

REPORTS

INVESTIGATIONS IN PANAMA DURING THE SUMMER OF 1930¹

INTRODUCTION

At the suggestion and on the invitation of Dr. Herbert C. Clark, director of the Gorgas Memorial Laboratory, Panama City, the writer undertook the investigation which is presented in this report. Facilities were extended so that Dr. William H. Martinez, Tulane Medical School graduate, accompanied the writer, and later Mr. Alberto Prieto, a Tulane Medical School student resident in Panama, was enlisted as a technical assistant. In addition, non-professional personnel were secured locally in Panama City. The entire facilities of the Gorgas

¹ C. J. Maury, *Bull. American Paleontology*, No. 30, pp. 25-26, 1917.

² "Geol. Reconnaissance Dominican Republic," pp. 214-215, 1921.

³ SCIENCE, p. 609, December, 1929.

⁴ *Bull. American Paleontology*, No. 42, 1925.

⁵ Contribution from the Gorgas Memorial Laboratory, Panama, and from the Department of Tropical Medicine, Tulane University.

Memorial Laboratory and the connections which it enjoys in the Republic of Panama and the Canal Zone were placed at the writer's disposal for the work in view.]

OBJECTS OF THE STUDY

The investigations were undertaken with the following objects in view.

(1) To study representative samplings of the population of Panama, in order to determine by present refined methods of examination the incidence of *Endamoeba histolytica*, both in its active and carrier states, and to discover, if possible, the public health importance of this infection in Panama at the present time.

(2) To study concurrently the incidence and significance of the following infections: giardiasis, ascariasis, hookworm infection, trichocephaliasis and strongyloidiasis.

(3) To obtain autopsy confirmation of as many of these cases as was possible.

(4) To treat selected cases of *Endamoeba histo-*

lytica with di-hydranol; to treat hookworm infection, where it seemed advisable, with tetrachlorethylene, and to treat cases of strongyloides infection with gentian violet.

(5) To determine whether *Endamoeba histolytica* is a natural infection in New World monkeys in the wild state or whether their infection, if present, is acquired from contamination with human habitations.

MATERIAL STUDIED

During the three months which were available for this investigation the following series of cases were examined.

(1) The Hospital Santo Tomas of the Republic of Panama: medical wards, 635; surgical wards, 166; maternity wards, 445; total, 1,246.

(2) Canal Zone Administrative Office employees and families (white population only), 143. Gorgas Hospital patients and staff (white population only), 153. (This group represents individuals enjoying the best sanitated condition of the Canal Zone).

(3) Four Chagres River villages, 542.

(4) Tiura River villages (Darien Province), 105.

These made a grand total of 2,089 cases. Of this number three or more fecal examinations were obtained on 1,340 individuals; two examinations on 326 individuals, and one examination only on 423. The total number of fecal examinations was in excess of 6,000, making an average examination quotient of approximately three per individual.

BRIEF RÉSUMÉ OF THE FINDINGS

(1) *Endamoeba histolytica*. (a) In the Santo Tomas Hospital, which represents the average cross section of the Panamanian population, the incidence of *Endamoeba histolytica* ranged from 12 to 18 per cent., the former being on medical wards and the latter on maternity services. (b) Canal Zone white administrative force employees, 2.81 per cent. (c) Gorgas Hospital patients and staff, 3.55 per cent. (d) Chagres River villages, 34 per cent. (e) Tiura River villages, 30 per cent. on one examination (children, 1 to 15 years, 38 per cent.; adults, 15 years or older, 18 per cent.). This last figure is based on one examination only, so that on a basis of three to six examinations the figure for children would range above 75 per cent. (f) Monkeys obtained in the wild state above the town of Boco de Cupe on the Tiura River, Darien Province, provided the following results: marmosets, negative for endamoebae; white-face monkeys, negative for endamoebae; black howling monkey, large numbers of active *E. histolytica*, *E. coli*, and *Endolimax nana*. In addition, autopsy examination of one red spider monkey, which had been in the animal house of the Gorgas Memorial

Laboratory for several months, revealed a condition similar to that found in the black howling monkey. Likewise, a baby black howling monkey, which had been in the laboratory for less than one month, showed, on examination of passed feces, numerous cysts of *Endamoeba histolytica*.

