VI

PUBLIC HEALTH

SANITARY DEVELOPMENT—U. S. PUBLIC HEALTH SERVICE—SANITARY ENGINEERING—PORTO RICO'S SALUBRITY—CHILD CULTURE—SCHOOL HYGIENE—INSULAR BIOLOGICAL LABORATORY—INSTITUTE OF TROPICAL MEDICINE AND HYGIENE—TUBERCULOSIS—UNCINARIASIS—MALARIA—BUBONIC PLAGUE.

Sanitary Development—Legislation—Board of Health

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General Remarks: It is an axiom of public hygeio-dynamics that a wise and well established sanitary organization must direct and merge all its efforts and proceedings towards the obtainment of three fundamental objectives: The increase of *natality;* the decrease of *mortality,* and the lengthening of life. In other words, to prolong the duration of life within biological limits.

This theory allows us to state that the characteristic of modern sanitary science, if we follow it in its universal influence, is mobility, or that sanitation is the dynamics of biology—an eternal present, something that is, and not something that has been.

A study of the evolutive history of sanitation and sanitary legislation in Porto Rico, should be divided into four periods.

FIRST PERIOD

The first period comprises the Spanish domination from the discovery of the island by Christopher Columbus on November 19, 1493, to the change of sovereignty on October 18, 1898.

In analyzing this lengthy period of four centuries we must say emphatically that it is against our temperament and against the spirit of this book to fall into the danger of unsound criticism, vexatious comment and impassioned interpretations. In judging passed facts or institutions which are august and full of majesty at all times, they should be considered as a starting point for a better present. The complaints of the past serve to stimulate us to greater effort and to a legitimate pursuit of positive hygienic welfare, whether individual or collective.

If past hygiene and sanitation were not in consonance with those of other countries achieving a higher cultural exponent, it was not the fault of the discovering nation nor of its illustrious medical class which has never lagged on the road to progress and biological discoveries, as her world renowned sages prove. It was the fault of the administrative system which would not conform to the demands of the time and moved in a sterile circle a *priority* of frustrated experiments, and of circumstantial calculations which never crystallized into anything *definite* for fear of the inevitable conflict with other interests.

Besides, if we have grown and become dignified to a considerable degree so far as relates to sanitation, it is fair to confess that the hygiene of transmissible diseases is a modern branch of medicine born during the beautiful era of Koch, Pasteur, Manson, Laveran, Rouk, Jersin, Ross, Finlay, Reed and others, whose work has been of inestimable benefit to mankind as connected with tuberculosis, cholera, malaria, yellow-fever, plague, diphtheria, smallpox, typhoid fever, etc., all of which are nosological species that no longer constitute a menace to civilized countries, since their nature, pathogenesis, and mode of transmission have become known, and consequently, such measures are applied to combat them as from day to day acquire greater clinical and therapeutic efficiency with surprising results in either case.

Reigning Diseases: Prescinding from a geographical description of the island, of its seasons and climate, which though tropical is of mild temperature, making it quite healthful as compared with other countries in the same zone, it is

pertinent to point out the frequent and intense epidemics of small-pox which decimated the population, among which epidemics the most deadly ones were those of 1804, 1818, 1877, 1880 and 1885.

Asiatic cholera morbus invaded the island in 1855. The first case was recorded in Naguabo, and came from St. Thomas where the disease was pandemic. Another important disease is syphilis, which was then quite spread, though not as much as at present. The Bubo (*pian* or *yaws*) was also imported through negro slaves coming from the Congo region and Guinea. Yellow fever (*black vomit*) broke out violently in different years, very specially during the last quarter of the nineteenth century.

As native diseases, typical and proper of the climate, we may point out malaria in all its forms, rheumatism, catarrhal affections of the respiratory system, liver troubles, tropical diarrhea (sprew), dysentery, specially amebic, mazomorra, elephantiasis, anemia, tuberculosis and many other cosmopolitan diseases.

Chronological Sanitary Summary: A brief review of sanitary activities during the Spanish domination can be made from information taken from the report on sanitation rendered to the Military Government by Dr. Ricardo Hernández and from the official rules drawn up by Mr. Francisco Ramos and approved by the Superior General Government of the Island.

PRECIOSA PRESA DEL ACUEDUCTO DE ARECIBO.
THE RIVER WHERE ARECIBO SECURES ITS WATER-SUPPLY.

1521: As a matter of fact, the first sanitary measure of that time was the transfer of the government from Caparra, capital of Porto Rico, founded in 1508, from the southern shore of San Juan Bay to the northern shore, where the capital city now stands.

This decision was taken on the insistent suggestion of Rodrigo de Figueroa because of unhealthful location and insect plagues which made the spot uninhabitable.

1768: A Royal Order was issued May 3

establishing in San Juan a Board of Health for the inspection of slaves and of ships arriving there from foreign ports.

1804: Governor Ramón de Castro issued regulations prepared by Dr. Francisco Oller for the preservation and widespread use of vaccine virus, since in that year small-pox appeared in epidemic form.

1813: A decree was published by the General Government creating local Boards of Health in the different municipalities under the presidency of the respective mayors.

Pursuant to a Royal Decree of November of the same year the San Juan Council rendered a report on black vomit, as yellow fever was called, comprising not only its origin, cause, nature, forms, symptoms and course, but also the presumed agents of infection, treatment and prophylaxis.

1814: A police and good government order provided, among other sanitary police duties, for the cleaning of streets, yards, the removal of garbage, cleaning of slaughter-houses, etc. The slaughter-house of San Juan was constructed this same year by order of Governor General Lemery.

1816: A chair of medicine was created on June 17 in the Military Hospital, under a Royal Decree of January 31, and under directions of Dr. José Espaillat.

In October an epidemic of malign fever appeared in Ponce, causing many deaths, and the isolation of the city from neighboring towns. The Governor sent Dr. Arvelo to Ponce to investigate, it having been ascertained that the disease was yellow fever.

1830: A sanitation bureau was established in August in every city, village and town of Porto Rico.

1832: The government adopted measures for the fumigation of ships and issued special instructions for the inspection of those coming from St. Thomas.

1837: A circular issued on December 31 by General Miguel López Baños directed all local authorities to render a report on public health in their respective localities. Another circular was likewise published making vaccination compulsory, even for those attacked by small-pox.

1838: A circular was issued relative to inspection and calls on vessels entering the ports of the island. In the same year, and on recommendation of the Superior Board of Health, the destruction of manchineel trees was ordered on account of their toxic properties.

1839: The Royal Sub-delegation of Medicine and Surgery was established, composed of three members and a secretary, which depended directly on the proper ministry in Spain. One of its chief duties was prosecution of the unlawful practice of medicine, for which purpose a register was kept of such physicians and surgeons as were duly authorized to practice. This body ceased to exist July 1, 1899. A Royal Order of May 14 created the Royal Sub-delegation of Pharmacy with authority to issue rules, grant licenses, etc., and fixing fees therefor.

1846: A circular of February 28 declared the house breeding of hogs and the sale thereof without previous examination, to be a public nuisance and the cause of many diseases, specially leprosy. The destruction of mango trees was ordered in the same year, such trees having been considered the cause of certain fevers, chief among them being malarial fevers.

1854: An epidemic of cholera existed in the neighboring island of St. Thomas, and precautions were taken to prevent the spread of the disease.

1855: This was impossible, and the first case appeared in Naguabo, coming as above said from St. Thomas. Persons dying of cholera were buried in special cemeteries, the place known as Santa Rosa and Santo Domingo having been used for the purpose in San Juan. The market-place was closed, and gatherings of vendors as well as door to door mendicity were prohibited. A special committee took charge of aiding the really needful, while Dr. Vargas prepared and published a pamphlet describing the symtoms of the disease, its manner of presentation and adequate treatment therefor. Slaves were protected from contagion as much as possible.

1865: In the month of April measures were taken to prevent the spread of diphtheria, among such measures being the disinfection of houses where deaths occurred. Regulations were also enforced containing useful precautions against contagious diseases in general. A severe epidemic of yellow fever was recorded this year, the same having been efficiently controlled.

1875: A general vaccination against small-pox was effected.

1877: A severe epidemic of yellow fever obliged the authorities to take extreme sanitary precautions, especially in the city of San Juan. Among the measures adopted the fundamental one was the immediate burial of persons dying of the disease, as well as the disinfection of houses and corpses.

1880: A small-pox hospital was built at the place known as Santo Domingo, this hospital having been destroyed by fire by direction of the government of the United States. An ice factory for military purposes stands at present on the spot.

1881: Publication of a newspaper dealing with hygiene questions and called the "Medico-Pharmaceutical Echo" was commenced this year.

1883: Dr. Francisco del Valle Atiles founded a newspaper called "Health" whose purpose was to spread knowledge of hygienic principles among the masses.

1894: Drs. Benito Gaudier and Eliseo Font y Guillot founded the "Medico-Social Truth" in Mayaguez, which paper was entirely devoted to matters of hygiene and sanitation. This newspaper was the initiator of the Bacteriological Institute which was not established because of the political intolerance of the times.

In this same year the Municipal Council of San Juan adopted a resolution creating a special police among the duties of which was the inspection of prostitution, and in 1895 a hospital for the treatment of veneral diseases in women was founded.

1898: At this time the Superior Board of Health was composed of the following members: The Governor General, the Intendent of Finance, the Commandant of the Naval Station, the Vice-President of the Provincial Commission, the Mayor of San Juan, the Inspector General of Public Works, the respective Presidents of the Delagations of Medicine and Pharmacy, the Public Health officer, the San Juan City Engineer, three practicing physicians, a pharmacist, an attorney-at-law and a veterinarian.

In the other towns of the island local boards existed composed of the mayor as president, the municipal physician and of members of the Council, besides the public health officer where there was one.

In this same year and during the autonomic régime, Mr. Luis Muñoz Rivera, then Executive Secretary, established a bureau of Health and the Press, the chief of which was Dr. P. Gutiérrez Igaravídez, who was succeeded by Dr. Acisclo Bou.

SECOND OR MILITARY PERIOD

This period comprises sanitary activities from October 18, 1898, to the establishment of civil government under the Foraker Act on May 1, 1900.

From the very moment that American forces finally occupied the island of Porto Rico they gave special attention to matters of public health, all of which were scrupulously studied and dealt with in harmony with immediate requirements as they presented themselves. It was a reasonable and discreet procedure to be followed until such time as scientific investigation should demonstrate the true sanitary condition of the island.

Following this procedure the first thing to do was to make a careful study of the sanitation laws, ordinances and decrees codified under former sovereignty, the knowledge having been obtained that as regards maritime sanitation and international quarantine, such laws, ordinances and decrees did not entirely differ from the scientific requirements of the times, though at times such requirements were not strictly complied with, thus allowing the importation of diseases which could have been prevented had there been proper penal sanction.

Land sanitation, though not perfect because of ignorance of the indices of mortality, of systematized prophylaxis, and of the pathogeny of transmissible diseases in their static modality, was not so imperfect as to the dynamics of hygiene, and for this reason the representatives of the Military Government entered effectively into action by formulating precepts for immediate or inevitable compliance, so that they should not remain in the category of simple aspirations.

Consequently, and simultaneously with urgent preliminary measures, the most important step was a general vaccination of the inhabitants of the island against small-pox, advantage having been taken of this opportunity to make an inspection of every town in Porto Rico. This inspection evidenced the necessity of systematic sanitary organization supported by a proper code.

The Board of Health and its Work: The

first Board of Health under the Military Government was organized June 29, 1899, and was composed of six members. In July following the Department of Education transferred the management and direction of the Insular Asylum for the Insane and of the Leper Hospital to this Board of Health.

Complying with the duties and obligations imposed upon it the Board of Health promoted the sanitary development of the island by all means within its reach, to which end it issued orders, ordinances and rules on the supply of potable water, sanitation of market-places, bakeries, retail and wholesale provision houses, milk depots, cafés and groceries, and took measures for the sanitation of schools, asylums, jails, hospitals, barracks, theatres, eating-houses, boarding-houses, etc. Preparation of vital statistics was ordered, showing marriages, births and deaths, including still-births, and a register was formed for the registration of physicians, pharmacists, midwives, embalmers and plumbers. Rules were promulgated on the cleaning of sewers, streets and latrines, and sanitary installations in the engineering branch were made. Undertaking establishments, cemeteries and desinfection were regulated; practical measures were taken as regards animal diseases transmissible to man, with the corresponding quarantine, and rules were laid down for keeping stables and all kinds of public nuisances in hygienic condition. Like precautions were taken as to explosives, prisons and all other sources of injury or danger to human life. The use of drinks, drugs, etc., was regulated, periodical and frequent inspections being made for the purpose of enforcing the rules and of correcting noted deficiencies.

Prostitution was regulated, the rules governing in Havana having been adopted in the matter. A commission was appointed for the issue of licenses to practice pharmacy after an examination comprising the subjects of this branch (November 16, 1899). On December 8 of the same year another commission was organized to look after interments, exhumation and embalming of corpses. And finally, a scrupulous investigation was made of the San Juan aqueduct and of the source of water supply.

Generally and summarily stated, such was the multiple and efficient activities of the military period, which culminated in a sanitary success worthy of all praise, and left us a model for the future. We must judge with calm reflection the significance of the vaccination above referred to, which in a few months extended its benefits to 800,000 people. For in addition to the difficulties of transportation met at that time, the fact must be added that all the virus employed was produced here in the island. At the same time the Department of Public Health of the United States radically prevented the importation of new cases of yellow fever.

Therefore, it must be willingly and in justice acknowledged that the starting point of our regeneration and progress in sanitary matters was the military period, our most worthy fellow-country men, Drs. Gabriel Ferrer and Ricardo Hernández, having lent their cooperation.

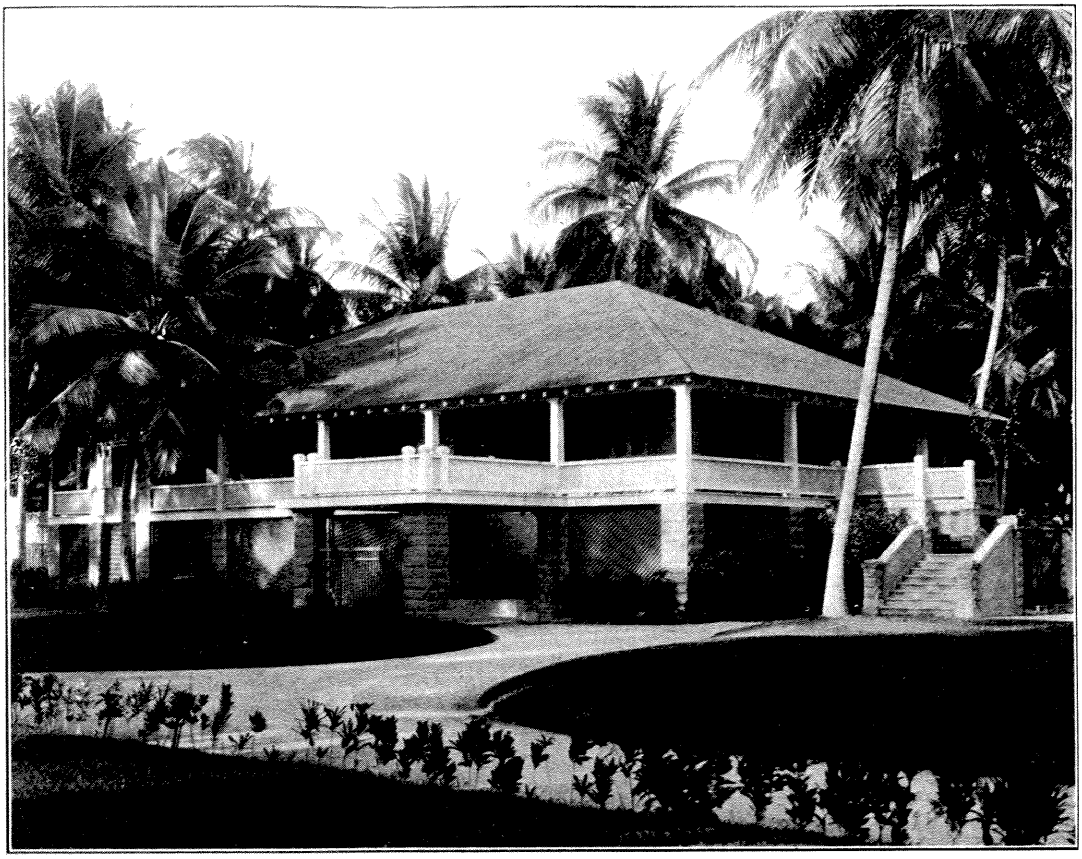
The work has been kept up under our own personality and psychology, our inspiration being taken from the sanitary traditions and discoveries of other countries, very specially the United States, which has been our source of information as to the process of the great problem, a problem we must study in connection with our own peculiarities and environment and in harmony with our own spirit, so as to offer original values capable of creating Porto Rico sanitation.

THIRD PERIOD

This period comprises the time from May 1, 1900, to the approval on March 9, 1911, of an Act Creating the Sanitation Service, passed by the Legislative Assembly.

Boards of Health: Upon the constitution of civil government a Board of Health was created, composed of the following members: The Commissioner of the Interior, the Commissioner of Education, Dr. Ricardo Hernández, Mr. Fidel Guillermety and Dr. Wm. F. Smith as secretary-treasurer. On request of the Board the Governor appointed Drs. Salvador Carbonell and Guillermo Curbelo as advisory members. This Board was granted executive and advisory powers, and could prepare ordinances and regulations. It allowed those issued during the military period to remain in effect, though making such amendments and extensions as seemed pertinent.

An Act providing for the appointment of a Director of Health was approved March 19, 1902, which Act defined the duties of the Director of



"LA BUENA VIVIENDA AHORRA MÉDICO Y HACIENDA".
CAPTAIN DE HOSTOS' RESIDENCE, SAN JUAN.

Health and created a Superior Board of Health. According to this Act, the Governor appointed the Director of Health, with the consent of the Executive Council (a branch of the then legislative department), and in administrative matters the Director of Health depended on, and was under the jurisdiction of, the Commissioner of the Interior, who in turn, and with the approval of the Governor, appointed a Board of Health composed of six members, as follows: The Director of Health as ex-officio Chairman; a vice-President who acted as secretary and paymaster; two physicians; one attorney-at-law; one pharmacist and one civil engineer, all of whom held office for two years. The first Director of Health was Dr. Ricardo Hernández.

Department of Health, Charities and Correction: Upon approval of the law of March 1, 1904, creating a Department of Health, Charities and Correction (the Consolidated Department) the Director of Health automatically ceased to depend on the Commissioner of the Interior.

At this time wise and discreet regulations on public hygiene in the island were prepared. Regulations were also prepared for admission to the practice of medicine, pharmacy, dental surgery, midwifery, minor surgery, and nursing, as well as for the examination and licensing of plumbers. Special attention was given to the prophylaxis of transmissible diseases, and action was taken in numberless directions which the nature of this book will not allow us to enumerate.

On May 1, 1903, the Superior Board of Health transferred to a Board of Medical Examiners the power to grant licenses for the practice of medicine, minor surgery, embalming, nursing, and at present for practice as trained nurses. This Board is composed of five members who must be practising physicians, one of whom acts as secretary.

Dr. Ricardo Hernández, the first Director of

and of Transmissible Diseases were taken from the Department of Health, Charities and Correction and automatically included in the Sanitation Service. This law gave homogeneity to the health organization, with all modern characteristics, and in harmony with all the requirements of public health.

