

AMERICAN TROPICAL MEDICINE AT THE
CROSS-ROADS

By Dr. ERNEST CARROLL FAUST

*Professor of Parasitology and Acting Head, Department of Tropical Medicine;
Consultant, U. S. Public Health Service; Consultant to the Secretary of
War on Tropical Medicine and Epidemic Diseases*

Introduction.—American Tropical Medicine was born during the last decade of the XIX century and the first few years of the present century to fight yellow fever, plague and malaria. In four and a half decades it has had an honorable, even brilliant career and has on its roll of honor, Finlay, Reed, Chagas, Gorgas and many more less commonly sung heroes. It has attacked problems of acute and chronic disease in warm climates with both vigor and ingenuity, without direct dependence or assistance from workers outside the Western Hemisphere.

Important diseases of the American tropics.—Among the more important campaigns which have contributed to life and health in the American Tropics have been those directed towards the control of yellow fever, plague, hookworm disease and malaria.

The problem of *epidemic yellow fever* of the port cities and other urban areas of the United States, Mexico, Central and South America and the islands of the West Indies was first attacked and solved by anti-*Stegomyia* measures, thus eliminating the transmitting agent and summarily terminating the disease in epidemic form. In more recent years, with the discovery of residua of the disease in forested areas throughout vast inland areas of tropical South America, it was realized that *endemic yellow fever* (so-called "jungle yellow fever") was an ever-present hazard for human beings living nearby and especially those entering the forests where monkeys and other mammals were the reservoir hosts and "jungle" mosquitoes served as the transmitting agents. Moreover, there was always the likelihood that endemic yellow fever might reach urban areas and be translated into the epidemic disease, and this was demonstrated on more than one occasion. Considerable success has resulted in accurate diagnosis of the endemic disease wherever it developed in man, in mapping out endemic foci month by month and year by year, and in immunizing the exposed populations by vaccination.

Plague was first introduced into the Western Hemisphere in 1899 and 1900 in rats brought into South American ports. It rapidly spread throughout the important port cities from the United States to Santiago de Chile and Buenos Aires, and became an acute public health problem throughout the Hemisphere. Anti-rat campaigns have brought the disease under relative control and eliminated it from practically all of the port cities. Meanwhile, reservoirs of plague have developed inland in rat colonies in such countries as Argentina, Brazil and Peru, while in the Western United States and elsewhere in the Americas ground-squirrels and other wild rodents in forested areas have become the hosts of *sylvatic plague*.

Hookworm disease was known to the early colonists in the American Tropics and was found to be an important cause of so-called "tropical anemia" in the Southern United States, the West Indies and on the tropical mainland. Commonly, it was associated with profound malnutrition. The death toll resulting from this disease was considerable, while the economic loss as a result of hookworm infection was tremendous. The campaigns against this disease, involving mass treatment of the infected populations, sanitary disposal of human feces and attempts to provide an adequate amount of nutritious, well-balanced foods, have materially reduced the waste of human life, although extensive areas of infection

of clinical grade still exist throughout all of the endemic hookworm belts of the Hemisphere.

Chinchona was known to be effective against "chills and fever" several centuries before the *Anopheles* mosquito was incriminated as the necessary host and transmitter of *malaria* to man. With a knowledge of the method of transmission, control became available by naturalistic and anti-larval methods. Considerable success has apparently attended extensive control efforts in the Southern United States within the past decade, but the most notable example is that of the elimination in 1939-1940 of the *Anopheles gambiae* from the increasingly imperiled area in Northeastern Brazil.

Brief mention of yellow fever, plague, hookworm disease and malaria, together with their importance in the Americas and progressive success in their control, provides a partial but incomplete picture of human disease in the warm climates of the Americas. To these diseases must be added typhus fever, tick-borne spotted fever, dengue, leishmaniasis, Chagas' disease, bartonellosis, filariasis, amebiasis and bacillary dysentery, schistosomiasis, relapsing fever, yaws and mal del pinto, systemic and dermal mycoses, as well as the cosmopolitan diseases, pneumonia, tuberculosis, measles and typhoid fever, in the tropical zones.

