

DEVELOPMENT OF MEDICINE AND SCIENCE IN PRESENT-DAY BRAZIL

By Dr. AFRANIO PEIXOTO

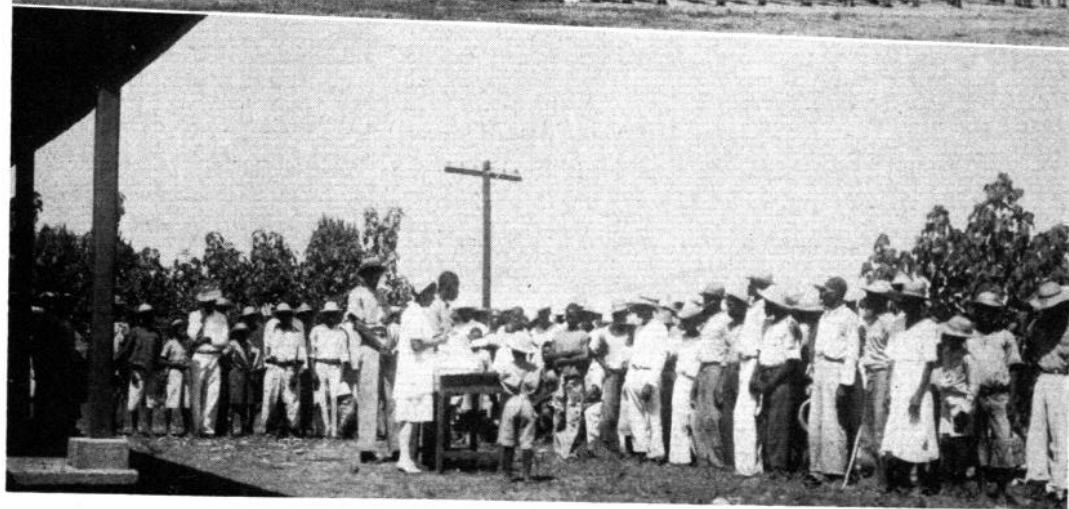
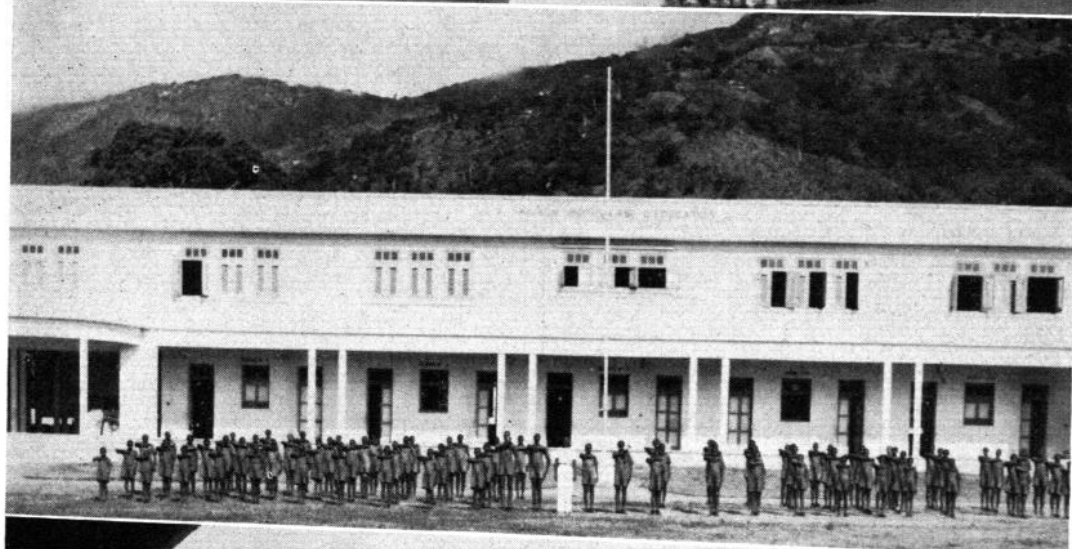
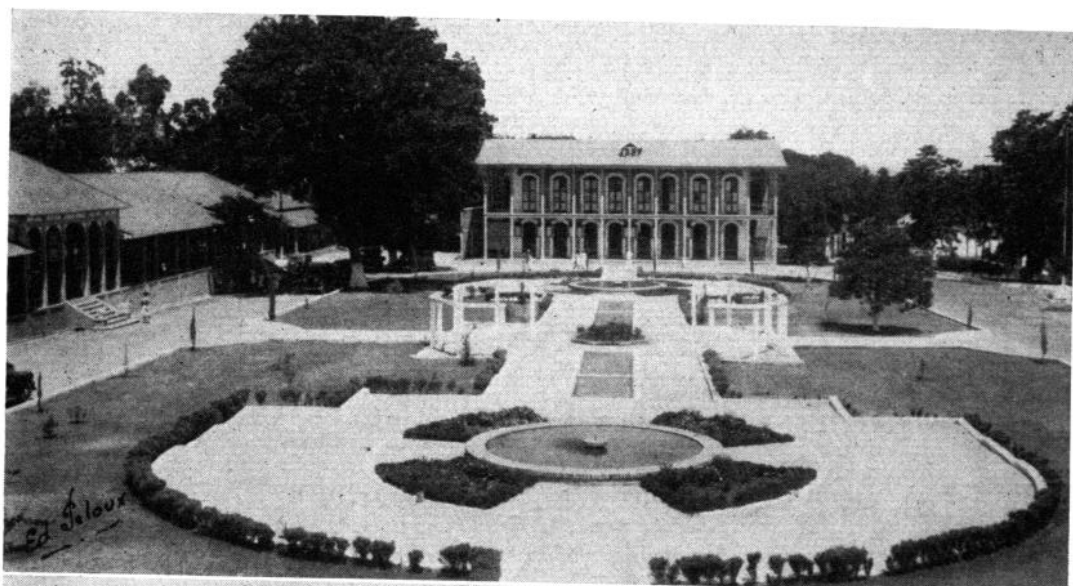
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The scientific and medical development in Brazil in the last forty years has of necessity depended on the social, economic, and political conditions of the country and of the world. During this period there have occurred two disastrous wars, originating in quarrelsome Europe as the result of the spirit of political imperialism which ought to be out-moded. . . . But it seems that in the European tradition, this is not to be. There progress has a warlike tradition with which it is inseparably mixed. The fashion reaches America, and with it, the necessity for defense. The internal conflicts in America have been imitations of European ones; as have been our would-be (sometimes civilian) Napoleons. American scientific progress, and with it that of Brazil, reflects these world upheavals. . . .