Organization of the Sanitation Service: The Sanitation Service was composed of two branches: a legislative branch represented by the Board of Health, and an executive branch composed of a director, an assistant director, and of the personnel necessary in the different bureaus which are: the Bureau of Accounting and Property; of Transmissible Diseases and Statistics; of Sanitary Inspection; the Biological Laboratory, the Chemical and Bromatological Laboratory; the Bureau of Inspector of Foods and Drugs; of Veterinary Inspection; the Supervisors of the Northern and Southern Districts; the health officers, and a number of inspectors exceeding one hundred and twenty-five.

The Asylum for the Insane, Asylum for the Blind, Anti-tuberculosis Sanatoriums of San Juan and Ponce, Quarantine Hospital, Leper Colony, two Charity Schools, one for boys and the other for girls, the school for deaf-mutes, and a hospital for uncinariasics in Utuado, all depend on the Department of Health.

The Department has charge of the extinction of uncinariasis, as well as of malaria and of mosquitoes. As to the first of these activities the cooperation lent to the Department of Health by the Rockefeller Institute should be stated here, for this Institute pursues positive sanitary activities, and as to the second, we must mention the financial cooperation of the corporation known as "Central Aguirre," in the jurisdiction of Salinas.

Epidemics During This Period: During this period certain outbreaks of typhoid fever were recorded, but they were successfully combatted by means of quarantine and anti-typhoid virus. The number of aqueducts has caused the hydric nature of the disease to disappear, and when it has appeared such appearance has been due to contamination of foods by flies.

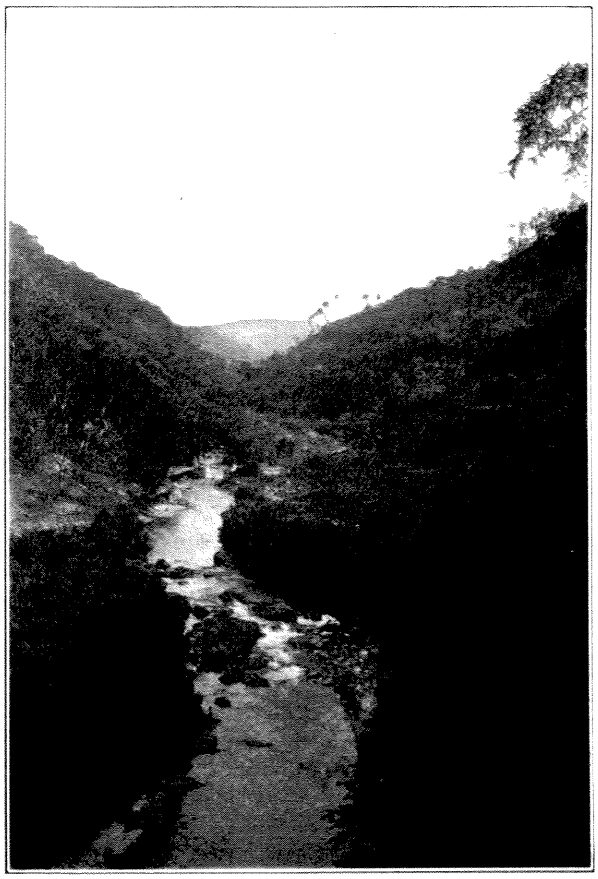
Two epidemic outbreaks of bubonic plague were also recorded, one in July, 1911, and the other in the month of February, the first outbreak having had the following results: Cases reported, 56; deaths, 28. In the second outbreak 33 cases were reported, and 20 deaths occurred.

There was a severe epidemic of measles in 1917, which noticeably increased infantile mortality notwithstanding the creation of hospitals in many towns of the island, for due treatment of patients. No exact statistics exist allowing a close study of this epidemic in its full intensity.

In October, November and December, 1918, and in January and the first two weeks of February, 1919, the island was entirely invaded by the wide-spread epidemic which scourged both hemispheres—influenza. The results were as follows:

Estimated population, 1,258,970. Number of cases recorded, 261,828.

	Deaths	Per Cent. of Population	Rate per 1000 Recorded Cases
Influenza	6,938	5.51	26.4
Broncho-pneumonia	1,055	0.84	4.0
Pneumonia	1,127	0.89	4.3



EL RÍO VIVÍ ES UNA DE LAS MUCHAS FUENTES DE SALUD.
ONE OF PORTO RICO'S MANY FOUNTAINS OF HEALTH.

Co-operation of People Towards Greater Sanitary Development: These epidemics are sufficient to explain the paralyzation of sanitary progress during this period so far as relates to total mortality, but now, as the sanitary organization of Porto Rico has reached full development it is logical to expect that in future such progress will be greater each day until the fundamental objectives of sanitation are achieved.

To attain this end the exclusive efforts of the Department are not enough. It is necessary to interest the people so as to make of them the most efficient colaborator in the pursuit of the *desideratum health* which is the greatest and best resource of communities. If they become associated in this civilizing task, the people will forget the past, learn to know the present, will keep alive the hope of a happy future, and become convinced that sanitary progress increases human welfare and independence by reducing the probabilities of disease and degeneration, basic principles of pessimism and of the nostalgia of life.

Social action must be brought to the aid of the health authorities so that the entire community may care for the future of the species, this being the highest conceivable altruism in counter-position to the selfishness of the past.

The Indispensable Basis of Effective Sanitary Victories: Sanitary development must be stimulated and increased by awakening the spirit of the masses and by utilizing the schools (specially the rural schools), by obtaining the cooperation of teachers, of the Red Cross, of municipal authorities, of the wealthy, of Masonic Lodges and other orders and organizations and of the centers of recreation, and by taking advantage of the powerful influence of the priesthood and of the ministers of the different religious creeds, as well as by promoting confidence in, and devotion to, hygiene, in the different labor unions as represented by their multiple organizations. In this manner will the necessary elements be obtained for the formation of a virile and healthy public sentiment which is the indispensable basis ot effective sanitary victories.

If we do this, sanitation will not then be an imposition, a system, a structure which only a hygienist can build, but an integral experience of the entire community, a complete and perfect solidarity between health authorities and people.

United States Public Health Service

By Pedro del Valle Atiles, Ph.G., M.D.,

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Major General John Brooke, U. S. A., with regular and volunteer troops, took possession of Porto Rico in the name of the United States of America, October 18th, 1898, and established his headquarters in the palace of Santa Catalina.

United States Public Health Service Inaugurated: Dr. Pedro Puig resigned the position which he had filled for many years in the port of San Juan on October 22nd, and his resignation was accepted by General Brooke, who immediately called the writer to fill the vacancy. That same day he took the oath of office before Col. Hunter, and was given charge of the office by Brigadier General Sheridan, under the orders of Dr. John Van Hoff, Medical Colonel of the Occupation Army, this simple proceeding marking the beginning of a new era in Marine Sanitation in the island.

The military authorities retained the Port Surgeons of Arecibo, Aguadilla, Mayaguez, Ponce, Arroyo and Humacao.

In the beginning it was necessary to continue using the prevailing laws and regulations which were generally good, though subject to great errors. An example being that of a vessel coming into port with a case or two of yellow fever. The Port Surgeon reported it to the Superior Board of Health which imposed quarantine on the vessel, its passengers and crew. The ship owner, informed of this act and feeling his interests injured, protested to the Governor of the action of the Board. The Governor then simply called

the president of the Board to talk over the matter, or else ordered the physician of the port to grant clearance papers to the ship.

In the old records of Marine Sanitation of San Juan, Dr. Pedro Puig recorded his protest for being forced to do things which were against his convictions.

Under the Laws and Regulation of the United States Public Health Service, however, not even the President of the United States can intervene in the decisions of the humblest officer in that service.

Old Ideas Concerning Origin: One of the ideas prevailing in those days and which, to a certain point, was the view of the Spanish Governors, was that yellow fever had an endemic character in Porto Rico, as in Cuba, the English Antilles, Mexico and South America. A belief based on the miasmatic theory; and it was thought that such conditions would never change, especially on the coast of the island.

What, then, was the use of checking and isolating cases of a disease which arose by itself from the soil? Such arguments as this, and others not less mistaken, but which were in accordance with the beliefs of the epoch as to yellow fever or black vomit and other diseases, were not in accord with the spirit of the American law, which saw to it that new sources of disease did not arise.

No Cases of Yellow Fever in Porto Rico Since 1896: In the year 1896 there were ninety-five cases of yellow fever among the Spanish troops stationed in San Juan, but since then no other case of this disease, which formerly overran Porto Rico, has ever occurred.

A Decided Factor in This Result: Undoubtedly the Sanitary Laws of the United States have greatly to do with this result, for soon after the Federal Service was established on the Island, rigid inspection of the crews and passengers of all vessels arriving from other countries was inaugurated, as well as the enforcement of rigid quarantine against countries infected or suspicioned of being infected with the disease. This enforcement resulting in isolating various cases of typical yellow fever in the Quarantine Stations at Miraflores, Panama, Daiquiri, Cuba, Port-au-Prince, etc.

Furthermore, there were other patients, who, detained on board the ships under rigid quarantine, died after their vessels left port. Two examples are the first machinist of a Spanish boat, and the wife of a Hayti diplomat of German birth, the latter dying on board the French ship Saint Simon, three days after leaving Porto Rico. Examples which prove the efficiency of this law, without which quarantine and isolation would not have been enforced in these cases, thus leaving Porto Rico open to the invasion of epidemics.

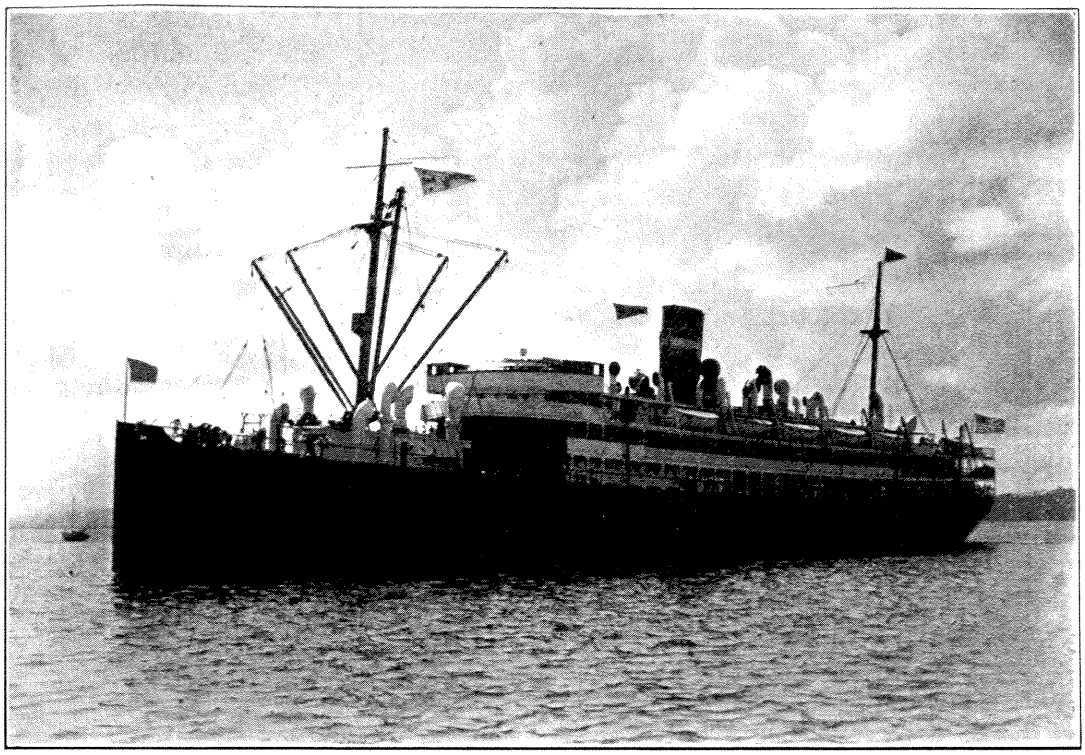
Value of Fumigation of Ships Against Mosquitoes: Another good measure of the United States Law is the fumigation against mosquitoes of ships from ports suspectioned to be, or known to be infected with yellow fever.

Establishment of Federal Sanitary Service: The United States Transport Mississippi, sailing from Cuba, reached San Juan in November, 1898, with a case of yellow fever on board. The writer reported the case to Colonel Van Hoff, U. S. A., and as both of us were of the same opinion, immediate measures were established for the isolation of the case on Cabras Island, and also for the detention of the troops, passengers and crew for six days under rigid medical, military and civil inspection.

This instance caused General Brooke to write to the Surgeon General of the Marine Hospital Service, then and at present in charge of the marine sanitation of nearly all the ports of the United States, and asked him to organize that service in Porto Rico, as had been done with the mail and the customs services. Surgeon Arthur H. Glennan, an efficient official, was named for that purpose and he arrived at San Juan December 21st, 1899.

Installation of the Service: Dr. Glennan called on the author immediately on his arrival, and both started work on the establishment of the Federal Sanitary Service in the island. All its ports were inspected and due instructions were given to the physicians of the service, whose salaries were raised in accordance with their work.

Quarantine Stations Equipped: The San Juan Quarantine Station was equipped and that of Ponce prepared for service. The laws and regulations of Marine Sanitation were translated into Spanish by the author and printed by the Government in order to make them known to the



EL RENOMBRADO VAPOR "SAN LORENZO", EN LA BAHÍA DE SAN JUAN.
SAFETY, HEALTH AND PLEASURE ON SUMMER SEAS.

port physicians, consignees and the captains of ships.

Rats as Carriers of Disease: In 1912 there was a bubonic plague epidemic in San Juan which was overpowered in three months. It would be very difficult to establish the origin of the first infected rat bearing the disease to the island. A few days after the appearance in San Juan of the first cases of bubonic plague, a possible source of origin, and one very difficult to fight against, was discovered in Cuba, and about a year later another one was discovered in New Orleans. In 1920 there was another outbreak in San Juan which was promptly wiped out thru the united action of the land and marine sanitation. This outbreak, it is of interest to note, coinciding with an emigration of rats from the mangrove-trees in Puerta de Tierra due to the work of the dredger.

Of Great Value and no Expense to Porto Rico: Another important work intrusted to the Marine Sanitation is the treatment, and if necessary the sending to hospital of sailors who work on American merchant ships no matter what their nationality may be. The crews of all merchant vessels of Porto Rico from the larger ships to the small coaster, have been benefited by the establishment in Porto Rico of the United States Marine Sanitation Service, at no expense to the island.

An Absolute Necessity to Public Health: In short, the development of this service in the island has followed the same course as that of this branch of the National Government. The military organization of Marine Sanitary work greatly aids the imposition of measures absolutely necessary for the public health, which is the supreme law.

Great Trust Placed in the "Public Health Service": So great is the trust placed in this body—popularly known as the "Public Health Service," that without doubt within a few years all the work in relation with the public health of the United States and its possessions will be placed under its wise management.

Its laboratories, hospitals and quarantine stations are everywhere splendidly equipped and conducted, and naturally all new methods and

modern scientific discoveries which are applied in the United States for the good of the population, are likewise applied to Porto Rico and the recently acquired Virgin Islands.

The annual expenditure of the Federal Government for maintenance of this service in Porto Rico is $35,000, and with but two exceptions all of its employees are Porto Ricans.

History of Sanitary Engineering

By Gustavo Adolfo Ramírez de Arellano, C.E.,

Sanitary Engineer of the Department of Health. Member of the Insular Board of Health.

The work of the sanitary engineer is one of the chief factors in the struggle against the original causes of disease.

The Hygienic and Sanitary Factors. Sanitation authorities agree that the two principal carriers or breeders of disease are man and his environment. The scientific study of both from this standpoint is known as hygiene in relation with man, and as sanitation as regards his environment.

The solution of hygienic problems depends on the physician, that of environment—food, lodging, air, water, insects and the disposal of refuse—is the concern of the sanitary engineer. Therefore, the latter is a most effective agent for the application of the principles of preventive medicine. Dr. Victor C. Vaughan, Dean of the School of Medicine of the University of Michigan, has stated in general terms in a lecture, that the sanitary engineer is better prepared for work as a specialist in preventing epidemics than the average physician.

It looks as if this truth was winning ground, for it is observed that many of the commissioners of health in several of the cities of the United States are sanitary engineers. Furthermore, among the authorities on the subject, many are engineers, such as Mr. George C. Whipple, for example.

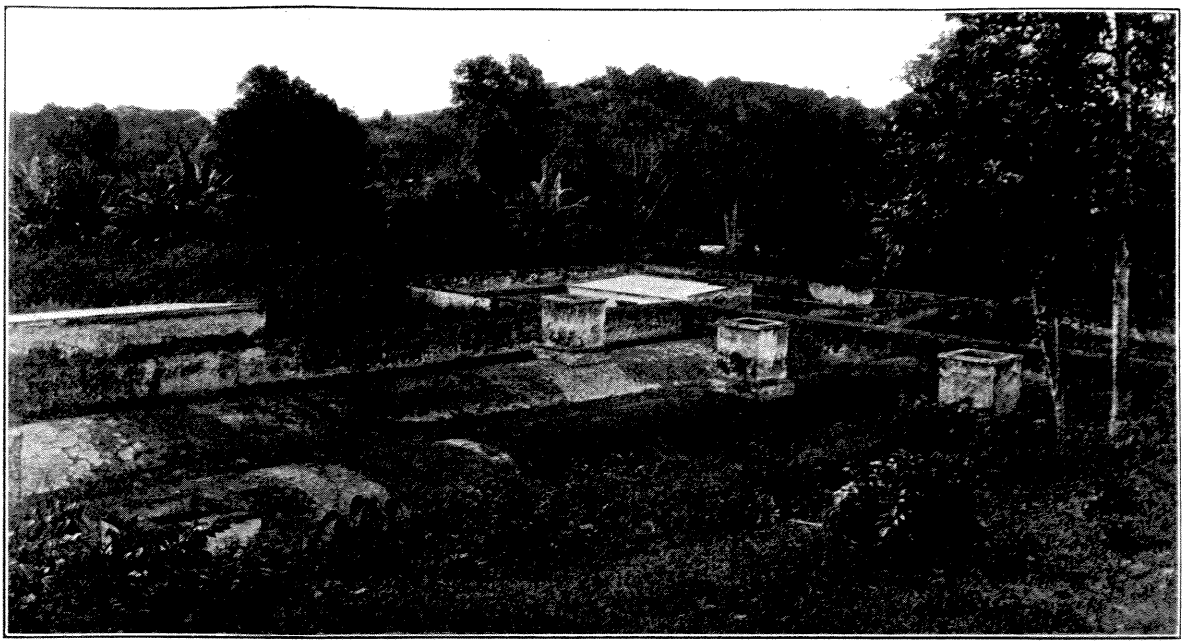
Sanitary Engineering During the Spanish Regime. Sanitary engineering work in Porto Rico is of recent date. Nevertheless, under the Spanish sovereignty there was a provisional board of health which had two engineers among its members, they being the Inspector General of Public Works and the San Juan Municipal Engineer. It has not been possible to determine their duties in that organization, nor to appreciate the work carried out by the Board, for though the work of the Mayagüez, Ponce, Guayama and San Juan acqueducts was done in that time, it is also true that they were constructed chiefly to supply water rather than for a sanitary purpose. Undoubtedly, there were among the Island's physicians and engineers, men with knowledge of the scientific principles of preventive medicine, who might well have done good work along these lines as evidenced by the writing of Dr. Francisco J. Hernández, in 1886, under the title of "Fomento de Puerto Rico" (The Improvement of Porto Rico). What was lacking then, was appreciation for such work.