Typhus fever has existed in the Western Hemisphere since the days of Columbus. When first introduced it soon developed into an epidemic scourge among the native peoples, especially in the highlands, and has never since been brought under adequate control. Moreover, not only is louse-borne typhus highly epidemic today in countries like Bolivia, but the somewhat milder murine type, transmitted from rat to rat by the tropical rat flea *Xenopsylla cheopis*, has become widely distributed in the Southern United States, the highlands of Mexico and elsewhere in the Hemisphere. In Mexico there appear to be both endemic murine typhus and the louse-borne epidemic form, as well as intermediate types. While personal hygiene with reference to de-lousing of the body and of clothing constitutes the indicated method of control against the more virulent epidemic type of typhus, no far-reaching intensive campaign along these lines has yet been undertaken. With the murine type man is only collateral to the usual rat-rat flea-rat endemic cycle. Thus, anti-rat campaigns, such as those inaugurated a few years ago in Savannah, Georgia, provide a definite method of attack on this type of disease, and should be undertaken in all rat-infested areas as a safeguard against murine typhus and plague.

Tick-borne *spotted fever* (Rocky Mountain spotted fever, tick typhus, febre de São Paulo, fiebre petequial) is widely distributed throughout the Western United States and Western Canada, along the Eastern and Southeastern seaboard and occurs in many inland areas in the United States. It is known to be endemic in São Paulo and Minas Geraes States, Brazil and in Colombia. It is usually transmitted by hard-bodied ticks which carry the infection congenitally from generation to generation. The infection in man is apparently becoming more and more widely disseminated and is developing enhanced virulence even though the disease may have been present in the Americas before the coming of Columbus. In highly endemic foci, as in the Bitter Root Valley, Montana, immunization of the population by vaccination has proved an effective prophylactic measure, but in widely scattered areas this control measure has not been employed. Eradication of the tick transmitter is probably not practical.

Leishmaniasis extends from Yucatan to Northern Argentina. In most endemic foci the type is cutaneous → mucocutaneous, caused by *Leishmania brasiliensis*, but in certain areas of Brazil and Argentina there is also a visceral leishmaniasis, caused by *L. donovani* or a very closely related variety. The former type in its more chronic forms (chiclero's disease of Yucatan, uta of Peru, espundia of

Brazil) is a mutilating disease widely distributed in forested areas, and is transmitted primarily by species of the sand-fly, *Phlebotomus*. Also belonging to the group of hemoflagellate infections is American trypanosomiasis or Chagas' disease, which is peculiar to the Western Hemisphere. The etiologic agent, *Trypanosoma cruzi*, was first discovered in Brazil by Carlos Chagas in the triatomid bug, *Panstrongylus megistus*, and the life cycle was completed experimentally in laboratory animals. The organism was then found to be responsible for the clinical entity which came to be known as Chagas' disease. The known distribution of the disease in man is from Northern Argentina to Southern Mexico, but in rodent and other reservoir hosts, as well as in triatomid bugs, it extends into the Southern United States. This suggests that human infection is potentially more widespread than the records indicate.

Another uniquely American disease, which is confined to the Andean valleys in Peru, Ecuador and Colombia, is human bartonellosis (Carrion's disease, verruga peruana), which is a sand-fly transmitted infection. Originally, it was believed to be confined to Peru, but recent investigation has found it to be endemic in the other two countries mentioned.

There are several types of filariasis endemic in the American Tropics. The mosquito-transmitted *Bancroft's filariasis*, with its complication of elephantiasis, extends from Cuba and Jamaica to Southern Brazil. This is as yet an uncontrolled disease, especially prevalent in the negroid peoples of the West Indies and the Atlantic Coast of the mainland. The other filaria infection with serious complications is onchocercosis, which is associated with ocular lesions leading to reduced vision and frequently to blindness. Fortunately, the present distribution of this disease is limited to a narrow strip of territory in northwestern Guatemala and adjacent Chiapas State, Mexico, and an isolated focus in Oaxaca State, Mexico, but the routing of the Pan American highway through this endemic belt suggests the possibility of the spread of this disease into areas wherever the intermediate host *Simulium* is present.

