticæ of the Amazon and the Andes, a work far in advance of the period at which it appeared, and which will probably remain the standard treatise on the subject for many years to come. He also published many other papers of importance. Most unfortunately, from 1864 until his death in 1893, the continued ill health from which he suffered prevented him from working out the many valuable observations which are scattered through these two handsome volumes.

If one remembers the date at which these notes were made, it is astonishing to find how clear and definite were his views on many modern subjects. The reader is advised to begin with the second volume, which contains certain valuable articles which had been more or less prepared for publication. The sketch of the vegetation in the Amazon valley, the chapters on migrations of insects, birds and fishes; on narcotics and stimulants; on the historical existence of women warriors or Amazons; on the picture-writing of the Indians; and on Valverde's story of hidden treasure (which, according to Spruce, may yet be discovered), are all of great scientific and historical value.

In the journals, extracts from note-books and private letters, which make up the first and a considerable part of the second volume, there is much that will interest intending travellers. He went through many dangerous experiences in these extensive explorations of the Amazon valley and its tributaries, as well as of Peru and Guayaquil.

The story of the collection of plants of *Chinchona succirubra* (red bark), one of the most valuable species of the quinine plants, and the one which yields the largest percentage of all the alkaloids, was a very important public service. The account of it is a romance in itself, and contains many valuable suggestions as to the climate and conditions under which these plants should be grown. There is also a vivid account of those uncanny ants who occupy, and one might almost say overawe, the whole of the Amazon valleys.

His description of travel-adventures, of animals, birds, characteristics of the

inhabitants, etc., are almost photographic, but yet they are tantalizing, for they were not intended for publication, and one is always trying to find out what he really believed upon many interesting subjects. It is clear that his notes were chiefly intended for his own use. Being a most enthusiastic collector in a botanist's paradise, his accounts of the flora are often more suitable for private letters to Sir W. Hooker and Mr. Bentham than for the general reader.

Amongst the many points of special geographical interest, are certain original observations on the volcanic rocks of the Amazons. Mr. Wallace, in giving a short summary of the geology as explained by recent explorations, points out that these observations throw much new light on the subject.

Another very interesting question relates to the great annual inundation of the river Amazon. A broad stretch of forest is overflowed and remains under water for months. On its outer edge this *gapo* or inundated forest mingles with and is scarcely to be distinguished from the "Great Forests" on fertile land above the flood-level. But its flora is quite characteristic and altogether different. In it one finds certain rubber trees, bushes inhabited by "fire" ants, peculiar palms, and other special plants. On the river-side, in the dry season, one finds a narrow fringe of salix and then a broad stretch of mud before one comes to the water's edge.

Both rise and fall of the "white," that is silt-laden, water, is gradual, gentle, and almost insensible. It is obvious that one has here a tantalizing glimpse into a great process of "filling up," by which the valley of the Amazons may in the end become another pampas like that of the La Plata. During the ebb, great portions of the bank, with trees growing on them and which have been undermined, fall into the water. On one occasion he found the entire breadth of the river obstructed by an entanglement of logs and branches.

His observations on the grass islands remind one of the Nile sudd, of which so much has been written recently. The masses of grass are torn away from the muddy bottom during the rise of the inundation, and float out into the stream when the water begins to fall. The two grasses of most importance are *Paspalum pyramidale* and *Panicum spectabile*, of which last Spruce found a specimen 45 feet long and with roots from each of its seventy-eight "joints." The other floating plants concerned are curiously similar to those found both in the Nile and in the Ganges.

Many of Spruce's observations are confirmed and extended by Dr. Ule's recent work on the same district. There is a clear account, for instance, of what we would now call the "vicarious" or corresponding species in different districts. The history of the very valuable paper on ant-agency is a disheartening example of how even distinguished scientists cannot divest themselves of dogmatic orthodoxy and on purely scientific subjects. It is a brilliant and original paper, and though it has awaited publication for some forty years, it is still of great importance to the theory of evolution.

Spruce, for the sake of his health, paid a visit to the northern desert region of Peru, and the valleys of Puira and Amotape. His description of the desert and its scanty vegetation is most interesting, and he added a valuable account of the cultivation of Peruvian cotton, with botanical descriptions. He was indefatigable in his philological researches, making a full vocabulary and grammar of the Jupi language, and collecting the only list we have of words of the almost extinct language spoken at Eten and Sechura on the Peruvian coast.

He also diligently collected the folklore, especially while in the Huallaga region. His story of the "Salto de Aguirre," gathered from the people of Tarapoto, is an interesting tradition founded on fact. Though his chief work was botanical, his researches were many sided, and in this respect he comes nearer to Humboldt than any other traveller of the last century.

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