The Corner-Stone of the Present Sanitary Organization. In June, 1899, after the occupation of the Island by the U. S. Army, Dr. John R. Van Hoff, U. S. A. Medical Corps, recommended the establishment of a Superior Board of Health, advising in his report to the Adjutant General, that a civil engineer be included in said Board. The splendid work of this Board may be well called the corner-stone of the present sanitary organization. Its main activities were directed towards the suppression of nuisances and the solution of the most urging sanitary problems, such as the proper disposition of refuse in San Juan and Ponce; the regulation of toilet rooms and their connection to the San Juan sewerage system; the correction of defects of sewerage systems and the imperfections of the San Juan water works. It also enforced hygienic measures in public buildings, but the reports lack data and details, which could only have been presented by a sanitary engineer.

On account of the poor financial condition

prevailing in the Island because of the San Ciriaco Hurricane, the Superior Board of Health was not able to correct the deficiencies of the San Juan water works and sewerage systems, nor of other cities, either. The construction work of the Arecibo aqueduct had to be stopped due to lack of funds. Nevertheless, this Board but because of the poor organization of the Sanitation Service, and the lack of sympathy for such work, his influence was not felt more strongly.

The Law of March, 1912. Porto Rico's Legislature passed a law in March, 1912, creating the Department of Health and providing a



DEPÓSITOS DEL ACUEDUCTO DE MAYAGÜEZ—1867.—THE OLDEST RESERVOIR ON THE ISLAND.

the Board carried out important sanitary inspections in nearly every town of the island, rendering reports which undoubtedly have been of great help to succeeding sanitary organizations.

The Period of 1904-12. The Department of Health was at first a part of the Department of the Interior. From 1904 to 1912 it was a part of the new department called Health, Charity and Correction, the plumbing branch being the one receiving the most attention, the existing latrines being replaced by water closets, and a decided step was also taken toward the placing of San Juan dwellings in hygienic condition.

Among the public works of real sanitary importance carried on during this period there are the aqueduct and sewerage system of Arecibo, and the Cayey and Caguas aqueducts. An eminent engineer was then a member of Board to act as a consulting and legislative body for it. Dr. W. F. Lippit was named Commissioner of Health and with the cooperation of several Porto Rican physicians, among them A. Ruiz Soler, A. Gaztambide, Pedro Malaret, Eurípies López, Francisco Hernández, José Belaval and Ramón Torres, did creditable work.

The Office of Sanitary Engineering and Its Work. Among the new branches, then established for the first time in Porto Rico, was that of Sanitary Engineering, its first Director being W. F. Darymple, later followed by the engineers W. F. C. Lippit, Antonio Romero, Etienne Totti and the writer, the present incumbent.

At the beginning the office had to carry on three important lines of works: preparation of laws and regulations governing the Bureau, drawing of model plans, pointing out the most

important sanitary work needed and regulation of plumbing.

The Director of this Bureau was also a member of the Insular Board of Health, aiding that body in the drafting of regulations concerning: drinking glasses in public establishments; tenements; rat-proof buildings; waste and filth disposal; destruction of mosquitoes; sunning and airing of all buildings and the sanitation of same; urbanization of grounds; plumbing; milk dairies; bakeries; cemeteries; cafes; restaurants; hotels; slaughter houses; street cars; use of bituminous coal and the protection of food. The office has continued such work up to the present.

The preparation of model plans was one of the most important functions, they being distributed gratis to persons who had to conform in their constructions to the established regulations. Among these, perhaps the most important, were those concerning the purification of water of buildings which were without aqueducts or sewer connections. Also those of plumbing installations, plants for purifying water, including sand filters for country houses, dairies, meat markets, bakeries, milk cans, coolers for milk cans, fly nets, stables, tenements, rat-proofing buildings, plans for hospitals and sanitariums, oil sprayers for the extinction of mosquitoes and specifications for the construction of streets, tombs, etc.

The trade of plumber was divided in three ranks: master, officer and apprentice; the degree of plumbing engineer being created by the Insular Board of Health. Those desiring any of the above classes of employment are examined by the Examining Board of Plumbers, which reports the result of the examinations to the Commissioner of Health who issues proper certificates to the successful candidates.

Sanitation of the Porto Rican Home. As was logical, the Office devoted its first efforts to the sanitation of Porto Rican dwellings and their surroundings. At the beginning, the campaign was drastic, it not being permitted to construct new buildings, nor to amplify, modify or repair existing ones without obtaining the approval of the Department of Health of the plans for such works. This means that pure air and sunlight must be abundantly provided to every portion of new buildings, the installation of water, baths, water closets and sinks in houses in towns which possessed aqueducts and sewers and the sanitary construction of latrines outside of the home in those towns where aqueducts and sewers had not been constructed, the new homes built to be rat-proof and placed in dry spots, facing the public streets and at a reasonable distance from places which might be injurious to health: cemeteries, slaughter houses and refuse dumps, etc.

Whenever permission is asked to make repairs, modifications or amplifications, the Department of Health grants them only provided they comply with the existing regulations.

Urbanization. The laying out and building of town or city additions is one of the branches to which much attention is paid by this Bureau. The new streets have been paved and constructed when possible, to a width of not less than ten meters, so as to facilitate the cleanness of the surroundings. Municipal authorities and private parties must drain the soil, before they are allowed to open a street or to continue existing ones, and such also being the case with the construction of buildings on wet soils, special care being taken so that said houses should face a street.

These improvements may be seen in the San Juan Laborer's Suburb, in Aguadilla, and in the laying out of streets which have been constructed in Santurce, Ponce, Mayagüez, Caguas, Humacao and other towns of the Island. It is safe to assert that nowadays the construction of buildings, facing streets and the opening of new streets, is owed principally to the sanitary engineer's office, as the municipal authorities have not exercised the diligence which might have been expected of them. For instance, had it not been for this department, Santurce would have been laid out and built in accordance to the will of the inhabitants.

Suburbs have been constructed in Puerto de Tierra, Arecibo and Ponce which lack the necessary sanitary conditions; but this is owed to the defects of the law on the laying out and construction of towns, and to the insufficiency of the penalty of the law creating the Health Department.

Rat-Proof Buildings. In rat-proofing buildings this Bureau acquired its initial experiences in the first epidemic of bubonic plague in 1912. Under the direction of the North American expert, Dr. Creel, important sanitary work was carried on in the business buildings of San Juan, Arecibo, Ponce, Caguas, Mayagüez and Carolina. This epidemic trained the personnel of this Department, enabling them to fight successfully the short epidemic of 1921, 7,391 buildings in San Juan being inspected and 3,879 reported. The number of re-inspections reached to 10,000 of which 7,000 were reported. The campaign extended to Carolina, Caguas, San Lorenzo, Arecibo and Manatí, in the latter, 60% of the buildings were made rat-proof.

Protection of Foods Against Contamination. Regarding this matter a rigid inspection of all establishments where foods are prepared was made so that they should be in compliance with the established requirements.

Regarding new buildings, the Office demands the approval of the plans of same for the purpose of making them according to the model plans and the sanitary regulations. Among others the following industries have been regulated: slaughter houses, bakeries, confectionery shops, dairies, meat markets, milk dealers' shops, paste factories, groceries, etc.

Campaign Against Mosquitoes. The extermination of mosquitoes, though largely a work for engineers, has always been entrusted to the Medical Division of this Department. Since 1911 great campaigns against the mosquito have been carried on, large sums of money having been spent on same.

The success, however, although great, has often been transitory due to the lack of necessary means to constantly support the campaign. Another great hindrance being lack of aqueducts and sewers in many towns.

In 1917 this office prepared the plans for the sanitation of Barceloneta and the surroundings of the Plazuela Central, where malaria is endemic, said work, however, not having been carried out through lack of means.

The "Rockefeller Foundation" recently started a great sanitation work in the surroundings of the Aguirre Central, under the technical direction of Mr. W. H. Green, C. E., and the financial help of the People of Porto Rico. It is nearly completed, though as yet its benefits have not been fully felt.

Aqueducts and Sewers. The greater activity towards the construction of aqueducts and sewers dates from 1911, when a very enthusiastic sanitary move was developed, it having been favored by the vigorous measures established by the Department of Health and the good economic conditions then existing in the Island.

The work increased so largely that the Department of the Interior created a Division of Municipal Works, entrusted with the planning and construction of systems of aqueducts, sewers and other municipal works. The Aibonito and Maunabo aqueducts were then constructed; those of Patillas, Salinas, Yabucoa, Humacao, Fajardo, Juncos, Gurabo, Coamo, Peñuelas, Arroyo, Guayanilla, Yauco, Maricao, Aguadilla, Lares, Utuado, Jayuya, Isabela, Quebradillas, Corozal, Naranjito, Ciales, Comerío, and Barranquitas having been enlarged and the sewers for Río Piedras, Miramar, Fajardo, Caguas, Cayey, Yauco, Aguadilla and Lares constructed.

Nearly all these works, however, lack sanitary perfection, many of the aqueducts lacking filters or other means of purifying the water.

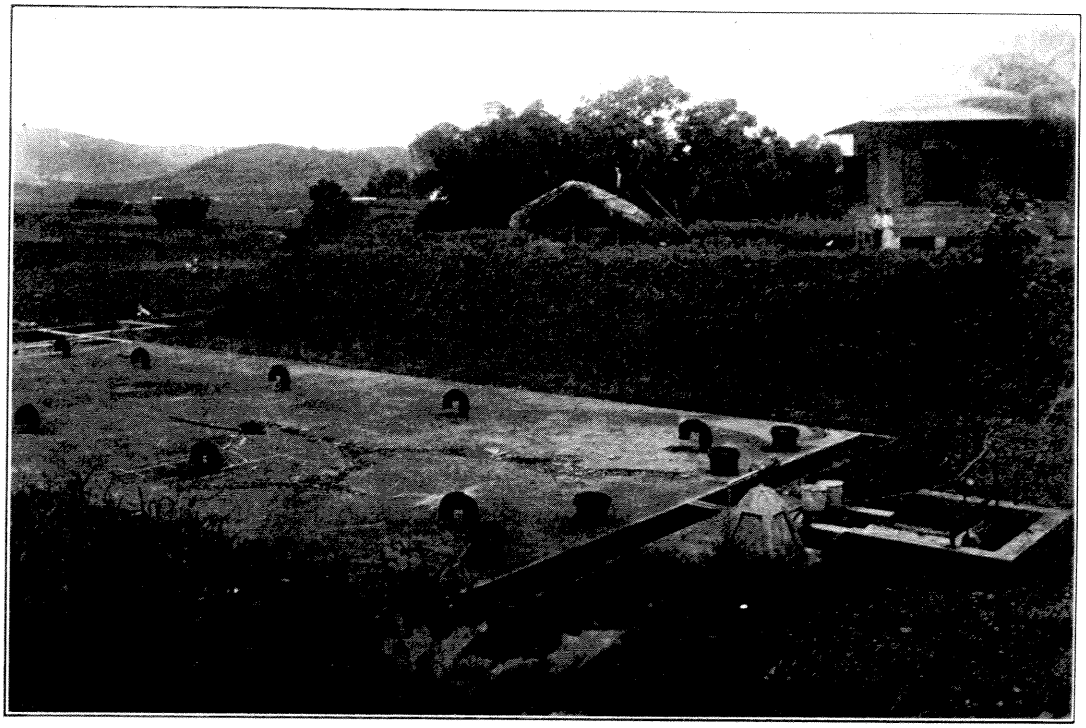
In any waterworks the filter is one of the most efficient and cheapest means of avoiding the spread of water born diseases, such as typhoid fever, cholera, dysentery and others.

Regarding the sewerage systems, the distribution of some of them either did not reach all sections of the cities or the grade of the sewer pipes was not always sufficient to avoid their being obstructed, causing the development of bad smells.

In some cases, too, like Yauco's and Lares,' the grade of drainage applied to sewerage was not sufficient, thus threatening the health of people living near them. What were the reasons that the office of the sanitary engineer had to accept these projects in said conditions? First the financial means of the towns interested in the project; second, the many aqueducts and sewers which at the beginning the Office had to give its attention to; third, the desire of the Department of Health to facili-

tate in whatever way possible this kind of construction, leaving for the future the correction of their minor sanitary deficiencies; fourth, the lack of personnel sufficiently qualified to obtain the necessary data to the wisest judgment of all the details; and lastly, the need of adequate legislation.

The same thing having occurred in the United States, where papers on the matter state the same deficiencies and the way in which they are being slowly corrected.



POZO SÉPTICO DEL ALCANTARILLADO DE CAGUAS.—FORMER TYPE OF SEPTIC TANK.

The Office of the Sanitary Engineer conscious of the sanitary significance of adequate water works and sewers, determined to use all means available for the protection of public health, though it lacked legislation on the matter. Due to lack of means that difficulty of all times in the island—filters could not be installed in the aqueducts of other towns, San Juan, for example, having done so voluntarily and Camuy, where the municipality in accordance with the recommendation of this Office, used the proceeds of its budget for that purpose.

There have been great improvements regarding the grade of sewerage systems, capacity of pipes and purifying plants, such projects legally complying with the standards advised by the principal authorities on the matter, with the aim in view to protect the health of the people who may drink the water of the rivers into which said sewerages flow, thus avoiding a public nuisance and unsanitary conditions.

The following projects have been revised and approved of during the last few months: Aqueducts: Manatí, Carolina, San Juan (embankment); San Juan (new aqueduct including Bayamón, Río Piedras and Guaynabo); Aguas Buenas, Ceiba, Vega Baja; amplification of the aqueducts of Juncos, Trujillo Alto, Añasco, Arecibo, Hatillo, Camuy, Caguas, Loíza, San Lorenzo and Mayagüez. Sewerage: Maricao, San Juan (embankment), Naguabo, Manatí, Humacao, Loíza, Utuado, San Sebastián, Santa Isabel, Juncos, Vega Baja, Río Grande, Camuy, Bayamón, Arecibo, the Laborers' Suburb of San Juan and Carolina. The aqueducts of Santa Isabel, Naguabo and Juana Díaz and the sewers of Humacao and Naguabo are now being constructed.

The Insular Sanitarium. The Insular Sanitarium at Río Piedras is another sanitary work of great importance, conceived and carried out by Dr. A. Ruiz Soler, aided by the late Don Pedro Arsuaga, who generously donated the land, where the Sanitarium was built, and by the financial assistance of nearly all the picture theaters of the Island, charity associations, either religious or financial, and altruistic individuals. The technical direction of Mr. Etienne Totti, the well-known sanitary engineer, deserving especial mention. The work on the Insular Sanitarium, however, is not yet completed due to lack of means.

In the Beginnings of Sanitary Engineering. Much work is yet to be done regarding sanitary engineering, it being safe to say that it has only been started. Great progress in accordance with sanitary principles has been obtained in one branch only, that of the construction of buildings. The sanitation of the Porto Rican home has been greatly improved, especially in the cities and towns which have sewerage systems such as San Juan, a part of Santurce, Cayey, Arecibo, Caguas, Fajardo, Aguadillo, Lares, where the latrines were replaced by modern sanitary installations.

The following is a program of the work which yet needs to be carried out:

Pure Drinking Water: It is vital that actually efficient aqueducts be constructed in the following towns: Bayamón, Cataño, Guaynabo, Carolina, Loíza, Río Grande, Luquillo, Toa Alta, Toa Baja, Dorado, Vega Baja, Vega Alta, Morovis, Manatí, Barceloneta, Hatillo, Camuy, Moca, San Sebastián, Rincón, Hatillo, Añasco, Las Marías, Hormigueros, San Germán, Sabana Grande, Cabo Rojo, Adjuntas, Villalba, Cidra, San Lorenzo and Las Piedras, and also to reconstruct and improve the aqueducts of San Juan, Caguas, Arecibo, Aguas Buenas, Quebradillas, Isabela, Guánica, Guayanilla, Ponce and Mayagüez; to amplify the aqueducts of Arroyo, Patillas, Cayey, Aibonito and Fajardo, where the installation of filters and other means of purification are needed in the existing aqueducts.

By-laws and regulations should be prepared by the Insular Board of Health, energetically stating that no aqueducts are to be constructed or modified, or enlargements made to existing ones, unless the plans and specifications of said works are previously approved of by the Insular Board of Health. Said by-laws to further regulate the quantity of water per capita to be provided daily; pressure of the water in the town; size and style of the tank for the reservoid; kind of purification which must be applied to the water before it is furnished to the consumer; protection of the water courses and the way in which all parts of the aqueduct are to be cared for.

Said Board to establish a quality "Standard" to be applied to the waters of the aqueducts and extended to the water served in public establishments, schools, hospitals, shops, hotels, restaurants and lunch rooms and in the homes in towns which do not possess aqueducts. Such standard to be applied also to the water furnished for drinking purposes in public vehicles and in the manufacture of ice. These requirements will have to be in accordance with the financial, industrial and commercial conditions of each municipality.

Sewerage. An aqueduct in a town immediately makes sewerage systems a necessity; said work being, therefore, necessary in the following places: Puerta de Tierra, partly; all Santurce—Miramar exempt—; Hato Rey, Corozal, Mayagüez, Naranjito, Ciales, Maricao, Utuado, Peñuelas, Ponce, Juana Díaz, Jayuya, Coamo, Maunabo, Yabucoa, Gurabo, Aguas Buenas, Juncos and Humacao. The amplification of the sewers in Fajardo, Cayey and Arecibo is also a sanitary necessity. The drainage of the Arecibo sewers in the Santiago Channel creates a public nuisance which should be suppressed. Sewerage systems should drain into the sea when possible. The discharge sewers into the San Juan Bay should be extended far enough to assure that organic matter can not be thrown on the shores by the waves and deposited on the land. It is imperious to construct sand filters in Yauco for the treatment of sewerage and also a bed on which to dry the mud from the purification well, thus avoiding it being thrown into the Yauco river, the waters of which are used for drinking and other domestic purposes by the people residing in the districts of the Guayanilla municipality.

The Lares and Cayey sewers should be equipped with sand-filters to avoid contaminating the waters of the Guajataca river, and the Plata system.

It is necessary to construct a bed for the mud so as to avoid the present contamination of the Guajataca river. As soon as Mayagüez and San Germán possess sewerage systems, the present old sewers should be eliminated, as they constitute a menace to public health.

The Insular Board of Health should publish its regulations regarding sewerage, just as they have regarding drinking water so as to prohibit the construction of new sewerage systems or the modification or enlargement of existing ones without the approval by the sanitary engineer of the plans and specifications for same. Standards for purifying the discharge from sewers should be established, before they are permitted to empty into any stream or lake, thus avoiding the creation of public nuisances and the contamination of water from streams or lakes which are used for drinking and other domestic purposes. This likewise to be applied to industrial drainage systems.

Upon enacting such regulations it should be born in mind that just as the people have the natural right to use the water of streams and lakes, the municipalities and the industries also have the existing necessity to discharge their drainage into such streams and lakes.

The regulations should provide the methods to be employed in order to keep the sewerage systems in good condition and especially the purification plants, so that their drainage should be in conformity to the required standards of purity.

