SPECIAL CORRESPONDENCE

RESEARCH IN VENEZUELA

THE activities of three previous Scarritt Expeditions of the American Museum of Natural History have previously been reported in this journal.[1] The general program of these expeditions and of the related office and laboratory work has been to contribute to knowledge of fossil mammals of North and South America and of the relationships between them. This program has been continued and broadened by recent work in Venezuela, under the direction of the writer, as were the three earlier expeditions. The Venezuelan work has been a cooperative undertaking between the American Museum of Natural History and the Venezuelan Government, through the Ministry of Fomento (development and exploitation), under the Minister, Dr. Manuel R. Egaña, that ministry defraying all field expenses and the museum paying costs of transportation and of preparation and study of materials. The museum's participation was made possible by continued sponsorship of Mr. H. S. Scarritt, of New York.

Field work in Venezuela developed into two distinct major expeditions and two reconnaissance trips. The first objective, reached in September, 1938, was the vicinity of Barquisimeto, in the State of Lara, in western Venezuela. Here Brother Nectario María, a teacher in the local Salesian school, had made several important and interesting discoveries of Pleistocene mammals. With his cooperation a camp was established about thirty miles southwest of Barquisimeto, near the village of San Miguel, and numerous fossil prospects were examined. These proved disappointing at first, but a new locality was soon found which turned out to be by far the richest deposit of fossil mammals yet known between Argentina and the United States. With the help of numerous local workmen, who proved to be unexpectedly intelligent and energetic, a large quarry was opened and this has been worked almost continuously, except for an interval of heavy rains, from October to the present time. Modern methods of extracting fragile and broken bones were employed for the first time in Venezuela, and native workmen were trained in these methods, a result which may mean even more for the future of vertebrate paleontology in Venezuela than do the collections already made.

This quarry has yielded almost innumerable bones of fossil mammals, with many jaws and at least two skulls. It is anticipated that the materials already in hand will permit the assembling and mounting of several essentially complete large skeletons. Most of the material belongs to still unidentified and probably new species of megatheres and toxodonts, with more fragmentary remains of several other groups.

[1] SCIENCE, 80: 2070, 207–208, August 31, 1934; 83: 2140, 13–14, January 3, 1936.

When the work here was well advanced and the men had become skilled in the collection of bones under these conditions, the San Miguel Quarry was left in charge of Brother Nectario, and a reconnaissance trip was made into the great llanos (plains) region south of Caracas, broad areas of which are underlain by middle and later Tertiary sediments. North of Zaraza, at a locality where the well-known geologist, Dr. Peter Christ, had already collected an important astrapothere jaw, the nearly complete carapace of a new fossil turtle was collected. With the cooperation of geologists working for the Standard Oil Company, two other promising prospects in the Miocene were located in this general region. There is every reason to hope that quarrying of these localities and more intensive search of the scattered and generally poor exposures will yield important fossil mammals, turtles and crocodiles.

A second reconnaissance, in April, 1939, was made into the higher Venezuelan Andes, as far as Mérida. In the vicinity of Valera deposits of fossil mammals, probably of late Tertiary age, were exactly located for future work. Even aside from strictly paleontological aspects, these promise to be exceptionally valuable because they are in the youngest beds definitely folded in the Andine orogeny and hence will serve to date the end of this activity.

Between these two reconnaissance trips, the writer and his wife accompanied a large Venezuelan expedition to the southern part of the country. This expedition, the Comisión Exploradora de la Gran Sabana, was one of two organized this year by the Ministry of Fomento to explore and map parts of the enormous and very poorly known Venezuelan Guayana, the great area south and east of the Orinoco, mainly inhabited by uncivilized Indians. At various times the expedition included three geologists and topographers, a mining engineer, a medical doctor, two astronomers, a soil expert, a colonization expert, an airplane pilot and a mechanic, and numerous assistants and native workmen. The writer and his wife worked with the expedition for about six weeks as naturalists. The general results of the extensive and excellent work done by this party will later be made public by its organizers and experts in other fields, and in the present note only brief mention will be made of our own results.

The first and principal base camp was established by airplane transport in Camarata, the broad open valley south of Auyantepuy, a large mountain about 300 kilometers south—southeast of Cuidad Bolívar on the Orinoco. Here, as was anticipated, no fossils of any sort were found, but during the month spent there we made collections of recent mammals and plants as well as very detailed study of the Kamarakoto Indians, a poorly known and hitherto unstudied Carib group

which preserves most of its aboriginal culture intact. From here we flew to Santa Elena, a mission station near the Brazilian border in the region of Mount Roroimá.[2] Since the Indians of this region are very, and the flora and fauna fairly well-known, we spent only about ten days here, obtaining comparative observations for the study of our Camarata materials.