Nevertheless, it has its Continental aspects. Spain was not able to exterminate yellow fever, even though Carlos J. Finlay had pointed out the way. The French failed economically in Panama because they had failed scientifically. Then America came forward with her own resources. In 1900 the American commission appointed by Sternberg and composed of Walter Reed, James Carroll, Aristides Agramonte, and Jesse Lazear fixed the responsibility for yellow fever (which Europe called "American typhus") on a striped mosquito, identified by Howard as *Aedes aegypti*—the same mosquito singled out by Finlay. Acting on his convictions of this demonstrated truth, Gorgas sanitized Cuba. Other confirmations followed, with the experiences of Juan Guiteras (1901) in Las Animas, Cuba; of Pereira Barreto, Adriano de Barros, and Silva Rodrigues, under the inspiration of Emilio Ribas and Adolfo Lutz in S. Paulo, Brazil (1903); of Parker, Beyer, and Pothier (1903) and Rosenau, Parker, Francis, and Beyer, in New Orleans, U. S. A.; and, finally, of Marchoux, Salimbeni and Simond, of the Pasteur Institute of Paris, working in Rio de Janeiro (1903). The supreme sacrifice was not lacking: Lazear, bitten by a mosquito in a sick-ward, and Miss Mass, a nurse who volunteered for some of Guiteras' experiments, died of yellow fever; two others died during the Guiteras experiments, and two more in those of Oswaldo Cruz, Marchoux, Salimbeni and Simond. Other experimentors, such as Carroll and Moran, became seriously ill, proving the transmission of the virus by the mosquito.

The work bore fruit: W. C. Gorgas cleaned up Habana (1901); then J. H. White did the same for New Orleans, Eduardo Liceaga for Vera Cruz, Garneiro de Mendonça for Rio de Janeiro (1903-8), Sir Rupert Boyce for the English Antilles, Gorgas and Carter for Panama, Lyster for Central America, Connor for Ecuador, Hanson for Peru. In 1908, after Rio de Janeiro was freed from yellow fever, came the turn of Manaus and Belem (1913), with the work of Teofilo Torres and Pedroso.