Industrial Drainage. The Department of Health should prohibit, in accordance with the dispositions of Article 332 of the Penal Code and the Law of Waters, the sugar centrals of Porto Rico from continuing the contamination of the water of rivers as they now do. Said centrals being obliged to neutralize the waste waters of their plants, to filter them through sand filters, when the waters of the river where they discharge are used for drinking, or emptying liquid not neutralized and free from saccharine substance, even into rivers whose waters are not used for domestic purposes, thus not menacing the life of the fish of such streams. The Insular Board of Health should enact regulations regarding the matter, amplifying the terms of Article 332 of the Penal Code and controlling rigidly the disposal of waste molasses by said centrals.

The lack of legislation mentioned regarding drinking water did not prevent the Department of Health from urging the installation of filters or other purifying devices in the approved of aqueducts, as it was advised by this Office, and on insisting on this point the authors of the plans and the municipalities excused themselves with the fact that appropriations were not sufficient to pay for filters or other means of purification.

Had the necessary legislation been in force, the municipalities on making their ordinances regarding the matter, would have included the sanitary improvements, referred to in the total cost of the aqueduct, or else the Department of Health would not have permitted its construction, or perhaps the Executive Council would have not approved of the ordinances made by the municipalities. That this would have been possible is demonstrated by the good results obtained by this Office in the censure exerted in relation with the drainage of projected sewerage systems into streams, thus enforcing the dispositions of Article 332 of the Penal Code.

The Manatí, Comerío and Maricao municipalities among others have had to raise money or transfer funds from other appropriations in order to pay the cost of the purification plant ordered by the Department of Health.

It has not as yet perhaps been as fully appreciated in Porto Rico as it should be, that a good system of water supply and a sewerage disposal including a plant for the cremation of refuse, and good paving of streets are more efficient and practical measures for avoiding the spread of infectious diseases, than is the maintenance of many physicians, and the construction of splendid hospitals and sanitariums.

Another important legislative measure which should be enacted either by the Insular Board of Health or by the Insular Legislature, is one which would complete the law as regards drinking water and sewerage and which

would constitute in Porto Rico a body of professional men as operators of purifying plants for drinking water, baths and sewerage systems. An Examining Board should also be formed to examine those desiring to fill such a position, as such a body of skilled operators will be an absolute necessity as soon as purifying plants for sewerage exist in Comerío, Manatí, Maricao, Yauco, Cidra, Ciales and Trujillo Alto and the many other plants which will be constructed in the near future, as without such skilled operators the purifying plants would cease to be a guarantee to public health and would become public nuisances.

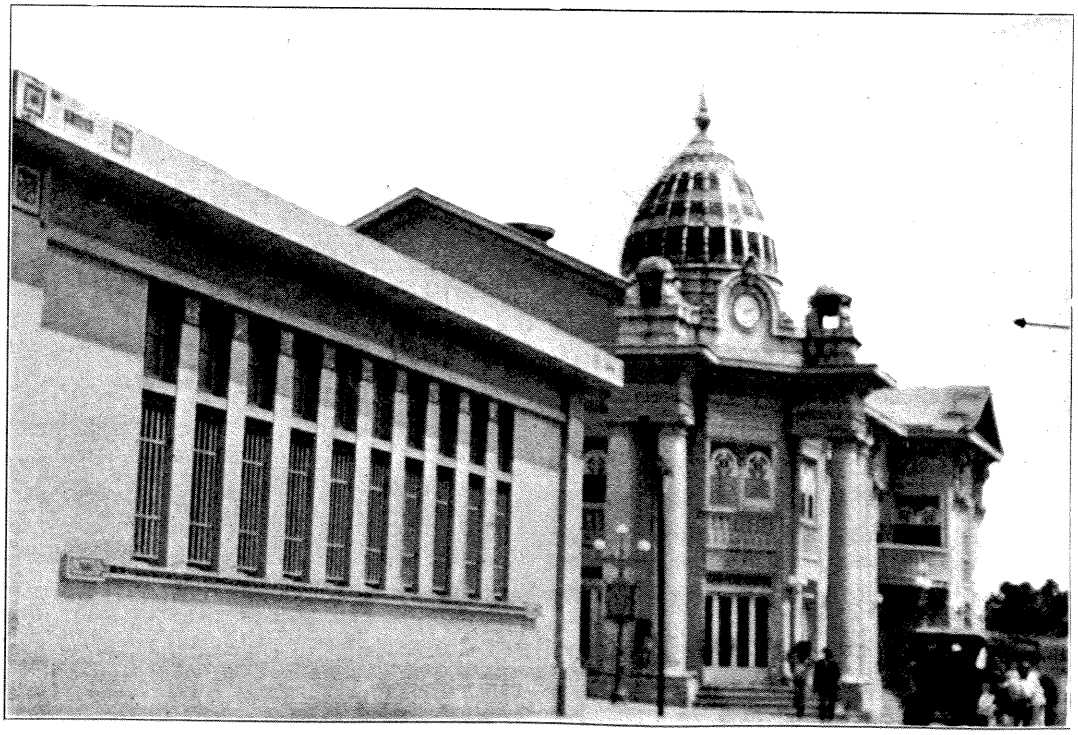
The aqueducts, sewerages systems and plans for the disposal of refuse having been constructed in towns of the island, it is up to the sanitary engineer to watch over the operation of said public works causing the municipalities to keep them in accordance with existing regulations concerning such matters.

A sanitary measure which should be demanded by the Department of Health, the financial resources of some of the municipalities being taken into consideration, is the acquisition of a portable plant of liquid clorin, thus making it possible for this Office to take the portable plant to any place where any epidemic of water born infections had developed, for the purpose of purifying the drinking water used by the town or to disinfect the sewerage in the epidemic source of origin.

Refuses and Filth: This is one of the sanitary branches where less improvement has been obtained as yet, which is due to the Island in general not giving due importance to the subject. The lack of efficient legislation regarding the matter making it impossible for the Department of Health to give it the necessary attention.

But the time has come for this problem to be solved. In several cities and towns as in San Juan, for instance, the manner in which refuse is destroyed constitutes a public nuisance.

It is true that in that city and others as large as Ponce, Mayagüez, and Caguas the proper solution of the problem would be somewhat expensive, but in the rest of the towns the problem could be economically solved by the treat-



EL TEATRO YAGÜEZ Y EL "ROYAL BANK OF CANADA".—MODERN TEMPLES OF FINANCE AND AMUSEMENT

ment of the refuse, being modified in the houses so as to separate the organic and inorganic matter, the first being taken to a suitable place where the residue may be buried in the ground and then properly covered or else ploughed into the soil.

The way in which this work is being done at present by depositing domestic wastes in the near surroundings of towns and sometimes close to the public way, is very improper, it being a serious sanitary deficiency whose far-extending bad effects can be appreciated by considering that said dumps are not only breeding spots for rats, but also for flies, the latter being the most dangerous of all the insect carriers of disease, such as typhoid fever, cholera, intestinal infections of various types, and many others.

Sunlight, Ventilation and Campaigns Against Rats. The legislation which rules these subjects ought to be revised, intensifying same as regards dwelling houses. As to sunlight being required for warehouses and other similar buildings, it could be modified to meet their requirements. In theaters and halls for conferences, where a great number of people gather, it is necessary to urge that the best ventilating conditions should be properly provided for.

The Insular Government should also provide money to continue the making of buildings rat proof, especially in the towns which import provisions from the exterior.

Extinction of Mosquitoes. On striving to solve the problem of the mosquito, the wisest expenditure that a community can make is to construct a system of aqueducts and sewers, as they largely eliminate the sources of origin of this plague, such as deposits of water in the houses and latrines, the overflowing of wells on watertight soils, etc.

The laying out of streets in all urban zones must also be done in accordance with the topography of the soil, having always in mind that streets are the natural location for the sewers of towns. In the case of marshy lowlands and their gutters, the channels of the surface water which can not drain to the streets and public sewers, the oiling of their stagnant water will not be sufficient, it being but a temporary measure. On the contrary they should be studied by the sanitary engineer, who must decide whether such soils can be dried or not, for, in case of large pools that can not be dried, cheap and permanent larvae killers such as fish should be applied. Said larvae killers also to be introduced into the large draining trenches or swamps where the water runs slowly. The extending use of soil for agricultural purposes, aided by the fish as larvae-killers will eliminate in the near future the problem of malaria, which exists today in many rural zones.

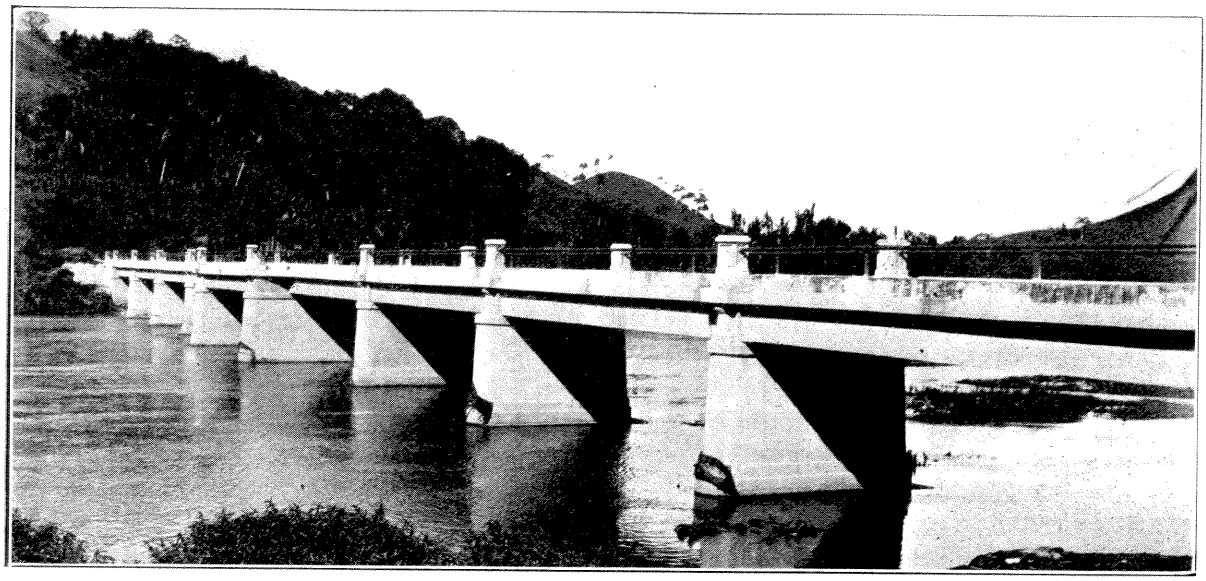
Protection Against Dust and Gases. The protection against dust, asfyxiating gases and fumes which may be developed from industries, is a problem which as yet has not arisen in the Island, but which, in the writer's opinion, will appear, as soon as capitalists, whether from the United States or from Porto Rico, see the riches that can be derived from the Island's hydraulic power.

It will then be solved efficiently, if the experience acquired in the United States and other countries such as Germany, England, France and Switzerland, regarding the matter, are availed of.

Necessary Measures. The Department of Health will never perform its duty efficiently unless it enforces the work of the sanitary regulations. It should be enabled to provide higher pay for its subordinate personnel in accordance to their services; furthermore have available larger sums for its work so vital to the island, and thus be enabled to increase the personnel, especially that of the Sanitary Engineering Bureau, to carry out a campaign on sanitary education all over the Island.

The duty of said office is overwhelming at present; for example, about 4,000 plans on constructions, reconstructions, modifications, enlargements and repairs of buildings and about 2,000 plans on plumbing and some 150 plans on sanitary matters of urbanization, are examined yearly.

When all the towns of the Island have the public works which they should have for the good of the public, it will be impossible for this Bureau, already oberburdened, to work officiently with the small personnel it has at its disposal at present.



PUENTE DE TRUJILLO ALTO, SOBRE EL RÍO GRANDE.
THE WATER SUPPLY FOR MANY TOWNS CROSSED BY ONE OF THE LONGEST BRIDGES OF THE ISLAND.

Porto Rico's Salubrity

By José Gómez Brioso, M.D.,

Specialist on Tropical and Infectious Diseases. Former Director of the Bureau of Infectious Diseases, Department of Health. Journalist.

Porto Rico is generally healthy, the diseases which cause trouble to some extent being of the same nature as those of other tropical countries but less severe due to the island's most favorable conditions.

The virulent epidemics which do so much damage wherever they appear have been of short duration if not always mild. In fact, it would seem as if the life of the troublesome germ was influenced by climate, soil, water, air and other factors which in their reactions resemble the impetuous and light hearted nature of Porto Ricans.

The promiscuous way of living of the people in densely populated cities, and unnecessary exposed conditions in the country regions, suffering in the former case the contamination of crowded dwellings and in the latter exposure to the weather, both are elements contributing to a greater mortality, one which though high is not exaggerated and this tends to present very interesting factors to the observer.

The Two Factors Responsible for the High Mortality. There are two visible factors which are responsible for the high mortality: the infantile mortality and the mortality due to tuberculosis.

In the study of the first disease, the study of the gastro-intestinal tract holds the most important place. The original cause of it is found in the general lack of knowledge of the best system to guide their children's growth and development, and to maintain an index of endurance of the children who depend on the care of parents or guardians.

On considering the second factor it must be observed that it stands in unreliable figures, because of the direct contamination from parents to children in their early stage of life, due to deficiencies of home hygiene and to the exalted love of the Porto Rican mother, which often establishes dangerous promiscuity for children, thus exposing them to conditions favoring contamination and the future development of the disease.

Tuberculosis in the First Place. Tuberculosis ranks first among the contagious and

transmitable diseases which decrease Porto Rico's population. The deaths due to tuberculosis in 1922 reached 2,667, the highest figure registered since 1913, when it reached 1,719 that is the 6.6 per cent of the total mortality rate, five years later, in 1918, however, the deaths due to tuberculosis were 2,505, or 7.3 per cent of that year's total mortality; it now being 8.9 per cent.

The number of tubercular cases existing in Porto Rico are only known through an approximate estimate, because the reports which the law obliges are not given, thus making it very difficult to obtain the actual figures.

Notwithstanding this, the total of 9,000 persons affected by the bacillus of tuberculosis in its various forms has been accepted, the people so affected being distributed all over the Island, in the cities rather than in rural districts, in the coast towns, rather than in mountainous regions, and in the densely inhabited cities, where small rooms without light and without ventilation favor the development of germs.

Organizations Dedicated to Tuberculosis Prevention. For the last ten years various efficient organizations have devoted their efforts to fight the white plague, and by secluding in hospitals the most serious cases, by the scientific treatment of the incipient cases, and through propaganda concerning the measures to be employed to avoid contamination, an active war is being fought to ameliorate the results of the disease, which chooses for its victims the youth in the most precious productive age.

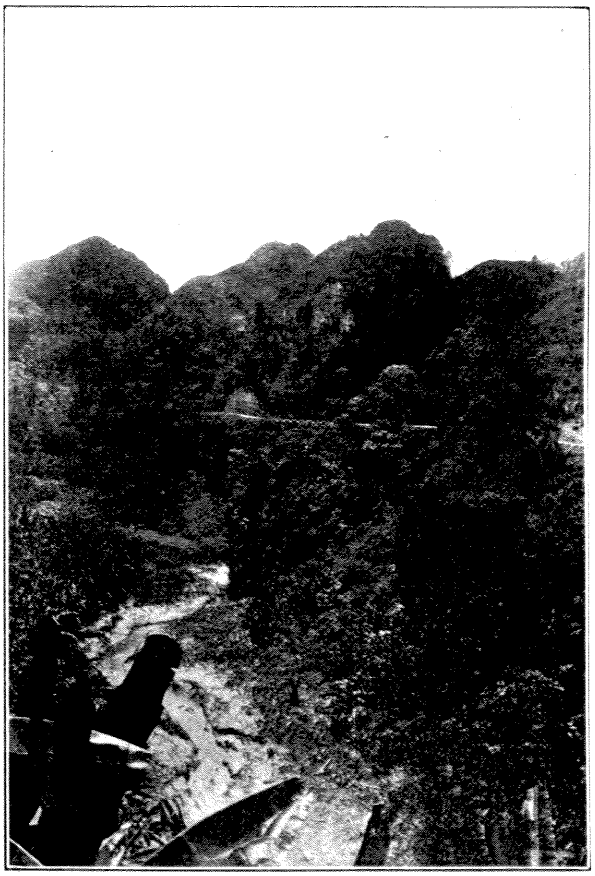
The death of children being a loss to Porto Rico, which must be estimated and appreciated as dollars in its active capital.

Infantile Mortality. The infantile mortality of from 151 to 158 per thousand births is the second factor contributing to the general mortality. In this phase some improvement has been attained by virtue of constant educational action supported to the limits of the power of spoken propaganda, thus gaining 29.6 for each thousand births since 1916 when the rate was 171 to 174 per thousand.

If the decrease in the mortality rate prior to the last five years could be estimated, it can be asserted that while in 1916 the percentage per thousand was 320, in 1921 it only reached 272.

Health Index. It is an exceedingly hard and complex problem to estimate the healthiness of the island by the mere statistical rates of tuberculosis and infantile mortality, for there are other elements besides diseases responsible, such as sanitary conditions, climate, malnutrition and others, which individually or in combination greatly lessen body resistance, this favoring parasitic diseases and others depending upon poor vitality.

Malaria Ranks Third. Next to the tuberculosis bacillus comes the malarial plasmodium which has overrun the island in certain epochs and at present troubles the inhabitants of various regions such as those of the northern and



SUMIDERO DEL RÍO CAMUY.

BABY WOODED MOUNTAINS AND SPARKLING, BABBLING BROOKS—CHARMING VISTAS AND HEALTH-GIVING AIR.

southern coasts. It is an endemic disease with which the people are so familiar, that unless it is serious they do not consult a physician as they know the common symptoms and treatment for the malady.

Obscure and Serious Forms. Notwithstanding the above statement every once in a while the population is alarmed by the number of infected persons and by the seriousness of its symptoms, which breaks its usual manifestations and adopts features of extraordinary intensity beyond their understanding, when they imagine that such features are due to an unknown disease which has nothing to do with malaria.

The benign tertian forms commonly known as "fevers," are the ones most occurring on the Island, the laboratories detecting at times the malignant tertian parasite, in its various forms and stages.

Noteworthy Anti-Malarial Campaigns. There have been great efforts made toward the eradication of the mosquito in the low coastlands, the mosquito having been eliminated in some limited regions. But no complete solution of the problem has been reached, due to the lack of sufficient financial means to carry on such an expensive campaign. The Sanitation Service has a section devoted to the matter, which takes care of the destruction of the larvae in the places where they mostly occur.

In 1921 the deaths due to malaria were 1,273 and 1,108 in 1922.

The ravages of the disease are troublesome and expensive to the community as it is known by experience, the great damages they cause through eliminating workers to a large extent, and also especially by the injuries left in the body, and the association which the disease effects with other diseases, thus disguising and influencing their symptoms. Malaria, however, does not assume at present the importance it did in former years, before the sanitary authorities helped to educate the people concerning how to prevent the disease by destroying breeding places.

Malarial Zones. The zones where malaria was comparatively prevalent in 1922 lay in the northern districts from Arecibo to Manatí, including Barceloneta; in the south from Cabo Rojo to Maricao across Lajas, Yauco, Guayanilla, Ponce, Coamo, Guayama and Patillas and Maunabo and in the west from Aguadilla to Cabo Rojo, across Aguada, Añasco, Mayaguez and Rincón.