During all the work in Venezuela the writer was accompanied by his wife, Dr. Anne Roe Simpson, who collected mainly recent mammals for the museum and ran our camp when we were working independently.

Except for the botanical collections, which will remain in Caracas for study and preservation, all the material collected, paleontological, mammalogical and ethnological, will be sent to New York for preparation and study, which has already begun as regards part of it. When this is completed, the collections will be divided between New York and Caracas, where they will form the nucleus of a national collection of fossil vertebrates. The results already obtained show that Venezuela is a very promising and still almost untouched field for such studies.

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SCIENTIFIC BOOKS

MALARIA IN PANAMA

Malaria in Panama. By Lieutenant Colonel J. S. SIMMONS, Medical Corps, U. S. Army with the collaboration of Lieutenant Colonel G. R. Callender, Medical Corps, U. S. Army; Major D. P. Curry, Medical Reserve Corps, U. S. Army; Lieutenant Colonel S. C. Schwartz, Medical Corps, U. S. Army, and Lieutenant Colonel R. Randall, Veterinary Corps, U. S. Army. *The American Journal of Hygiene,* Monographic Series No. 13. The Johns Hopkins Press, Baltimore, 1939. $1.10 net, postpaid.

WORKERS in public health, tropical medicine and parasitology, in general, and in malariology, in particular, welcome source books regarding malaria in any region. The present volume is particularly important because it deals with Panama, a region of outstanding importance in the development of methods of malaria control and yet one which is often misunderstood.

The book is divided into three main sections. Part 1, which deals with malaria on the Isthmus from 1501 to 1938, gives in one chapter a most interesting series of notes on the history of the disease and in another an account of the present distribution of malaria in the Republic of Panama. Part 2 is a more detailed consideration of malaria in the Canal Zone from 1904 to 1938. Its seven chapters give information of the utmost importance on various geographic features, meteorology, Health Department and vital statistics of the Zone; malaria among the canal employees; malaria carriers in the Zone, Anopheline mosquitoes, and sanitary methods used for the control of malaria in the Zone. Part 3 is concerned with malaria in the military forces on the Zone and in four chapters considers malaria among U. S. troops; distribution among the various military posts; factors concerned in the relatively high incidence of the disease among the troops, and an evaluation of methods used to control the disease among the troops.

Each chapter is a compendium of material taken from a wide variety of sources, including many official records and results of the authors' own research. Much of this material is stated in synoptic form, but at the end of most chapters a concise, readable comment is given. Finally, there is a terminal résumé in which the authors give their main conclusions in five pages. With such a mass of detail it is possible to select only a few conclusions of general interest.

According to the available data, malaria seems to have been common on the Isthmus for several centuries, and recent surveys show conclusively that the disease is widely spread in all the provinces of the Republic of Panama. This wide-spread distribution serves as a reservoir of potential infection for the sanitated regions. At the present time the sanitated areas are situated chiefly around the terminals of the Canal (including the cities of Colon and Panama in the Republic) and the locks. In these locations most of the Canal employees, military forces and their families are concentrated. Elsewhere on the Zone, where there is no anti-mosquito work or general sanitation, the employees are furnished with thoroughly screened quarters. Within the sanitated areas, the records are conclusive in showing that control measures have been effective in reducing the incidence of the disease among the employees since 1904, when Gorgas, Carter, LePrince and their associates arrived on the Zone. At the same time they also show why, even with the extensive resources at hand, it has been impossible to control the breeding of *Anopheles* in many bodies of water and why it has proved possible to sanitate only relatively small areas near the principal towns occupied by employees and around military posts. For example, Gatun Lake presents a tremendous problem, since from it mosquitoes can apparently fly into the sanitated areas at certain times of the year. This 165-square-mile lake, built as a necessary part of the high level lockage system of the Panama Canal, is relatively shallow, and vast areas of it harbor aquatic plants. These plants, especially in the dry season, are exposed in surface mats level with the water's surface and appear to be ideal breeding places for *Anopheles albimanus* and *A. albitarsis.* The former appears to be the chief malarial vector. No satisfactory means of controlling the growth of

[2] Widely, but incorrectly, publicized as Roraima.