The new theory was not accepted in Brazil without a struggle. Arguments became fanatic. Professor Rocha Faria was severely criticized in medical science for not admitting the exclusive role of the *Aedes aegypti* (then known as *Stegomyia fasciata*) in the transmission of yellow fever. . . . Ironically, today a number of species have been shown to transmit the virus in Africa, in the West Indies, and in South America. In the jungle, *Aedes aegypti* is actually absent. . . . *Aedes scapularis*, *A. fluviatilis*, *A. leucoleaenus*, and even one of another genus, *Haemagogus capricorni*, have justified Rocha Faria in his protest against public health



Au dessus: Vue partielle de la cour de l'Hôpital Général, Port-au-Prince, Haïti
Au centre: Local des Enfants Assistés, Assistance Sociale, Cap-Haïtien
Au dessous: Clinique rurale en activité, Léogane, Haïti
(Above: Partial view of the court of the General Hospital, Port-au-Prince, Haiti)
(Center: Child Assistance Center, Social Assistance Service, Cap-Haitien)
(Below: Rural health clinic, Léogane, Haiti)

fanaticism. None the less, such fanaticism—the “believe or die” policy—had its uses. It brought about the sanitation of America.

But the victory proved deceptive. Yellow fever, once the battle—or the armed sanitary truce—had ended, returned. It came from Northeastern Brazil to Rio de Janeiro, in 1928–29. And, significantly, this once-so-urban disease became suburban. It was eradicated by Clementino Fraga. But yellow fever was not done. It reappeared not long ago (1932) as jungle yellow fever, reported from Colombia, Venezuela, Brazil, Bolivia . . . by experts of the Rockefeller Foundation, headed by Fred. L. Soper. In Brazil serious studies were made by Beaurepaire de Aragão. Yellow fever: first urban, then suburban, then sylvatic—these the avatars. An epizootic among wild animals, eventually spread to man . . . at times domesticated among us, causing epidemics . . . such is the present theory. When these epidemics are conquered, the focus remains, as does the danger. An armed sanitary truce must be enforced—the mosquito-killer, the inspection of foci, viscerotomy, immunity tests—these are the weapons.



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To meet the danger, new methods have been introduced, nearly all of them American. First, the experiments with tremendously infective yellow fever virus, in the blood: their price the laboratory martyrdom of Adrian Stokes, Howard Cross, Hideyo Noguchi, William A. Young, Paul Lewis, Theodore Hayne, Maurice Wakemann. . . . The *macacus rhesus* monkey is discovered susceptible (Stokes, Bauer, Hudson), as are other monkeys: *Cubus macrocephalus* (Davis and Shannon), *M. cynomolgus* (Aragão), and *M. speciosus* (Aragão). Even better, the white rat, through intra-cerebral injection (Max Theiler). Viscerotomy, used by Soper and the Rockefeller workers, followed by the anatomic-pathologic examination of cases dying of strange fevers, proved that yellow fever was spread through much of South America, up to the Bolivian highlands, involving all of Brazil, Colombia, Venezuela, the Guianas. . . .

Then came the vaccines, convalescent serum, autolysated organs. The last word has not yet been spoken. The identity of American and African virus is certain. The identity of jungle, suburban, and urban yellow fever, unquestionable. The struggle, and the studies which prepare the means for the struggle, go on. America has taken the matter in hand, dispensing with the aid of foreigners.

Oswaldo Cruz had in Brazil another and greater influence: he introduced the laboratory into clinical medicine, and made from a serum-therapy institute a school of experimental medicine. A revolutionary measure was the regulation making smallpox vaccination compulsory in Rio in 1906 (Arnoldo Vieira de Carvalho had already thus eradicated the disease from Sao Paulo). Disciples of Cruz made memorable discoveries: Rocha Lima found the *Ricketzia prowazeki*, cause of exanthematic typhus; Gaspar Viana developed the treatment of cutaneous leishmaniasis by antimony tartrate; Arthur Neiva anticipated Nocht in observing the quinine-resistance of the hematozoon; Carlos Chagas discovered American trypanosomiasis; Beaurepaire de Aragão made hundreds of scientific contributions of inestimable value; Cardoso Fontes demonstrated the filterability of the tuberculosis virus (1911), anticipating Vaudremer (1922) by 11 years. The school of Sao Paulo, under Emilio Ribas, Adolfo Lutz, and Paula Souza, has likewise had a far-reaching influence.