Through the cordial cooperation of Dr. L. C. Prieto, of the maternity service of Santo Tomas Hospital, a considerable series of cases positive for *Endamoeba histolytica* received di-hydranol treatment. In every case the drug was effective in clearing up active or obscure symptoms involving the large bowel, and follow-up examinations showed that the dysentery amoebae had disappeared from the stools. A special paper will communicate these findings in detail.

Autopsies were obtained on five cases which had been previously diagnosed as harboring *Endamoeba histolytica*. Of this series two showed extensive deep chronic amoebic ulceration of the cecum, colon and rectum. The other three, which were carrier cases, showed no lesions which were detectable either by gross examination or by microscopic findings.

(2) *Giardia lamblia*. This infection ranged from 4½ to 9 per cent. in the Panamanian populations examined. It was more common in children than in adults.

(3) *Ascaris lumbricoides*. This worm was relatively common in the native populations, particularly in the country districts, but was fairly light as respects the number of worms in each case. As a fifth infestation it was found to be more common in children than in adults.

(4) *Necator americanus*. This worm was also found to have a wide distribution but to be of relatively little clinical importance in the populations studied. It was not common among children under eleven years of age. Treatment with tetrachlorethylene on the maternity services of the Santo Tomas Hospital indicated the value of this drug in the treatment of such cases where toxic complications are to be avoided.

(5) *Trichocephalus trichiurus*. The infection with this worm ranged from seven tenths of one per cent. among the Canal Zone employees to 21 per cent. incidence in the Santo Tomas Hospital and river-town populations. Most of these cases consisted of light infestations only, but from 15 to 20 per cent. constituted conditions of clinical significance. One case in particular, which was observed in the maternity service of the Santo Tomas Hospital, called for special consideration. This woman was almost in *extremis* at the time when observation was first begun. Her stools were watery in consistency and teemed with *Strongyloides* larvae. Treatment with gentian violet *per os* was instituted and improvement noted.

after ten days, with larvae reduced to a minimum. By the end of three weeks her condition was markedly improved and the stools were formed. In less than two weeks she had left the hospital, having gained several pounds and with evidence pointing toward complete recovery.

Thirty-two heavy strains of *Strongyloides* were cultured and examined daily over a period covering approximately two and a half months. Five of these were duplicate strains from the same individuals. Of the total number, twenty-three strains showed direct development only, four showed indirect development only and five consisted of combined types. Clinical importance is attached to those direct strains which metamorphose into the filariform larvae without a previous feeding period. Larvae of this filariform type are frequently passed in stools of individuals showing clinical symptoms. Evidence is accumulating to indicate that this is the type which is responsible for hyperinfection of individuals.

RARE PARASITES ENCOUNTERED

Bobulidiom colli. This ciliate protozoon was encountered in four cases during the investigations. These cases gave a history of probable contamination from porcine sources. Red spider monkeys in the animal house also had this same infestation.

Hepaticola hepatica. This infection is common in rats and mice in various parts of the world but there is only one human case on record, from autopsy of a

British soldier in India. Nine cases of this rare human infestation were diagnosed from the Chagres River Basin.

Gongylonema pulchrum. One case of this rare human infestation was diagnosed on the basis of eggs from the Chagres River Basin.

EXAMINATION OF ANIMALS IN THE JUNGLE OF DARIEN PROVINCE

Altogether 45 animals were examined during the trip up the Tiura River in Darien Province. The majority of these were monkeys. Filarial infections were found in two types, the marmoset and the white faced monkeys. In the poncho (*Hydrochoerus hydrochoerus*) amphistomate flukes were obtained from the abdominal cavity. This is possibly the same fluke which was recovered by Dr. Clark from the wild hog in the Coto region of Panama in February, 1929. Other helminth and protozoan parasites were obtained from the agoutis, the ponchos and the monkeys.

CONCLUSIONS

The material obtained from these investigations has indicated to the writer that the area studied offers extremely valuable opportunities for helminthological and protozoological work. The data obtained will serve as the basis for several important papers which will be published in the near future.

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