Dengue is present in much of the warmer countries of the Western Hemisphere. It can develop in any area where the *Stegomyia* mosquito, *Aedes aegypti*, breeds, provided human infection is present to serve as a source for the mosquito. The disease may be either mildly endemic or may develop into severe epidemics. Although dengue is seldom fatal, it is commonly incapacitating.

In addition to syphilis, there is a trilogy of spirochetel infections in the American Tropics: frambesia, mal de pinto and relapsing fever. *Frambesia* (or yaws) is commonly found among the peoples of some of the West Indies, particularly Haiti, and to a lesser extent in the low-lying coastal area of Northern South America. It is commonly transmitted by contact but may be disseminated mechanically by filth flies, especially of the genus *Hippelates*, which suck up mucopurulent serum from open yaws. The epidemiology of the skin lesion *mal del pinto* is poorly understood. *Relapsing fever* today in the Western Hemisphere is almost exclusively of the endemic type transmitted by soft-bodied ticks of the genus *Ornithodoros*. It occurs from Western Canada to Northern Argentina and is particularly prevalent in areas where caves constitute a hiding place for the ticks. Epidemic louse-transmitted relapsing fever has developed in past decades in many countries of the Americas.

Amebiasis, due to infection with *Endamoeba histolytica*, is known to extend from Saskatchewan, Canada, to the Straits of Magellan and even in the Temperate Zones of the Hemisphere may show a rather high incidence in certain localities or in certain population groups. Nevertheless, by and large, there is more amebiasis and especially more amebiasis of clinical grade in the Tropics than elsewhere, due to the greater contamination of food and water, to the common

mechanical transmission of the infection by filth flies from uncovered human dung heaps to food, and to gross lack of personal hygiene among the lower strata of the population of the Tropics. While there is suggestive evidence that native peoples constantly exposed to infection may become partially tolerant to *E. histolytica*, there is no proof that it is ever a continuous inhabitant of the lumen of the bowel. In other words, it is always an actual or potential tissue invader. Bacillary dysentery is also a common tropical disease and is much more prevalent than nosographic reports suggest. Many of the tropical strains of the etiologic agent have not been adequately studied and require typing before their importance can be evaluated. Relatively few clinical laboratories in the American Tropics have a staff properly trained or experienced to make an accurate diagnosis of amebiasis or bacillary dysentery.

In several of the West Indies and in extensive areas of Northern and North-eastern South America, *Mason's schistosomiasis* constitutes an important visceral disease. In these areas there is a particular species of mollusc, *Australorbis glabratus*, which serves as the appropriate required intermediate host of the etiologic agent, *Schistosoma mansoni*. The infection is typically contracted from bathing, swimming or wading in water containing the larval worm, which escapes from the snail and enters the human skin. Human feces, containing the egg stage of the parasite, provide the source of infection for the snail when washed into the water where the snails breed.

Mycotic infections involving both the skin and the viscera are common in the warm countries of the Western Hemisphere. A few types, as histoplasmosis and South American blastomycosis are believed to be uniquely American. Diseases common to cool climates, as pneumonia, tuberculosis, typhoid fever and measles, are also common in the Tropics. *Pneumonia* constitutes the most common cause of death on the Mexican plateau and is even frequently encountered in the warm humid tropical lowlands. Tuberculosis is still the "white plague" of the Tropics. Adequate campaigns to control this disease are proving successful in the United States and Argentina but in the tropical areas no effective prevention has been undertaken. *Typhoid fever* is especially found in all areas where opportunity is afforded for contamination of water or fresh food. It ranks high among the enteric infections in most tropical countries. *Measles* was introduced to the Western Hemisphere by the Conquistadores and next to smallpox probably constituted the most extensively decimating disease in the wholly non-immune American population. Today it is much less important than it was a few centuries ago but it must not be overlooked.