An enfeebled pestilence is not a danger past. *Caroço fever* or *ingua de frio* (Amadeu Fialho, Antônio Periasú) is a frustrate, ambulatory form of plague which may eventually become acute and fatal. . . . Smallpox appears in the interior in its mild form of *alastrim*. . . . Trachoma, which we allowed to enter from the Mediterranean, with Syrian and Italian immigrants, is spread over Sao Paulo and Minas, and has a focus in Ceara (Sanson). . . . Snake bites, which killed or poisoned around 5,000 persons a year, were combated with specific serums developed by Vital Brazil, and made known in the United States by Afranio do Amaral.

During the last 40 years tuberculosis has shown no change. Culpable are malnutrition, over-crowded, unhygienic housing, lack of knowledge of modern methods of diagnosis and treatment. First came the costly sanatoria for the rich, and then those for the poor, inadequate because they are not supplemented by economic assistance for the inmates, early treatment, and security for the family. Our tuberculosis mortality is 250 per 100,000; that of the United States is 47. Manoel de Abreu invented the system of taking a photograph of a radioscopic image, so that instead of the cost of 20\$000 or \$1.00 for an X-ray, the expense is only 200 reis, or 1 cent, for an "Abreugraph" (Sayago). . . . The whole population could be surveyed this way, and the pre-tuberculous or cases without symptoms (Aloysio de Paula), the declared cases (Assman-Redeker early infiltrations, without fusion), and the open, cavernous, contagious cases, discovered. . . . All these might be treated surgically, with the rudimentary Forlanini method, or even more serious operations (costal, pleural, etc.), the surgery being supplemented by proper feeding and vitamins. The tuberculosis problem of today is one of diagnosis and treatment guided by the X-rays. Adequate nutrition, proper housing, hygiene, complete the program. It is in the hands of an intelligent though not extravagant government. It will cost something, of course, to overcome the antiquated medical routine. . . . The general measures, housing, nutrition, avoidance of contagion, have given results the world over. Brazil remains behind, with her heavy burden of tuberculosis. . . . It has not decreased; it actually increases. . . . I do not wish to omit this note of warning, because the public good is worth the sacrifice of some restraints. There can be no patriotic reservations against this disease. . . .

Likewise with leprosy. It was disregarded, because it seemed tending to disappear, in certain regions, as in Bahia. Its contagiousness appeared to be limited. But the constant foci, in Para and Maranhão, had their counterparts, in Sao Paulo and Minas. The estimated number of lepers was increasing. Adolfo Lutz calculated them at 10,000; Valverde, at 15,000; Pupo, at 27,000; Lindenbergl, at 30,000; Eduardo Rabelo gave the figure 50,000. This is high indeed: higher than the 5,000 of Colombia; the 9,000 of Madagascar; the 11,000 of the Dutch Indies; the 15,000 of the French Indies; the 40,000 of Japan; it is exceeded by the 100,000 of British India. But in proportion to density of population, India's 400 million to our 40 million, Brazil has the unenviable record for the highest amount of leprosy in the world. Considering the magnitude of the problem, little has been done. There are some model leprosaria, in Sao Paulo, in Minas, in Espirito Santo, and in Rio; others are being built in the northern part of the country, but these are almost nothing, reaching two or three thousand out of our many. Meanwhile, Sousa Araujo, familiar with the international problem of leprosy, has been as one vainly crying in the wilderness. We are not attracted by the idea of isolation, even partial isolation, which has accomplished so much, from Norway to the Philippines. . . . We are waiting for treatment—for rapid treatment.

Let us close on the brighter note of a great sanitary triumph. The rapid aerial-maritime advice-boats brought to us at Natal, from Dakar, the worst possible immigrant. No heretical, communistic, or nazi invasion could be as dangerous as the invasion of *Anopheles gambiae*, the deadly African mosquito which was identified here in 1930 by Dr. R. C. Shannon. Other malaria-carrying *anopheles* transmit the disease in a bare 5% of bites; the *gambiae*, in 100%. A small demonstration was the epidemic in Natal and vicinity, with tens of thousands of deaths (at least 40,000 cases, 8,000 deaths). Souza Pinto estimated the annual number of deaths in Brazil from malaria at 8,000, with about 800,000 cases. (Barros Barreto multiplied these figures by ten.) What then would the spread of *A. gambiae* mean to Brazil? Ruin, utter and complete! And to the rest of the continent? The United States understood, and in defending herself, defended the continent. In cooperation with the Brazilian Government, which shared in the expenses, the Rockefeller Foundation undertook the extermination of the *Anopheles gambiae*, which had already reached Ceará. In 1941 the miracle was announced . . . the unwanted invader had been eradicated from America; the least desirable of the undesirables was gone.