The Uncinariasis. The conscientious works of Drs. Bailey K. Ashford, P. Gutiérrez Igaravídez and King, the results from which have appeared in several volumes and numerous pamphlets, give an accurate idea of the reach of anemia caused by the uncinaria, of its spreading to such a great extent that it threatens the health of 90 per cent of the population and also point out the most efficient means to fight that disease.

The living conditions of a large number of the people in the Island's country districts are the active factors which facilitate the acquisition of a feared and destructive disease.

The parasitic nature and the life of the parasite being well demonstrated, it only needs to be stated that the Island's country people customarily walk barefooted, in order to see clearly that such practice affords the most sure entrance for the parasite which is in human excreta, and which is sometimes present in places through which people must walk in their daily work.

The town districts where the presence of uncinaria has shown itself more notably during the year of 1922 are Mayaguez, San Sebastián, Arecibo, Moca, San Germán, Aguada and Quebradillas.

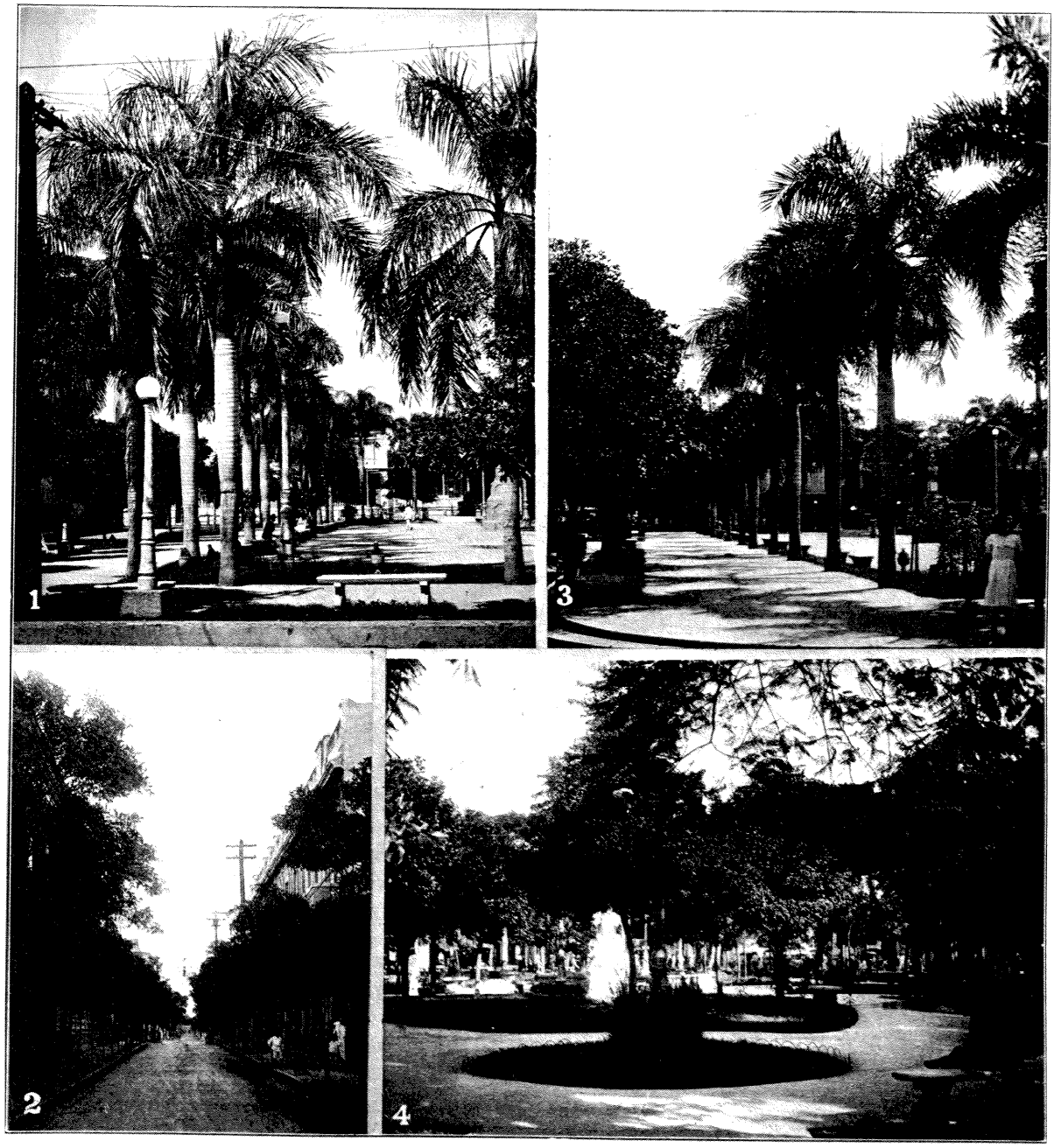
Typhoid Fever. Other diseases common in Porto Rico which are comprised in the group of contagious and avoidable diseases are the typhoid infections and the filariasis. The first being endimical and spread all over the Island, especially in some towns, due to promiscuity of the population and to inefficient system of public water supply.

The experience of the writer acquired in time of outbreaks of an epidemic tendency, leads him to emphasize the importance of the direct contagion by carriers of the bacillus, rather than to the other causes of the disease.

It is worth stating that in San Juan the existence of over eight cases of typhoid fever

were observed recently, they being located in three streets which fact eliminated the factor of contiguity in the case. Most of the cases were among children and young people.

When these cases occurred, analysis of drinking water was made which did not lead to any definite conclusions. A careful examination of the conditions of life of the infected persons, however, led to the belief that the owner of a small place where refreshing beverages were prepared and sold, was suffering from chronic fever supposed to be malarial. The sanitary works asserted that that person was a carrier of the Eberth bacillus and



SITIOS DE RECREO Y ESPARCIMIENTO: (1 Y 2) PLAZA DE LAS DELICIAS, (3) CALLE CRISTINA, (4) PLAZA DEGETAU. "BEAUTIFUL PONCE".

that the means of propagation of the disease was cane-juice which the infected persons used to drink in that place.

Typhoid is milder at present, the especial cases exempt having modified the strength of its virulence, adopting prolonged forms of short intensity as compared with the terrible virulence which was observed in San Juan and other towns during the years from 1880 to 1890.

The hygiene developed in the Island, the publication of scientific knowledge in understandable terms and the salubrity of the towns obtained through constant sanitary activities, have given the results mentioned.

The vaccination against typhoid, as established regularly and systematically all over the Island, also greatly co-operates to the extinction of the disease if such extinction be possible.

The Filariasis. The other disease mentioned, the well known filariasis has generalized notably in the population with varied features which have to be observed in the determination of the diagnosis in a wide group of sufferings especially in the lymphatic system of the woman.

The writer has had the opportunity to compare very serious cases of filariasis in connection with other parasites, said cases having been of short and fatal duration with pernicious character. However, it should be stated that the mortality does not point out a notable proportion of deaths due to that disease.

The Diphtheria. An affection of some prominence among the infantile population in the last few years, is diphtheria, with small mortality due to the good action of the antitoxic serum which reduces the deaths to nearly inappreciable figures. It must, however, be stated that the observations in the search for the cause of propagation of the disease in the nourishing environs of the bacillar agent, has not been successful, though splendid and conclusive results have often been obtained when endeavoring to locate the carriers of the bacillus. Valuable information proving this, however, cannot be given due to lack of space.

There were sixty severe cases of diphtheria in 1922 of which the Department of Health had official knowledge, they having been confirmed by bacteriological tests. But the mortality was 59 per cent, thus proving that there were cases which were not reported and hence no doubt improperly treated.

Feverish Exanthemas. The feverish exanthemas, smallpox, varicella, measles, scarlatina, pellagra, roseola and others known by the Insular Health Service do not greatly trouble the population, the statistics not showing over nine cases of smallpox which appeared in the district of San Germán, caused by a traveler from Santo Domingo, the exanthema having appeared a few days after his arrival in San Germán. The vigorous sanitary work in these cases overpowered the disease, also giving an opportunity to carry out a vast number of vaccinations in the regions exposed to contagion.

The rest of diseases mentioned have required but slight sanitary attention, such attention being rather preventive than for correction.

Infantile Tetanus. Infantile tetanus is a destroyer of children, its type of mortality being so high that it seriously preoccupies the attention of the sanitary authorities, it not having been possible to reach the homes with the education, and with the usual measures to avoid the infection and make the situation normal.

Educational Work. A meritorious educational work and the campaign of imparting knowledges is now being initiated through the Sanitary Nurse, the duty of the nurse being to get in touch with the mothers of children to advise and teach them the best way to care for their children, to lead them and to point out to them the correct ways of the hygiene and health. Social organizations working in Porto Rico, such as the Red Cross, and the Bureau of Infancy of the Labor Department at Washington, co-operate with the institution of the Sanitary Nurse, which works in San Juan, Ponce, Mayaguez, Aguadilla, Arecibo, Guayama, Humacao, Utuado, Yauco, Adjuntas, Coamo and other places of the center of the Island.

The statistics on mortality record 496 deaths due to infantile tetanus, said figure raising the infantile mortality 4 per cent.

Whooping-cough. No deaths have been recorded in Porto Rico due to whooping-cough, which might give a note of danger to such disease.

Leprosy. The leper is the object of a special study entrusted to a skilled physician, who manages the Leprosery. The number of the patients is forty-four, twenty-nine males and fifteen females. It is observed that in the low southwestern regions of the island the greater number of cases have appeared, and perhaps careful investigation might add new patients to the present group which is treated on Cabras Island.

The Bubonic Plague and Other Contagious Diseases. The bubonic plague has caused no uneasiness since its outbreak from February 17th to April 12th, 1922, when thirty-three cases were reported of whom twenty died.

As regards other contagious diseases no mention is made because they are so rare and the Island's salubrity is good, notwithstanding the high numerals of its mortality.

General Mortality. In 1912 the deaths were 27,152, in 1917 they were 38,675 and in 1922, 29,666. The mortality rate per thousand of population in those years being 23.6 in 1912, 31.5 in 1917 and of 22.2 in 1922.

In those figures were included the infantile mortality of children less than five years old, i. e. 5,862 in 1912, 9,920 in 1917 and 6,127 in 1922, which added to the deaths of children less than one year of age, make a total of 12,556 in 1912, 18,599 in 1917 and of 14,088 in 1922, said figures representing 46.2%, 49% and 47.6% of the general mortality.

If the number of deaths from tuberculosis, which in 1913 were 1,737, 2,707 in 1917, and 2,705 in 1922 are added to those of infantile mortality, the mortality from them is of 52.6%, 56% and 56.6% of the general mortality of the years 1912, 1917 and 1922 respectively.

The Solution of the Problem—Sanitary Education. The outstanding features of the above being considered it can be said that the sanitary problem of the Island is a matter of education, education of which the basis must be continuous labor to obtain the co-operation of the people in order to carry out the sanitation of homes and towns.

The mortality figure which at first sight might appear as a demonstration of unhealthiness, is in fact but the exponent of the lack of knowledge or low appreciation of the precepts of public and private hygiene.

The present initiatives are solving the problem even with the unfortunate slow full cooperation of the people, faster indeed than it could be hoped from a society which is not as quick as it should be to recognize that the sanitary precepts are a benefit to the community. While many of the Island's inhabitants are still indifferent they are not gloomy nor sullen, as it was but a few years ago, due to unnecessary bother caused by the sanitary inspectors and his regulations, and it will soon advance and become a decisive factor in the great victory over the high figures of mortality; thus offering to the world the proof that the Island of Porto Rico, practically free from diseases, is a true paradise caressed by the light winds of the Caribbean Sea.

UN PROGRESISTA CIUDADANO DE SAN JUAN RODEA A SUS HIJOS DE AMBIENTE PROPICIO.
A PROGRESSIVE CITIZEN OF SAN JUAN PROVIDES ADEQUATE SURROUNDINGS FOR HIS CHILDREN.

Child Culture

By Ramón Lavandero, M.D.,

Former Assistant Director of the Bureau of Contagious Diseases and of the Bureau of Children's Hygiene of the Department of Health. Vice-President of the Northern District Medical Association.

It is an established fact that, in spite of the medical and sanitary efforts used thruout the world for the prevention and cure of disease, various pathological conditions remain even to mature age that had their origin in small defects back in childhood when they could and should have been corrected. This fact was clearly demonstrated during the Compulsory Military Service when a great part of the youth was declared physically unfit. If this is the case during youth, it is easy to foresee what must occur in adult age. We seldom see a grown person whose actual physiological type corresponds to his age.

Every disease during life, light or serious, leaves its print on the body by helping organic breakdown and accelerates old age at which time any corrective hygienic effort is almost useless. If the improvement of the *average vital standard* of a country is desired, it is necessary that the work should be started in childhood. Therefor, it is necessary to make a preliminary investigation in order to know precisely the conditions of life of the infantile population.

To try to improve conditions so as to provide for the child a good moral, domestic, economic and educational environment and to avoid their

undue exposure to infections which impede and hinder normal development, is to accomplish a true sanitary and scientific work which would in the near future show its power in statistics on infantile and general mortality.

In February, 1921, the Bureau of Infantile Hygiene, whose activities are entrusted to the Bureau of Contagious Diseases and Statistics of the Department of Health of this island, was established in accordance with these views and aimed at the racial betterment of the people.

Bureau of Infantile Hygiene: The personnel of the Bureau of Infantile Hygiene consists of a Director, a medical officer who is the Assistant Director of the Bureau of Contagious Diseases and Statistics, two visiting nurses and a sanitary inspector.

Zone Under Study: The object and administrative functions of this Bureau are: 1st. Investigation of the living conditions and hygienical status of the infantile population in a zone of the city of San Juan inhabited by laborers and poor people. This zone being bounded as follows: to the North by Ponce de León Avenue; to the East, to stop 26½; to the South by the mangroves which limit the bay of San Juan; and to the West by Cerra Street; 2nd. Investigation of the sanitary conditions of dwellings in those limits; 3rd. Securing data on pathological conditions even apparently slight deviations from normal in children from one to five years old, at the same time taking note of the civil status of parents, the economical condition of the family, kind of employment, etc.; 4th. Investigation of the number and physical condition of pregnant women; 5th. Data on the number of tubercular cases, especially those who live among children; 6th. Percentage determination of common diseases as well as of all suspected cases; 7th. Report to the Bureau of Contagious Diseases of conditions found to exist. Special attention being given to parasytic diseases of the intestinal tract.

Work of the Personnel: 1st. Inspection of the houses and the numbering of same by the sanitary inspector, filling out a card prepared for that purpose with the existing sanitary conditions in the interior of dwellings and their surroundings; number of dwellings, number of persons occupying each dwelling, its size, capacity, exterior openings, etc.; 2nd. Report to the office of local sanitation of all sanitary and building deficiencies found, in order that they should be corrected; 3rd. Home visits by visiting nurses to make physical examinations of all children from one to five years old, of pregnant women and of all persons who are sick at home; 4th. Medical examinations by the Director of the Bureau, of children and adults who are not in good physical condition or who are sick, as well as women with child. Hygienic advice, practical talks, or actual isolation of cases according to their requirements; 5th. Microscopic examination of the feces of a certain number of persons of each zone, due treatment being applied twice a week by an officer of the Bureau, according to the standards of the Department of Health; 6th. Gathering of pathological specimens of suspected cases to be sent to the Byological Laboratory; 7th. Weekly statistical summaries drawn up from the data obtained, and a monthly report sent to the Bureau of Contagious Diseases and Statistics.

Infantile Morbidity: The data obtained in the preliminary investigation is so numerous and varied that it cannot be treated in detail in this article. Here as elsewhere the number of children suffering from skin parasitic diseases with hypertrophied lymph nodes in various parts of the body, bad nutrition due to foods inappropriate in quantity or quality, poor living and unhygienic conditions, is appalling.

Reforms Needed: It is absolutely necessary that there should be established in the island a health center where those representing the activities of the various public and private institutions for social welfare might meet. In order to secure a complete co-operative plan for their work, it would be necessary to establish a hospital for children's diseases. The Bureau of Infantile Hygiene as manager, teacher and inspector, the Junior Red Cross, with its body of visiting nurses, the school physicians and the Anti-tuberculous League with a dispensary to be the branches of such an institution. An institution of this kind would save unnecessary expense and duplication.

It is unfortunate that lack of universal co-operation exists at present in the island, the Department of Health not having co-operated as yet with the work of the other organizations, now on the field. For instance, though the Bureau of

Infantile Hygiene has no reports as to the work carried out by the Red Cross, it is more than likely that it is similar to that of this Bureau, and if it be so, would it not be wise to unite both activities?

It is hoped that this plan may soon be realized, thus making it possible to outline the problem of the infantile health, in its true aspects, that problem being the first to be solved by a community which aims at the future social welfare.

School Hygiene in Porto Rico

By A. Fernós Isern, M.D.,

Director of School Hygiene of San Juan. Ex-Chief of the Bureau of Transmissible Diseases and Statistics of the Insular Department of Health. Assistant Insular Commissioner of Health, and Member of the Academy of Medicine of Porto Rico.

Progress of Education. The application of the principles of hygiene in the public schools of Porto Rico is not a matter of recent years. It is well known that one of the most notable effects of American sovereignty in Porto Rico has been the extraordinary progress of public education. A large number of splendid buildings have been erected and the number of such buildings continues to grow in the island, wherein numberless children who attend school find room. The location and construction of these buildings, as well as the distribution of space therein and their equipment, are in harmony with the requirements of science.

Official medical attention has likewise reached the schools during different periods: In the application of vaccine virus to check the spread of epidemics of measles; during the outbreaks of diphtheria, and so forth. But this, however, has happened in periodical and circumstantial form.

Medical School Inspection. The organization of medical school inspection is something more recent. The idea had been brewing for some time among the physicians and hygienists, and is now under frank and powerful development. Insular and municipal organizations are surely and decidedly advancing towards that end, so far as their resources will permit.

The capital of the island—its most important and wealthiest municipality—has organized a Division of School Hygiene, comparable favorably, within fair relativity, with other similar organizations outside of the island.

With the co-operation of distinguished physicians residing in the respective towns, the Porto Rican Red Cross Chapter has practiced regular medical inspection in Bayamón and Manatí. This inspection has been carried on in Barranquitas by a trained nurse.

In co-operation with the local Red Cross and the insular health officers, the city of Guayama has a service of school hygiene.

In passing the last appropriation act the insular Legislature authorized the appointment of seven medical school inspectors for the second and third class towns of the seven districts into which the island is divided.

The Junior Red Cross maintains and pays for a rural medical inspection service in charge of two physicians who travel throughout the island in the performance of their duties.

The Children's Bureau of the Federal Department of Labor maintained two health teachers during all of last year in each of the towns of Bayamón, Ponce, Comerío and Quebradillas. Besides weighing and measuring the stature of the children, they taught them the use of toothbrushes and simple rules of hygiene.

These last-named systems represent a beautiful principle, and the officers thereof have rendered valuable and permanent services, though limited by the magnitude of the task and the scarcity of personnel.

The Charity Schools maintained by the people of Porto Rico in Santurce have always had a regular medical service to look after school hygiene in the institutions. Thanks to the creation of new positions by the insular Legislature, it

has become possible for the Department of Health, on which these schools depend, to appoint an eye, nose, ear and throat specialist to examine and treat the inmates.