General considerations.—The review herein presented of the more common and more important present-day diseases of the American Tropics, together with brief comments on their geographical extent and epidemiologies, provide material for serious thought and concern. Even should there be no appreciable dissemination of these diseases outside present boundaries, they constitute a challenge to our intelligence. Endemic disease is always less dramatic than epidemics which sweep with a clean, frequently fatal stroke through a population, as did smallpox, measles, yellow fever and typhus fever when they were first introduced to the aboriginal peoples of the Americas. Nevertheless, the yearly toll in incapacity and in death resulting from endemic diseases is tremendous and must be reduced.

There are practical ways and means of controlling all of the diseases which have been considered. Cleaner bodies and clothing will reduce contagious diseases. Cleaner food and water will markedly lower the death rate from enteric infections. Campaigns against rats and other rodents will be effective against murine typhus and plague. The destruction of mosquito larvae and of their breeding places would terminate the transmitters of malaria, dengue and Ban-

croft's filariasis. Similar measures can be found to reduce the breeding of other blood-sucking insects and thus lessen the incidence of leishmaniasis, onchocercosis and Chagas' disease. Where insects themselves cannot be eliminated, ways can and must be found to protect human beings from their bites. Endemic foci of the snail *Australorbis glabratus* can be discovered and the snails killed with copper sulphate or copper carbonate, thus eliminating exposure to schistosomiasis.

The needs for carrying out the program which has been all too briefly outlined, require a radical change from the primary emphasis on treatment of individual patients to an attack on each disease as an epidemiologic entity. By eliminating the supply of etiologic agents the disease will be controlled at its source and many hundreds of thousands of human beings will be saved yearly from disease. This means that many more physicians, nurses and technical assistants must be trained as full-time workers in preventive medicine in the American Tropics.

We of the present generation have the challenge frankly presented to us. The opportunity is tremendous. Are we willing, do we have the courage, do we have the vision to solve these problems as Finlay, Reed, Chagas and Gorgas did those problems which confronted them?

POLIOMYELITIS IN CUBA

During the year 1941 there were only 10 cases of poliomyelitis in Cuba. In 1942, provinces, cases, January, Habana 1; Oriente 1; February, Oriente 1; March, Habana 2; Villas 1; April, Habana 1; Villas 1; Oriente 1.

In May 12 cases were reported in Oriente and 23 in the other provinces, Camagüey remaining non-infected. In June and July cases in Habana had risen to 248 cases and in Oriente Province to 127. In July the disease reached Camagüey (10 cases).

In August and September, there was a decrease in Oriente, and an increase in Habana. At the present time (Oct. 10) poliomyelitis has spread all over the national territory (429 cases), Matanzas being the most affected province, with a disease rate of 12.22 per 100,000; Oriente comes next, 11.69; and Villas is the least affected, 3.84.

The highest death rate in the provinces, occurred in Oriente, 16.56%, and the lowest in Villas, where no deaths were reported among 37 cases.

Comparing this year's epidemic with that of 1934, it is seen that the disease so far has had a greater spread, but that the mortality has been lower; 5.5% against 18.82% in 1934.

It has not been possible to determine either the relation between one case to another, or the course of the disease from zone to zone and province to province. Just as in 1909 and 1934, no reports have been received of more than one case of poliomyelitis in one family.

Since January to November 17, 1942, the cases officially reported are 486, the deaths 43.

PAN AMERICAN YELLOW FEVER, 1938, 1942

Today there is no need to justify viscerotomy, protection tests and vaccination in jungle districts, all of which have proved their worth in recent years. It is necessary, however, to emphasize the advantages of permanent anti-aegypti measures throughout the Americas; not the measures developed by Gorgas and Oswaldo Cruz to eliminate yellow fever from places under constant control, but modern anti-aegypti measures designed for species eradication which have proved their value now for a full decade. The initial costs will be high but the program