To review other developments: Our geology and archaeology, derived from Federico Hartt, Orville A. Derby, and John Casper Branner, had worthy successors in Arrojado Lisboa, Calogeras, Gonzaga de Campos, Eusebio de Oliveira, Betim Paes Leme. In phytophraphy Lindmann, Lutzelberg, Hueber, Sampaio, Hoehne, won distinction, as did Goeldi, von Ihering, Melo Leitao, and Costa Lima in zoology. Roquete Pinto, in "Rondonia" made the finest ethnographic journey of our times, as von Martius and von den Stein did in other days. Miguel Osorio is our Number One physiologist, as a result of his original findings. Decades ago Nino Rodrigues created a school, not only of experts in legal medicine, but also of anthropologists and ethnographers, a school which preceded the modern "Africanology" of the American Herskovits. Arthur Ramos is our major "negrologist." In another field, that of fingerprint identification, Leonidio Ribeiro discovered the precariousness of these marks in various nervous diseases, in leprosy, in certain manual professions, and opened a new chapter in medicine, "dactylodiagnosis." Finally, Anisio Teixeira brought from North America their educationalist enthusiasm, and has become our Dewey, not only because of his practical achievements, in Baia and Rio, which his opponents were unable to

destroy, but also because of the written and otherwise disseminated proselytic influence, both of himself and of his numerous followers.

This rapid review is, or has attempted to be, an act of faith on the part of Brazil, an expression of confidence in our continent. We in America are capable of a few things. The United States of North America, our oldest brother, is taking the place of our old and decrepit mother, suffering, poisoned Europe. . . . Our newer brothers all have something to offer. Brazil is an honor to her family.

PUBLIC HEALTH IN CUBA

By Dr. ALBERTO RECIO

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The Island of Cuba, and particularly the city of Habana, were considered in colonial times the Inferno of America. Yellow fever, malaria, smallpox, dysentery, typhoid fever, tetanus of the newborn, glanders, and even cholera and other diseases periodically decimated its population, from the days of the Conquest until the year of Independence. During the Intervention Government of the United States, after the country was freed from Spain in 1899, sanitation was begun and campaigns were waged against the prevailing epidemic and endemic diseases.

The Provisional Military Government lasted for two years and five months, and was under the direction of a physician, General Leonard Wood, who considered the improvement of the precarious health of an impoverished people the greatest of his duties. In this brief period the bases were laid for a public health organization which, carried to completion by succeeding administrations, soon converted the former Inferno into one of the most prosperous and healthy tropical regions in the world. Besides the subjection of Habana to the most thorough cleaning ever given a city, the program saw the organization in 1900 of two sanitary inspection services, in the charge of 100 Cuban physicians and directed by Major William Gorgas, and also the establishment of the Services of Sanitation and Disinfection, Statistics and Demography, and Orders, Archives, and Correspondence, and of a Department of Maritime Sanitation. A vaccine commission was created, as well as one for the combating of glanders and tuberculosis.

To the work of the former is due the disappearance of smallpox from Cuba, the last autochthonous case having been reported in 1923; and to the second, the disappearance of glanders from the equine population, and of bovine tuberculosis. The founding of a League Against Tuberculosis, of tuberculosis dispensaries and sanatoria, and of a Superior Board of Health, with legislative and executive powers, were also the results of the initiative of those fine administrators.

But the most notable accomplishment was the verification by the North American Commission for the study of epidemic diseases and especially of yellow fever, of the discovery of the transmission of yellow fever by the mosquito. This discovery, announced by Finlay in 1891 and proved by Read, Carroll, Agramonte and Lazear, has been the most important achievement in America to date, and the one most useful to humanity. The application by Gorgas, at first, and later by Finlay, Barnet, and Guiteras, of the preventive measures suggested by Finlay, resulted in the total eradication of yellow fever from Cuba. The last case was reported April 9, 1908.

When the Republic was restored in 1902, Finlay and Barnet succeeded Gorgas and his assistant Furbush, and extended the benefits of public health to the whole