Organization in San Juan. In the city of San Juan the organization has attained full growth. The municipal Department of Education has established and maintains its Division of School Hygiene under the following organization: One medical director, two medical inspectors, one eye, nose, ear and throat specialist, four dentists and nine nurses. Each one of the physicians and dentists has his respective office, conveniently equipped and located, in one of the schoolhouses of his district.

The functions of the physician are as follows:

1. To make a general physical examination of each child in his jurisdiction.
2. First assistance in cases of emergency.
3. Visits to the homes of the children for purposes of investigation and hygienic instruction.
4. Treatment in cases where it appears that the relatives of the child can not afford it.

The specialist is in charge of the examination and treatment of such children of the poor as from a general examination show any affection of the organs wherewith his specialty is concerned.

The dentists are entrusted with the examination of the children's teeth; with the service of notice on parents of such defects as may be observed, and with treatment of these defects in the case of poor children.

For the treatment of the children of the poor the service also counts on the generous and free co-operation of distinguished specialists of San Juan, and of clinical institutions of solid reputation endowed with complete equipment.

Polyclinic School Dispensary. In the plan which the municipalities are developing, the aim is the establishment of a polyclinic school dispensary where school children may resort at established hours in demand of adequate treatment. This dispensary will be served voluntarily and free of cost by the same specialists who at present co-operate at their own offices.

Under the present system each child is examined at least once a year. The child's record follows it from grade to grade, from the time of his admission to school to the time of his graduation from the eighth grade.

Its progress and slumps in intellectual labor are noted and surveyed in their possible relation to the child's physical condition. Absences because of disease are investigated by a visiting nurse who carries instruction in hygiene to the home, thus joining home and school in safeguarding the child's health, such educational work not only reaching the child, but its parents also in many instances.

OFICINA DENTAL DEL SERVICIO DE HIGIENE ESCOLAR. GENTLE HANDS DIRECTED BY A TRAINED BRAIN ADMINISTERING TO CHILDHOOD NEEDS.

The record of each child shows its past sicknesses, present condition and mental work, and the physician instructs the teacher as to the proper interpretation of determined physical modalities which are the result of morbid antecedents or manifestations of atavic influx.

Medico-Social Labor. When the causes are social, when effects are due to need in the home (this fatal enemy of happiness availing itself of multiple and diverse means of manifesting itself) the Service of School Hygiene

seeks the aid of public and charitable organizations such as the Red Cross, Masonic Lodges and others, for such relief as will lift from the weak shoulders of the children such enormous weights as hunger, nakedness, lack of adequate shelter, disease, weak eyesight, defective hearing, etc.

This, so that the fruits of learning may be eagerly received and easily acquired by brains that are in the process of formation and that are a gestation of humanity, a living future, real though unknown, but which will be for good and for happiness or for pain and misfortune, in a greater or lesser degree, but within human possibilities, according to whether we now carefully cultivate and protect those mites to whom we ourselves have given life, or whether we allow them to grow in an unequal fight with the same obstacles that we ourselves met, some to fall forever and perish, and others to enter the struggle for life burdened by an unconquerable handicap.

The Insular Biological Laboratory

By Francisco Hernández, M.D.,

Director of the Insular Biological Laboratory.

The first laboratory of health in Porto Rico was instituted when the Superior Board of Health was established by the general order of April 30th, 1900.

First Commission Appointed and Its Report. On May 4th, 1900, the Board held its first meeting and named a commission to visit the Station for Smallpox Vacine, to investigate whether said Station could furnish vaccines in sufficient quantity in case of an epidemic.

The Commission presented its report at the following session, stating that the Station was functioning in perfect order, filling all its requirements and accomplishing its work with an annual budget of $2,337.

Great Aid at the Time of the Arecibo Smallpox Epidemic. During the year 1902 a total of 154,920 vaccines were prepared in the laboratory, which were successfully employed all over the island, thus avoiding the dissemination of the smallpox epidemic then existing in Arecibo. But the easy and rapid transportation of vaccines prepared in the United States and the small need for same in Porto Rico during the following years caused the discontinuance of this Station.

Health Chemical Laboratory. The Superior Board of Health established a chemical laboratory to inspect and determine the quality of the food stuff for public consumption. The personnel consisted of a chemist and an assistant, the place occupied by the laboratory being a small room in the Customs House. In 1902 the Board of Health was reorganized by the Legislature and this personnel was increased.

From 1900 to 1902 the laboratory examined only foodstuffs, giving special attention to milk, thus greatly improving this article of such fundamental importance to public health.

When the Bureau of Health and that of Charity and Prisons were combined to form the "Consolidated Department", the laboratory was entrusted with chemical investigations relative to legal cases and the chemical analysis of water for public use.

The Health Department was created in 1912, the Chemical Laboratory since then being named "Chemical Bromatological Laboratory", and its personnel was once more increased. Owing to the enactment of the Pure Food and Drugs Act, routine examination were carried on according to the methods advised by the Department of Agriculture at Washington.

The remarkable improvement attained in the quality of food articles and the care taken by merchants to meet the requirements demanded by public health, are due to the work of this laboratory backed by the Pure Food Act.

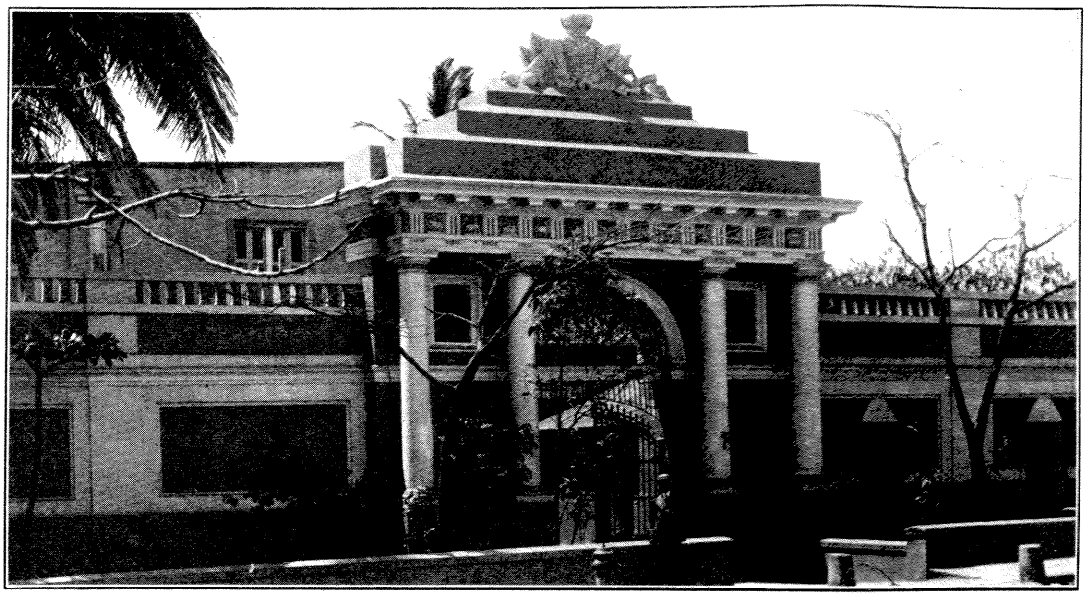
Laboratories on Pathology and Bacteriology. In 1904 the commission created to

study and treat uncinariasis, carried with it a small laboratory all over the Island to aid its diagnostic work.

This small laboratory chiefly used in the work done at Bayamón, Aibonito, Utuado and Río Piedras proved to the general public in a most practical way the value of careful microscopic and serological examinations in the diagnosis and treatment of disease.

These offices comprised of a dispensary for uncinariasis and tuberculosis cases and a clinical laboratory to be used also free of charge on charity cases by private practitioners. A visiting nurse was also assigned to each dispensary, to visit the homes of tubercular patients, and to educate the family on preventive measures against this disease.

The Insular Bacteriological Laboratory at



ELEGANTE Y SEVERA FACHADA DEL ARSENAL, CORONADA CON EL HISTÓRICO ESCUDO ESPAÑOL.
PORTAL OF THE OLD ARSENAL CROWNED BY THE HISTORICAL SPANISH COAT-OF-ARMS.

Formerly the diagnosis was largely based on clinical observations. Scientifically considered the island's statistics were therefore based on presumptions. This state of things aroused progressive physicians to ask of the Legislature the approval of a bill for the promotion of the study and prevention of tropical and contagious diseases, and for the continuance of the anti-uncinariasis campaign, this bill becoming a law in March, 1909.

Said law provided for the appointment of a pathologist for each one of the seven districts in which the island is divided, and a bacteriologist for the Insular Bacteriological Laboratory at San Juan, these appointments to be based on Civil Service Examinations. Seven physicians were then appointed and their headquarters established in the capital city of each district.

first largely devoted its efforts to examinations of milk and water, besides attending to any routine clinical work demanded of it. Because of the public benefit derived from this work the Legislature in 1912 further amended the Sanitary Laws in a more restricted and modern way, the two leading laboratories being made the Chemical Bromatological Laboratory, already mentioned and the Insular Biological Laboratory.

The Insular Biological Laboratory. The management of this laboratory is in charge of an experienced bacteriologist and adequate technical personnel. Its duties are to prepare vaccines and serums; to do all kinds of bacteriological analysis; to make pathological investigations regarding contagious and tropical diseases; and to render any other further service required by the Commissioner of Health.

The study of infectious and contagious diseases of man and the lower animals that may endanger public health has also been assigned to this laboratory.

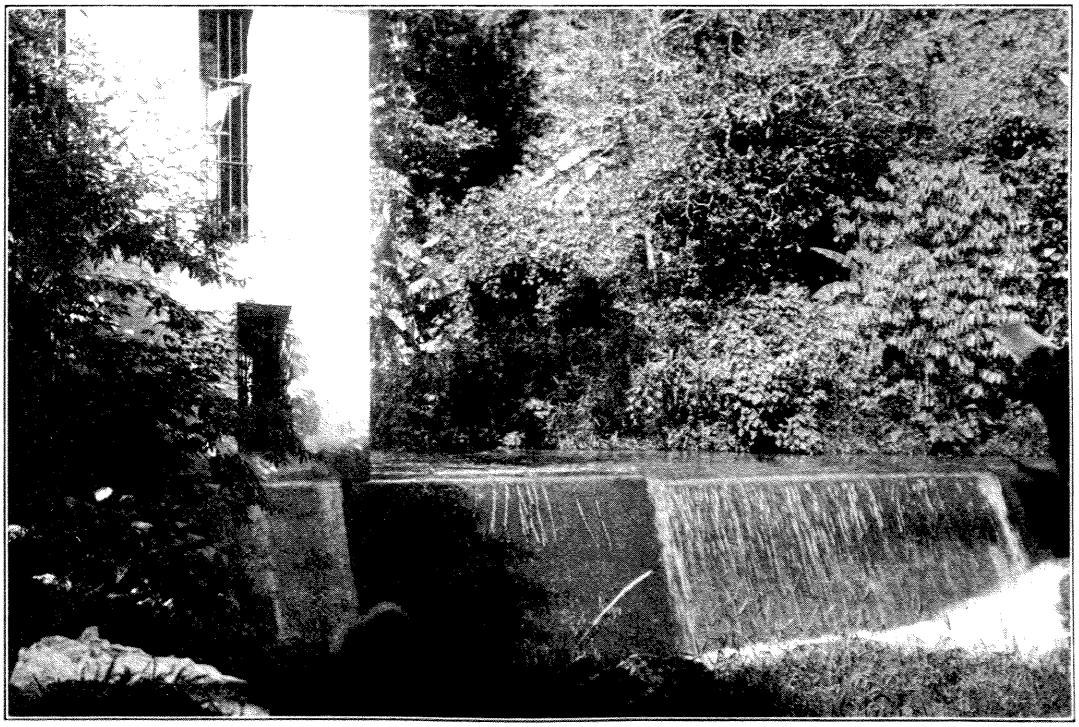
The clinical laboratory work of the several insular institutions, among others the Insane Asylum, the Boys' Charity School, the Leprosery and the Penitentiary is entrusted also to this laboratory. Clinical researches have been carried on in connection with the problems of malaria, uncinaria and tuberculosis eradication. The medical profession as a whole receives actual support and service from this institution.

The total number of analysis made by this laboratory since its foundation covers over 75,000 specimens; of these 7,667 were examined in 1922.

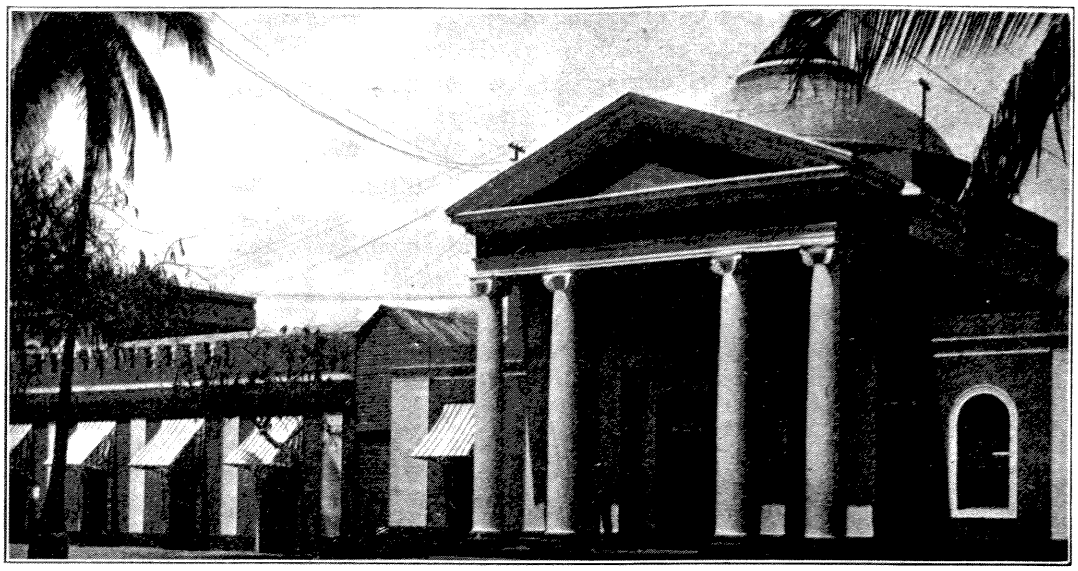
The two bubonic plague outbreaks in San Juan and other places in the Island have strongly proved the public benefit to be derived from an institution of this kind. All suspected human cases were examined by its staff. Cultures, inoculations and microscopic examinations were the daily routine work at this period, thus largely differentiating the bubonic cases from the other glandular diseases whose symptoms resemble those of bubonic plague.

The examination of rats accomplished the location of the focus of the disease. This enabled the taking of adequate measures to overpower the epidemic. Bubonic plague is primarily an infection among rats, prevailing among them before human beings became contaminated—and for this reason the number of rats examined since the first oubtreak up to this date is over two millions.

As governmental institutions like this represent the labor of numberless experts, and as it is impossible to give due credit to them all separately, it is the writer's wish to state, before closing, that besides its own staff, due credit should be given to the Insular Legislature and the Commissioner of Health for their most splendid support.



REPRESA DEL ACUEDUCTO Y PLANTA ELÉCTRICA DE GUAYAMA.
AN ALLY OF GOOD HEALTH—PLENTIFUL, PURE WATER.



CAPILLA DEL ARSENAL.—WHERE NAVAL HEROES OF OLD WORSHIPPED.

Institute of Tropical Medicine and Hygiene of Porto Rico

By Pedro Gutiérrez Igaravídez, M.D., B.Sc.,

Director of the Institute of Tropical Medicine and Hygiene. President of the Insular Board of Health. Ex-President of the Porto Rican Medical Association and of the Academy of Medicine. Life Secretary of the Academy of Medicine of Porto Rico. Member of various professional and scientific associations.

The Institute of Tropical Medicine and Hygiene is an organization created and sustained by the Government of Porto Rico for the study of diseases peculiar to this climate, as well as the means of preventing or avoiding them. It is located in San Juan and occupies the lower floor, facing the South, of the Government building known as the Pink Palace.

Founded in 1912, the Institute is therefore a new organism which has not yet completed its development, and which still requires time to interest public opinion in knowing and esteeming it at its true value to the end that it may be provided with the necessary elements for its maturity.

Tendencies: But, although this institution was organized only a few years ago, the spirit that guides it is the same that burned in that constellation of medical investigators which appeared on the horizon to shed the light of Science upon the fields of public hygiene at the dawn of a change of sovereignty and, especially, at the creation of the first Commission for the study of Anemia in Porto Rico. Activities then awakened first took the form of a study of our regional pathology and, now under one name, now under another, the Government of the Island has maintained from that time to this, scientific commissions charged with specific research problems.

The Institute of Tropical Medicine has taken up these problems and directs its attention not only to the investigation of the causes of disease and means of prevention thereof, but devotes itself to the teaching of this pathology and prophylactic hygiene.

Laboratory: It depends largely for this work upon a well-equipped laboratory, capable of carrying to a satisfactory conclusion any clinical problem. This laboratory possesses sections for the study of gross anatomy, serology, experi-

mental bacteriology and pathology, and histologic anatomy, as well as for the preparation of experimental vaccines.

Library: It is provided with an excellent library containing all of the recently published works on Tropical Medicine, subscribes to all of the periodicals and reviews of tropical medicine, hygiene and laboratory investigation of the principal countries of Europe and America, and their tropical possessions and dependencies and collects numerous pamphlets and monographs on diverse subjects relating to the Medical Sciences.

Pathological Museum: It is gradually developing a small museum of pathologic specimens obtained by the personnel of the Institute in their medical expeditions and from those contributed by our colleagues so that at any time those interested in such studies can find the necessary material with which to work.

Dispensary: Through its dispensary, opened to all who suffer from some unusual complaint requiring special analysis, it is enabled to conduct such clinical and laboratory investigation as may be necessary to their elucidation and to furnish to physicians who so request, specific diagnoses of those diseases in which the aid of the laboratory is indispensable.

Thus the knowledge of our insular pathology is being daily enriched: inexorable facts yielding more knowledge, and with more knowledge more precise methods of treatment for many diseases which until now had no known cause, nor specific or appropriate medication.

Diseases Under Study: Among the diseases which have been especially studied by this Institute should be noted: uncinariasis, schistosomiasis, filariasis, relapsing lymphangitis, the amebiasis, malaria, meningitis, sprue, beriberi, pellagra, certain dermatoses, and other diseases which although cosmopolitan, nevertheless have special characteristics in this land.

In order to study these diseases at their point of origin, as well as to form a medical geographic chart of the Island, the Institute at times makes research expeditions into the Interior. During the expeditions made to Utuado and Barceloneta, there was a total attendance of over 14,000 persons, and if the benefit which the patient received was great, great also was that received by the investigators, and greater still that of the young physicians who accompanied them from the abundant clinical material offered.

The Institute desires and seeks to obtain a small hospital for the constant observation of the diseases under study, annexed to which there should be a polyclinic for outpatients. Such a center would thus serve the high interests of a better medical education as well as select those cases of scientific value which should have hospital treatment.

Aspirations and Finality: Thus would the Institute realize its full mission and carry on the work for which it was created, i. e.

1. The study of diseases peculiar to this Island and the proper means of combating them.
2. The teaching of the facts thus obtained in clinic and dispensary, in the hospital ward, and at the laboratory table.
3. The sanitary instruction in those special prophylactic subjects that ought to be known by those who work for the Health Service.
4. To offer to investigators in tropical medicine who visit us the necessary material and scope for the development of their studies.

With what has so far been accomplished the Institute has succeeded in making itself known beyond the limits of the Island and this knowledge of its work binds it to the most reputable scientific centers of the world.

It serves the interests of the Island within the limitations noted above, and carries its contributions to the professional press in various countries, to medical encyclopedias, to Academies of Medicine and to Medical Congresses.

Organization: The organization of the Institute, according to the present law, consists of a director, a permanent member, a secretary.

The laboratory personnel comprises: a physician, one assistant, a chemist, and two assistants, bacteriological technicians.

The Solution of the Tuberculosis Problem

By E. Fernández García, B.Sc., M.D.,

Specialist on Diseases of the Respiratory Tract. Former Member of the Faculties of the University of Indiana (Medical School) and of the University of Porto Rico. Author of original contributions to Medical Science, especially concerning Tuberculosis and Chemical Pathology. Member of several professional and scientific societies.

Dedicated to the Victims of the White Plague.

As soon as all the people are fully convinced:

First, that public health is a commodity that can be purchased at reasonable cost;

Second, that tuberculosis is a slow developing, rather mild and most widespread disease — from every one hundred persons who die from all kinds of diseases and accidents, careful post-mortem examination reveals that over ninety per cent have, or have had, some tubercular lesion of some kind, somewhere in their body, and yet last year the total death rate from tuberculosis in Porto Rico amounted to less than three per thousand of the total population;

Third, that because this disease is so stealthy and widespread it has become a public menace —about nine per cent of the total death rate of the island is due to tuberculosis, which figure, it should be remembered, does not include the large number of semi-invalids that it leaves in its wake;

Fourth, that the unfortunate individual with tuberculosis, far from being responsible for his infection, which more than likely he innocently and unconsciously contracted in childhood, deserves our unstinted protection and sympathy for the following two strong reasons: in the first place, because of brotherly love, or that natural sympathy that is always felt for those who innocently suffer; and in the second, because as it is impossible to isolate all infected cases, the tubercular individual himself, kindly and intelligently cared for, becomes the only real safeguard against the further spreading of the infection by avoiding promiscuous contact that might endanger his family, friends and associates, while at the same time it protects him from dangerous superimposed secondary infections;

Fifth, that it is wise to seek prompt medical advice, for the early symptoms of tuberculosis are very similar to those of common and ordinary uncared for maladies;

Sixth, that any persistent, slow but pro-

LUGAR DONDE LAS ALMAS ENTRISTECIDAS POR EL DOLER VISLUMBRAN UNA NUEVA AURORA.—INSULAR SANITARIUM —WHERE THE FORLORN SOUL FINDS RENEWED HEALTH AND HAPPINESS.

gressive general debility, re-occurring pains of the chest and back with or without burning sensations, undue exhaustion on slight exertion, frequent coughs or colds, lack of appetite and loss of weight, general malaise or a feverish sensation after mid-day, frequent rosy cheeks when the individual himself feels weak and is losing weight and appetite, frequent tendency to "indigestion," etc.—any or all of these symptoms, recurring persistently, should be considered as an ominous sign, the danger signals of nature itself, although, fortunately, the disease at this stage is comparatively easily eradicated, provided *early* steps are taken;

And seventh, that the moderately, or even fairly advanced stages of tuberculosis are curable in a surprisingly large percentage of cases, but it not only involves greater risk of life, greater expense, loss of time and peace of mind, but especially it leaves too large a percentage of semi-invalids, reducing considerably their sphere of usefulness, besides the loss, sacrifice, worry and menace that their condition entails on them, their family and society.

In short, as soon as the public point of view may rest on the solid and sure foundation that modern medicine affords, that very moment the dreaded white plague will have lost its chief and most able ally—the ignorance and prejudice of the public concerning this disease.

Health authorities naturally should be the ones called on to prepare a practical and useful plan to combat it, one in which all the forces for good could not but co-operate. This immediately presupposes that the direction of the health department is in charge of a health officer who commands the respect and support of the public in general and the entire medical profession in particular.

Special stress should be laid on the respect that the Health Commissioner may deserve and receive from the medical profession as a whole, because the family physician is the one who is in constant and intelligent contact with the sick, and for that very reason is in the best position to judge of the limitations of each case; in other words, he is the most capable authority to serve as interpreter and adviser between the natural private interests of the patient and the inflexible principles of public health.

To eradicate the white plague, a successful program must recognize, in the first place, that all sanitary and social problems are direct or indirect tributaries to this great tuberculosis question. Taking for granted the true facts that practically every individual over fourteen years of age, has or has had some tubercular lesion of some sort, and that the great majority of the adult tubercular cases are, as a rule, due to the flaring up of latent tubercular infections, this flaring up depending largely upon the lowering of the natural resistance of the individual, either because of malnutrition, improper food or clothing, unhygienic housing conditions, secondary anaemia due to severe infections or tropical endemic diseases like malaria or hookworm, overwork and constant worry, uncleanly habits, etc.; in other words, the flaring up of tuberculosis depends on the index of natural resistance, and this natural resistance index depends upon definite social, sanitary and hereditary conditions capable of improvement.

A cursory examination of conditions shows, that the great proportion of the island's working population (that factor of progress on which so much depends for the actual accomplishment of fundamental improvements which make for progress) is undernourished and improperly clothed and housed. (How else could they be with the exceedingly low wages which they receive?) There has been no scientific investigation to determine the ill effects of those occupations which now produce the greatest percentage of tubercular cases among those who engage in them. So far, there have been no really trustworthy and comparatively reliable statistics on the incidence of tuberculosis; and no definite policy based on scientific facts, for what has been done to date has been rather the effort of good intentions, than of a carefully worked out scientific plan. Is not the time ripe now, when we have a capable and efficient Government and an intelligent Legislature always eager to meet actual public needs? Is it not wisdom to prepare, after careful investigation and study, a wise, practical, scientific program to be followed now

and in the future, particularly as we have a capable and progressive medical profession, active institutions for social progress that decidedly co-operate in public betterment, and above all else, a willing public?

The writer firmly believes that the time is most opportune to weld together all these factors that make for progress in order to most strongly focus public opinion on the solution of this vital problem at this most momentous time.

Slight reflection convinces one that by aiding to stamp out the white plague we not alone greatly lighten the unhappiness of the infected, but especially largely reduce the chance of contagion for ourselves, our children and our children's children "unto the third and fourth generation."

An intensive sanitary and educational campaign, widely spread and officially directed by the Department of Health, and with the hearty support of the Departments of Education, Justice and Agriculture and Labor, launched in such a way that the public will be convinced that, in faithfully and earnestly furthering such a program, they are doing real, important work in furthering the highest interests of public health; such a movement will be sure to receive most enthusiastic support and impulse from all religious, political and social institutions. An intensive and defensive campaign of this nature, carried out for a reasonable length of time, will most certainly prove the very strongest factor for the betterment of social and sanitary conditions in general and tuberculosis in particular.

A campaign of this sort will make even more efficient and effective the work of the Government agencies, especially the Departments of Health and Education.

Even now the Department of Health may reorganize the service in such a way that the local health officers may devote some of their time to the treatment of needy tubercular patients, at public dispensaries especially established in each municipality, or at least, in each large city. This service should be carried into the home by the social service nurse attached to each dispensary, giving the family and the patient clear, intelligent and practical instructions as to the care and the safeguarding of the patient and the family, especially concerning the proper and right protection of the children from contagion.

By selecting from such patients those who actually deserve and require public support, and will profit most from scientific medical care, the work of the Insular Sanitarium will prove more efficient and more effective to the greatest number.

An adequate institution to care for chronic, advanced tubercular cases should be provided for at the earliest practical time. The Tubercular Sanitarium at Ponce could probably fill this need.

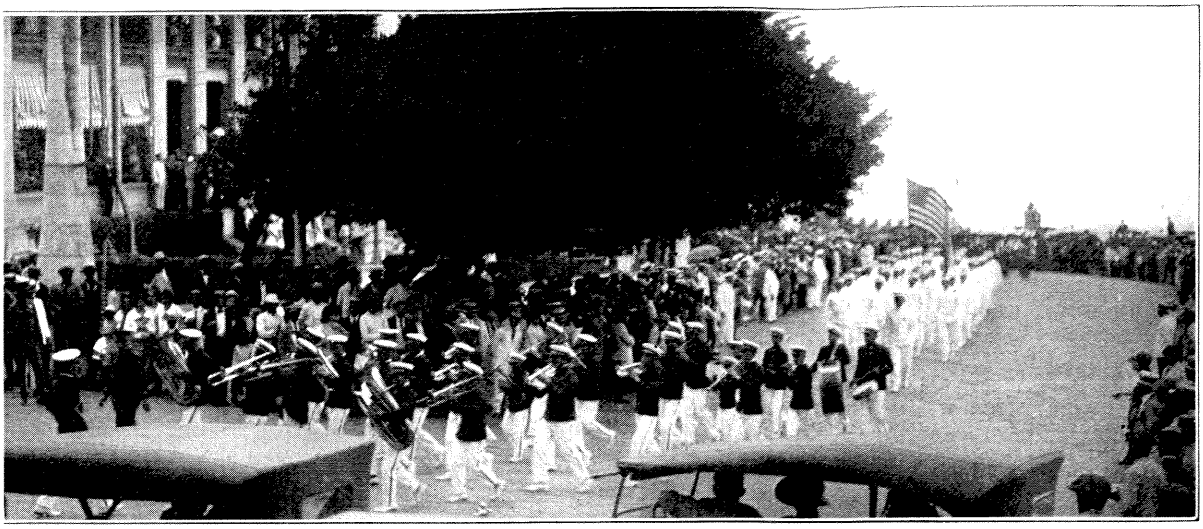
It should be borne in mind, too, that such a reorganization of the Health Department not only need not entail any additional expenditure of either money or time, but would insure a far greater practical return from each dollar expended.

Recently there has been appointed to direct the Insular Department of Health a most capable physician in the very prime of life, Dr Pedro N. Ortiz, who is familiar with sanitary conditions in the island, and from whom much can be rightfully expected.

A Little of History. A few words of what has been done in the past may be of great value to ascertain whether there are grounds for what has been stated above.

Among the pioneers in social campaigns for the eradication of the "white plague" mention should be made of the enlightening public lectures at the Ateneo by Dr. F. del Valle Atiles, and the series of newspaper articles by Dr. R. Ruiz Arnau, in 1905. Three years later a strong movement, supported by the public, was initiated and directed by Mrs. Edith Wood, gratefully remembered throughout the island for her practical charitable work. Drs. Dobal and Gutiérrez Igaravídez were her able lieutenants in the work of founding the Anti-Tubercular League, an institution supported by both the public and the Government.

The well-known physicians, Drs. Agustín Stahl and Calixto Romero, were selected to lecture throughout the island in a wise, practical effort to teach the public how to safeguard their health, and to protect themselves



A PRACTICAL EXAMPLE OF WELL DEVELOPED STRENGTH AND HOPE—GOVERNOR TOWNER'S INAUGURAL PARADE.

and their families from possible tubercular infection.

Some fifteen years ago, about 1908, it was the writer's good fortune to attend one of the lectures delivered by Dr. Stahl. This was the first time that the actual prophylactic and curative value of sunlight was explained in such a convincing manner that it made him realize why Porto Rico, with such a great natural ally as the sun, need not fear tuberculosis if proper thought and care is given to this matter.

His pithy advice on general prophylaxis still rings in the air:—"Let the rays of the sun penetrate even to the furtherest corners of the home, and provide an abundance of pure air by keeping doors and windows open at all times; provide individual eating and drinking utensils, especially those for children; use plenty of water — inside and outside the body; spend your money on food and not on vices, and you will save yourselves the great mental and physical torture of becoming, either you or any of your beloved family, an easy prey to the dreaded disease. Let me emphasize the fact that by keeping your windows wide open and letting in a flood of health-bringing sunlight and fresh air, you effect the most practical means of escape from disease."

That famous old savant, with his microscope, his illustrated charts and his kindly face and earnest manner, was the living image of the apostle of one of the greatest crusades—that of public welfare.

Dr. Calixto Romero, the other lecturer of Porto Rico's first campaign against the dreaded "white plague," paid with his very life for the great devotion and absolute self-sacrifice that noble and highly cultivated man always had for the welfare of the public, proving often and often by actual demonstrations, during his busy life, that to the man of nimble wit, nimble fingers and well-trained brain, the word impossible does not exist.

The Anti-Tubercular League established a sanitarium at "El Seboruco," Santurce, on the ground which later was ceded to the Federal Government for the establishment of Camp "Las Casas" during the great war. This Sanitarium had to be closed, not only for this reason, but especially because at the same time, due to the enactment of the present organic act, which provides that no public funds shall be donated to privately-conducted institutions, the Legislature had to withdraw its $10,000 annual appropriation.

A great blow to the League, too, but nevertheless it had the inborn strength to carry on its great work although, naturally, on a smaller scale. The League is today directed by that able physician, Mrs. Josefina Villafaña de Martínez Alvarez, and helps to support the Tubercular Sanitarium at Ponce.

When "El Seboruco" was forced to close due to loss of both home and income, the Department of Health was called upon to care for its inmates. Temporarily they were lodged and cared for at the hospital for infectious disease at San Juan.

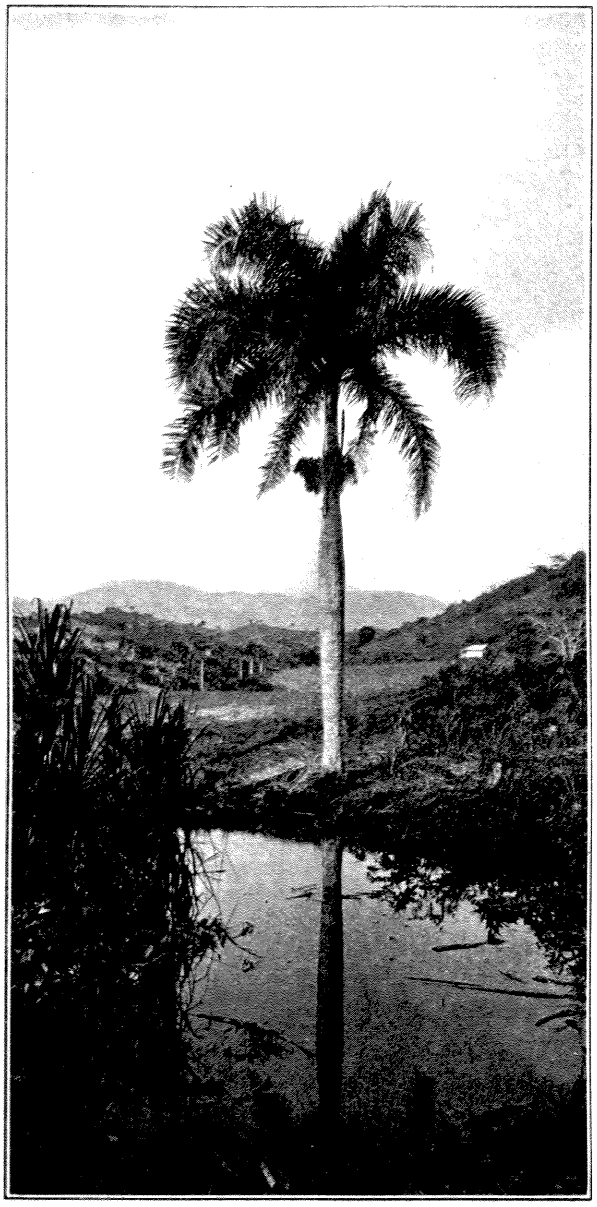
Dr. A. Ruiz Soler, then Commissioner of Public Health, however, aware of the hardships and greater risks which those poor people ran through such an arrangement, initiated and led a determined and enthusiastic campaign to provide the island with an adequate, modern sanitarium for the care of tubercular patients.

Fortunately his humanitarian effort was crowned with great success, thanks to the hearty support of a large number of patriotic citizens and well disposed institutions and industrial corporations, especially the private effort of the well beloved adopted son of the island—Don Pedro R. de Arzuaga, who donated the large and valuable tract of land on which today stands the Insular Sanitarium.

The Legislature did its full share towards making the humanitarian vision of Dr. Ruiz Soler become a vital, constructive factor in the island's life by appropriating adequate funds for the support and betterment of this institution, which was conceived to do such vast good.

Unfortunately, however, through lack of proper understanding and clearer vision of the real needs of the island, all these benefactions only reach a very small proportion of the needy, an almost inconsiderable proportion when one considers that about one hundred and fifty individuals are cared for, out of a possible total of 20,000 victims of the white plague, the number given by recent conservative estimates of the National and Insular Public Health Authorities.

All these unhappy people deserve a better lot, and through me as one of their advisers, heralds and friends, they wish to present clearly and truthfully before the congress of public opinion their needs, their sorrows and their hopes.



A SOLAS CON MIS REFLEXIONES.—THE TRAIL OF THE LONESOME PALM.

Uncinariasis

By Bailey K. Ashford, M.D., D.Sc.,

Author. Colonel Medical Corps, U. S. Army. Representative of said body in the Institute of Tropical Medicine. Ex-President of the "American Society of Tropical Medicine." Ex-President and Honorary Member of the "Medical Association of Porto Rico." Member of various professional associations.

Discoverer of the Hookworm in Porto Rico, and of the monilia Ashfordii

The Scourge of the Agricultural Laborer: The scourge of the agricultural laborer, of the pale man of the mountains, of the campesino, of the well-beloved, barefooted jibaro of years gone by!

Within the memory of the adult population of this island is the spectacle of a country in which the rural, not the urban class bore the unmistakable pallor of chronic invalidism, the very antithesis of the normal for a prosperous people. From time immemorial *"ANEMIA"* was easily King in Porto Rico's country districts. It was always considered to be the legitimate offspring of malnutrition. The simple fare of codfish, rice, beans and plantains did not conduce to ruddy complexions and stout physique, it was said. Strangers to red meat, toiling throughout the waking hours beneath blistering sun and in driving rain, sleeping in huts, illy clothed, ill-nourished, the Goddess of Hygiene unworshiped, well-nigh unknown, these simple folk could not hope to wear the bloom of health. Thus spoke our people in the dark days of the physical and commercial depression of Porto Rico.

Causation Agent Found: In 1897 some seven thousand died of *"ANEMIA,"* but in the fiscal year 1900-1901 this harvest of disease rose to twelve thousand, or one-third of the total death rate. This was attributed to the devastating hurricane of 1899 which swept away the main source of fresh food and reduced the rural class to a diet of rice and beans—when they could get it.

Out of the long lines of swollen anemics who sought rice, beans and clothing which our Army provided for a starving people in this crisis, was picked a man in whose feces was found the eggs of a blood destroying parasite, known to a later generation as the hookworm. Thus was read from the face of a plague of centuries, the secret of the chronic ill health and inertia of countless thousands, and which kindled the light that illuminated the dark corners of a tropical and subtropical world, and opened the ample heart and treasury of an American multimillionaire for the salvation, not only of the tiller of the soil in his own South land, but in all warm countries the world over.

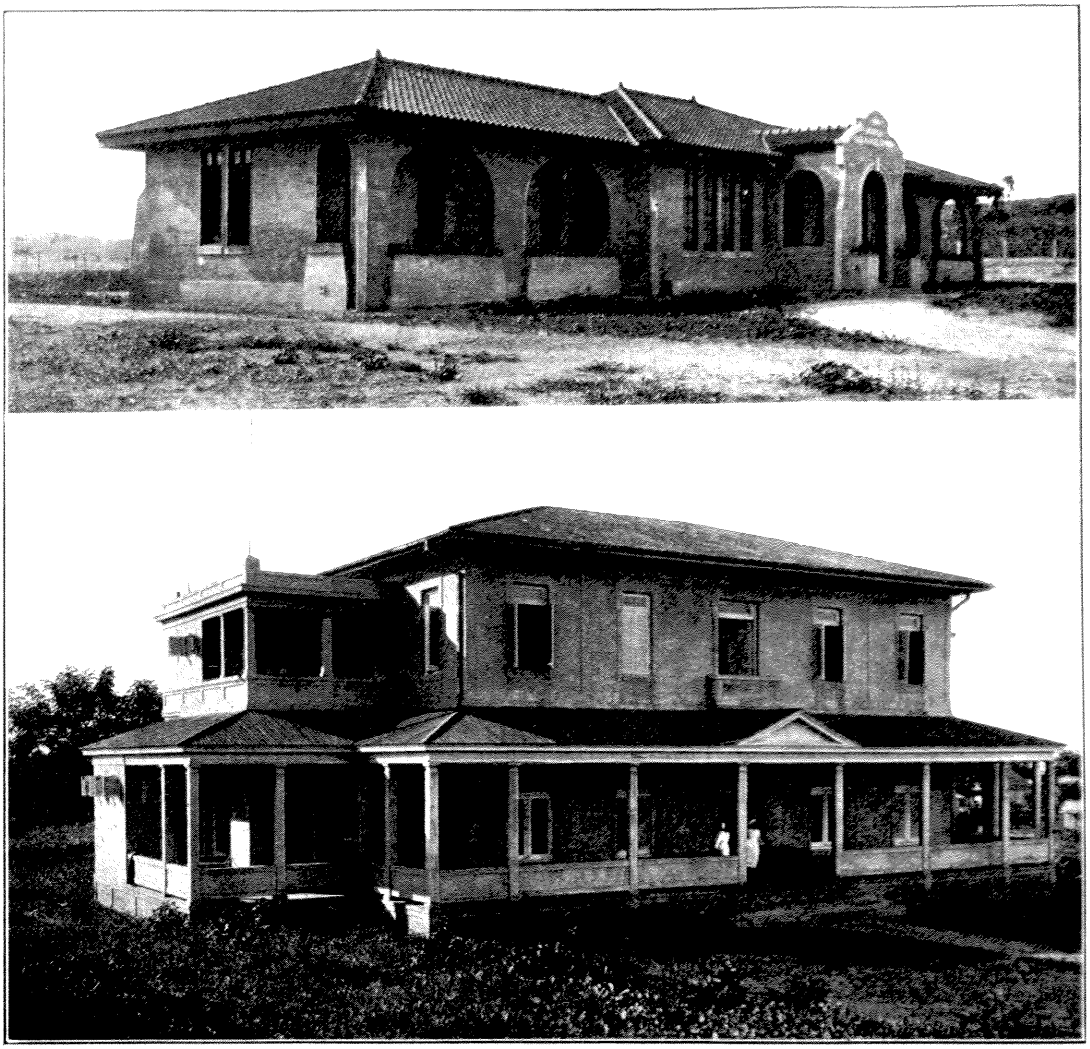
Endemia Ludex: To show the desperate situation of the agricultural laborer in Porto Rico in 1900-1904: Out of a calculated 600,000 of the million of her inhabitants, 98% were found to harbor this lethal parasite. The average hemoglobin, or blood value, of the country classes was 43.09%. The peasant was at a value of 50 cents on the dollar.

Insular Campaign Against Uncinariasis: Here for the first time in the Western world the disease was attacked on a large scale from funds cheerfully provided by the Porto Rican people, and over 300,000 cured by government administration, 200,000 more extra-officially. A circular letter to 400 of the planters employing the largest number of laborers as the conclusion of this campaign revealed an increase of 67% in efficiency for labor and the average blood value of these working classes rose to 72.2%.

Such is the simple story of Porto Rico's contribution to the World's work for healthier people, a campaign costing only $287,000.

Labors of the Porto Rico Anemia Commission: In the official Report of the Porto Rico Anemia Commission, published by the Senate of the United States, appears the story of a ten years' hard fight against this disease and, in honor be it said, no part of that work of 335 pages needs serious correction twenty years after. The precise solution of the problem this Island first furnished.

How Uncinariasis is Contracted: The hookworm is a parasite, three quarters of an inch long and of the thickness of a pin. It buries its head in the wall of the intestine and by its poison dissolves the blood of the victim. It lays its eggs in the intestinal contents which when passed upon the surface of the damp and shaded earth hatch into tiny embryo worms hardly visible to



HOSPITALES MUNICIPALES DE FAJARDO Y RÍO PIEDRAS.
MUNICIPAL HOSPITALS—FAJARDO AND RÍO PIEDRAS.

the naked eye. The laborer who relieves his bowels in the environment of his home thus creates little nests of wriggling worms which when stepped upon by bare feet or leaky shoes penetrate the skin by their sharp-pointed extremity, migrate through blood and lmyph streams to the human intestine and reach their chosen home in the host's intestinal tract.

Treatment: These worms are expelled by an adequate dose of thymol and infestation is prevented by the avoidance of promiscuous earth-pollution.

The Only Real Safeguard: The proper disposition of human excrement is the only real safeguard of the State in its struggle against uncinariasis. No amount of mere drugging will eradicate the endemic disease as long as a human being voluntarily consents to act as a link in the span of life of a parasite destructive of health, happiness and prosperity.

Recent Investigations by the International Health Board: Recently, however, the International Health Board, through the brilliant work of Dr. W. W. Cort and his associates in Utuado, has made clear that the soil in Porto Rico remains infective only about two months after pollution and that in a few weeks ninety per cent. of the larvae die a natural death, moreover, it has been experimentally proven that these larvae do not migrate from the place of pollution but form isolated nests of worms at these soiled spots, thus corroborating a doctrine first enunci-

ated years ago by the Porto Rico Anemia Commission.

Appropriate Deductions: A little reflection will show that these scientific demonstrations completely justify our own Commission in its insistence upon thymol as the principal *arm of combat* for the unprecedented emergency of 1900-1910 in Porto Rico, and are a convincing rebuttal of the pessimist's complaint that to treat anemics who would become reinfested from a soil universally and indefinitely loaded with larvae was a waste of time and money.

As a coadjuvant to treatment the correction of an ill-balanced diet will prevent the fearful toll in lives and invalidism which is the resultant of the invasion of a devitalized organism by a definite parasitic enemy.

Thus, at bottom, mal-nutrition is the primary condition which provides a fertile field for not only the hookworm but for the microbic causes of practically all common slow-going diseases here, such as tuberculosis and sprue. "Anemia," Uncinariasis, or "Hookworm Disease" in Porto Rico, is far from extermination, but the back of one of the "Four Masked Horsemen" is forever broken by the efforts of the Porto Rican people themselves in a campaign which has caused the veil to drop from the eyes of its American brothers of the Continent, showing what could be done against tuberculosis.

Malaria

By Arturo Torregrosa, Ph.G., A.B., M.D.,

Secretary, Institute of Tropical Medicine and Hygiene. Member of various professional and scientific associations.

Malaria, in Porto Rico, has always been a sanitary problem of great importance. It is worth recalling that the various types of fever, so called malarial, account for the death of about 1500 to 2000 people out of the total death rate; there being places such as Salinas and Guayama, for instance, where the proportion runs as high as three to six deaths out of each thousand of the population.

The statistics on malarial mortality, however, are not accurate enough to draw conclusions from. This being due on one side, to the inefficient service of medical assistance in the rural districts, on the other, to the natural tendency of the average person to include as malarial all ailments characterized by more or less evident periodicity, and finally, of the reluctance of some physicians to report cases classed generally as mild. These reasons being responsible for the classification as malarial of many chronic diseases of different kinds, such as tuberculosis in its early beginning, typhoid fever, infections of diverse organs, certain neuralgias, anemic conditions, etc. Thus the sanitary authorities only have official knowledge of the serious and malignant cases, notwithstanding the regulations of the law which orders the report of the occurrence of mild cases that are easily curable.

The physician who has for several years practised his profession in marshy districts and who has not confined himself to routinary prescription of quinine to every feverish person, but who has undertaken the task of proving his diagnosis through microscopic blood examination, is the one really able to establish the extent to which this disease exists in Porto Rico.

The writer, in a recently published article on the differential diagnosis which should most commonly be made in fevers of usual occurrence in Porto Rico, had to devote almost four-fifths of it to the malarial diseases in reference to their diverse feverish types.

If we are to consider the sanitary feature of this question, it is absolutely necessary to bear in mind the various afebrile types which in some cases lead to chronic invalidism of the infected patient. So far as the community is concerned the infectious character of these obscure cases makes them more dangerous than those febrile ones—even the serious ones—for the former are seldom isolated.

Past Sanitary Labor. What have been the

HOSPITAL TRICOCHE—PONCE MUNICIPAL HOSPITAL.

efforts in Porto Rico to overcome this disease? Perhaps the first effort was the organization of the district laboratories of the special service of Tropical and Contagious Diseases which existed from 1909 to 1911. These centers carried on true diagnostic work which was continued by the Institute of Tropical Medicine and Hygiene and the Insular Laboratory of Sanitation, and it can therefore be asserted that the blood test corroboration has been indispensable and of more value than the clinical suspicion which years ago sufficed to assert the presence of malaria.

In 1912 the campaign to eradicate the mosquitoes—the agent transmitting the disease—enforced a regulation which ordered all wells, reservoirs, pools, etc., made mosquito proof, also ordered the drainage and leveling of swampy marshy soils, and other measures that tended to destroy such insects. Further sanitary forces were organized in San Juan and other towns to spray mineral oil on such spots, as far as could be done with the scanty appropriation in hand. In 1917 and 1918 hospitals and dispensaries were founded in various infected zones, where most needed.

Lately, a commission for medical research of the Rockefeller Institution, with the cooperation and financial assistance of the Insular Department of Health, carried on in Aguirre a comprehensive study of what an anti-malarial campaign should be in its several phases, that is, considering the germ carrier, the transmitting insect and the nature of the soil where the latter breeds. It is regretted that this work could not be taken as a guide for a general campaign extended to all the infected zones of the coast, for the reason that the cost of such work is about $2.16 per capita, thus making it prohibitive, as the official annual budget of $30,000 for the purpose would scarcely do for such sanitation of the district.

Limitations and Plans for the Future. Let us briefly consider two practical solutions to the problem: 1st. The drainage of cane plantations and the leveling of mangrove trees and other swampy soils, the killing of mosquito larvae by spraying of mineral oil and the growing of fish that prey on the mosquito larvae, would in the long run check not only the spread of malaria, but also of some other contagious diseases carried by the mosquito,

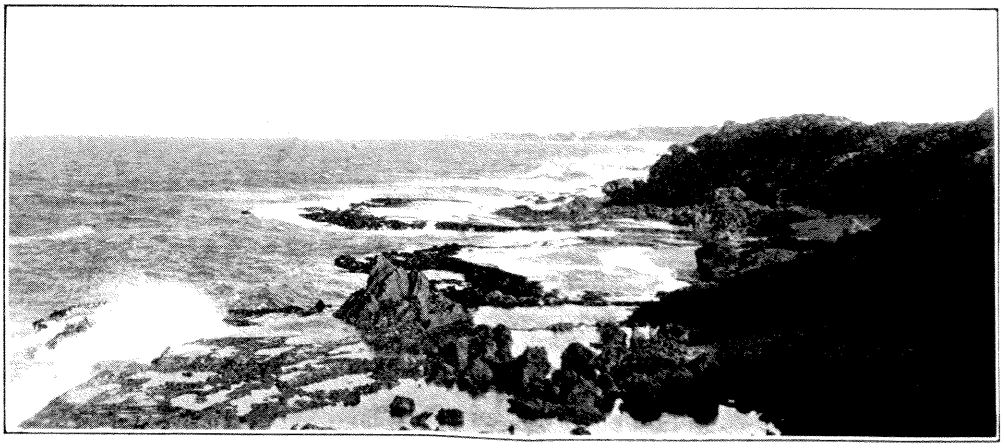
such as filaria and dengue fevers. In this way permanent results could be obtained, which otherwise would be impracticable because of their high cost.

Not even could such results be obtained by legislative action obliging landowners and corporations to disinfect their lands, because the Insular Health Department would necessarily have to maintain an efficient inspection and continuous vigilance to assure good results from such a campaign, and this would mean a large annual disbursement for an indefinite time, which at present is not provided for.

2nd. The cure of infected persons by the adequate use of quinine, solves the problem effectively and at a low cost, the quinine to be administered in sufficient doses and for a relatively long period, in order to insure the sterilization of the people. Furthermore, the use of quinine in small doses as a preventative treatment, to all people exposed to infection, and the use of mosquito nets to isolate all malarial cases in order to avoid human sources of infection, will check this disease in a given zone, provided no new cases are allowed to go unwatched, and when found subjected to the same treatment.

As the extermination of the mosquito is not possible at present in Porto Rico on account of economic conditions, she must strive to exterminate the parasite by inexpensive measures, for we must accept with Bass that such measures do not add any additional expense, because the money spent for other medicine by the patient for the cure of fever, could be employed to buy quinine. The only extra expense would be that of an intensive propaganda to educate the people concerning: (1) the uselessness of other drugs compared with the good results of quinine; (2) the time and doses of quinine to administer either as a curative or as a preventative agent; (3) the wisdom of protecting themselves against possible reinfections by means of the mosquito net, thus avoiding the spreading of the disease. The three-linked-chain — infected person, transmitting insect and sound person—is actually eliminated through a small disbursement, by eliminating the first factor, that is, the parasite, thus making the infected patient non-dangerous either to his family or the community. It would be necessary to establish a means for the discovery of new cases which once discovered would be submitted to treatment, thus insuring the permanency of good results.

It has been recently asserted that Neosalvarsan is an efficient preventative agent for malarial infections, and notwithstanding its relatively greater cost, it would be worth trying for the reason that only one dose is required.



ACANTILADOS DE LA COSTA.—BATHED BY BOTH SEA AND SUN.

The Bubonic Plague

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The Bubonic plague has appeared twice in Porto Rico, fortunately in limited areas. The first outbreak was on July 14th, 1912 and lasted until February 15th, 1913, when the intensive sanitary campaign was stopped. The second, lasting 14 months, broke out February 17th, 1921 and lasted until April 12th, 1922, the last human case being registered on August 30th, 1921. The epidemic had a period of activity of 6 months and seventeen days.

The epidemic of 1912 lasted 8 months and there were 55 cases registered, of which 36 died, a mortality rate of 65 per cent. The total expense of the campaign against the plague being $228,372.76. Of the cases 51 were in San Juan, 3 in Carolina and one in Dorado.

The epidemic of 1921 lasted 14 months and there were 33 cases and 20 deaths, a mortality rate of 60.6 per cent, the total expense of the campaign being $388,394.30. Of these cases 15 were in San Juan, seven in Caguas, four in Carolina, three in Manatí, one in Arecibo, one in Bayamón, one in Río Piedras, and one in Juncos.

The expenses of the campaign against the second epidemic were much higher than those of the first, owing to it covering a much larger area, and among others, towns of the importance of Caguas, Manatí, Areeibo and Bayamón. It should not be forgotten also that the difference in cost not only of equipment but of the wages of the workers was considerable.

The confining of the number of cases to thirty-three was due to the energetic precautions issued by the Sanitary Authorities such as:

1—Seclusion and isolation in the Quarantine Hospital of the Department of Health of all patients with bubonic plague;

2—Fumigation of the provision establishments and warehouses in San Juan and its suburbs. This measure was extended also to towns where infected and suspicious rats were found;

3—General cleanliness and anti-murine campaign in all the municipalities then in charge of the Local Sanitation;

4—Fumigation of freight from San Juan;

5—Fumigation of houses where human cases occurred or infected and suspicious rats were found;

6—Anti-murine campaign, including the capture of rats and measures taken to make buildings rat-proof;

7—General anti-bubonic plague vacination.

Up to August 30th, 1921, when the last human case occurred, it being in the city of Caguas, 120,480 rats were examined in the Biological Laboratory, of which 93 were found to be infected and 563 suspicious. The infected rats of each town being: San Juan, 78; Río Piedras, 6; Manatí, 4; Bayamón, 1; Carolina, 1; Caguas, 1; Fajardo, 1; Guaynabo, 1.

The epidemic commenced February 17th, 1921, when the first three human cases were found. Three other persons in the same house were suspected, due to symptoms more or less identical, consisting of high fever, swollen glands in the inguinal region and general malaise. This fact was reported to the sanitary authorities who did not cease their activities and late in the afternoon of that day the presence of the Bacillus Pestis was demonstrated on a deceased rat taken to the Biological Laboratory for examination.

The Quarantine Hospital at the Marina was promptly prepared for the purpose of seclusion and isolation, and that same day the first three infected cases were brought in. Twenty-four cases in all were taken to that hospital, nine others dying in their homes. The following is a summarized report of the patients: Number of infected persons, 33; secluded at the Quarantine Hospital, 24; deceased at home, 9; patients secluded who died at the Quarantine Hospital, 11; patients dismissed after recovering, 13; mortality rate, 60.6 per cent; mortality rate on cases secluded for treatment at the Quarantine Hospital, 45.83 per cent.

Of the 11 patients who died at the hospital, two died the day they entered, three the following day and two died two days after their entrance. In short, four of them died in spite of the anti-pest treatment administered to them, the other seven arriving very seriously ill, which made impossible their being rescued from death. The results therefore, were as good as could be hoped, and it is worth stating that, in accordance with the author's experience a patient treated before the third day of the illness will most probably recover.

The pure bubonic type of the disease was the most observed. Of the twenty-four hospital patients there were only three cases of pneumonia, two of which had also buboes, one of them having multiple inflamed glands. The pure pneumonic form could only be verified in one patient who came from the San Juan Municipal Hospital, in whose expectoration the Bacillus Pestis was found a few hours before death. In the cases studied the distribution of the bubonic lesions was as follows: femoral buboes, 23; femoro-inguinal, 3; axillary, 2; femoro-cervical, 1; inguinal, 1; femoro-axillary, 1; multiple, 1; pure pneumonic, 1. The number of cases studied was thirty-three.

In spite of the efforts made, no definite conclusion has been established as to the origin of these two epidemics. There is no doubt as to the Bubonic Plague being brought to the Island from some infected port which has direct commercial relations with San Juan. However, it is not as important to establish its origin, as it is to note the measures which should be taken to make modern buildings rat-proof, and to establish at the same time, as is the case in Porto Rico, a permanent laboratory for the examination of rats.

The great important of this measure was demonstrated with the six hundred suspected patients reported to the Department of Health, of whom, on investigation, it was found necessary to seclude only forty cases in the Quarantine Hospital for further invevstigation, which showed that thirty-three were infected.

In ordering the isolation of patients, besides the symptoms displayed, the condition of the dwellings were also considered, that is, whether rat-proof or not, and thus favoring or not the possibility of infection. It is safe to say that in seeking a definite diagnosis, both the environment and the series of symptoms shown by the patient should be considered.