THE WORK OF THE BIOLOGICAL LABORATORY OF THE DEPARTMENT OF HEALTH

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The Public Health Laboratory in Porto Rico was established in 1900 by the Superior Board of Health, as a station for the preparation of smallpox vaccines. Later on these vaccines were so easily obtained in the United States that the small laboratory was discontinued.

In 1904, when the Anemia Commission was created by the Insular Legislature, a small laboratory was organized, and was transferred to different parts of the Island with the Commission for diagnosis purposes.

In the year 1907 an epidemic of typhoid fever broke out at Caguas, and Dr. P. Gutiérrez Igaravídez was called by the Government to make a study of the situation. In Yauco a similar study was made. From then on the Sanitation Service and the Anemia Commission worked harmoniously in doing research work.

In 1909, a law was passed by our Legislature providing for the study and prevention of tropical and contagious diseases and for the continuance of the anti-uncinariasis campaign. This law provided for the appointment of a physician for each one of the seven senatorial districts where laboratories were to be established, and a bacteriologist for the Insular Bacteriological Laboratory at San Juan, who was to be in charge of the examination of milk and water besides attending to all routine clinical work.

When the Sanitary Law of 1911 was passed, the Laboratory was greatly improved and was known from then on as the Insular Biological Laboratory.

At present we have a well-equipped laboratory, its staff and personnel consisting of a Director, an Assistant Director, a Pathologist, a Serologist and a Bacteriologist, all being physicians especially trained in their respective fields. In addition there are also technical assistants.

The laboratory does all the work of the charitable institutions of the Department of Health such as the Insane Asylum, Leprosarium, Boys' and Girls' Charity Schools and the Insular Anti-Tuberculosis Sanatorium. It also does the laboratory work of the Army, the

U. S. Public Health Service, the Veterans' Bureau and the Penitentiary.

The present laboratory carries out all investigations, particularly those related to public health, leading to the study of infections and transmissible diseases in man and the lower animals.

At the present time there is a branch laboratory at Ponce which takes care of all the work of the southern part of the Island. The San Juan laboratory takes care of the northern part. The bacteriological examination of water, milk and sewage and the pathologic examination for rabies is done exclusively at the San Juan laboratory. The laboratory carries out investigations only in transmissible diseases and in special problems related to public-health work.

The work of the laboratory is growing so rapidly that we examined 7,067 samples in 1921; 9,992 in 1922; 19,004 in 1923; 33,248 in 1924, and 37,703 in 1925. These figures do not include the work done at the branch laboratory at Ponce.

The investigations which have the larger demand according to the figures for 1925–1926: are the Wassermann Reaction (15,868); intestinal parasites (6,107); sputum for tuberculosis (4,498); urinalasis (3,128) and malaria (2,296).

Of the 2,296 samples of blood examined for malaria, there was 24.5 per cent of positives, 16 per cent of which were *Plasmodium vivax*, eight per cent *Plasmodium falciparum* and five per cent of both *vivax* and *falciparum*.

Of the 15,868 samples of blood for Wassermann, only fifteen per cent gave a positive reaction and of the 521 samples of cerebro-spinal fluid, 22 per cent gave a positive reaction. Of 1,287 Widal reactions performed, 21 per cent gave a positive reaction. Of the 4,408 samples of sputa, 32 per cent was positive for tuberculosis; of the 6,107 samples of feces examined, 46 per cent had ovas of some kind as follows:

Uncinaria	16	per cent
Ascarides	6	per cent
Trichocephalus	23	per cent
Oxyuris	.052	per cent
Bilharzia	.060	per cent
Anguilulla	.70	per cent
Cerchomonas	.09	per cent
Stronguiloides	.016	per cent
Tenia Sanguinata	.01	per cent
Ameba Histolitica	.03	per cent

Note the different investigations in their order of importance:

Intestinal parasites	46 per cent
Tuberculosis	32 per cent
Malaria	25 per cent
Typhoid	21 per cent
Gonococcus	16 per cent
Diphtheria	16 per cent
Lues	15 per cent

Samples of feces examined from the Insane Asylum, Penitentiary and Boys' and Girls' Charity Schools gave the following results:

	Boys' School	Girls' School	Insane Asylum	Penitentiary
Uncinaria	19.6 per cent	9 per cent	18 per cent	40 per cent
Trichocephalus	47.5 per cent	35 per cent	38 per cent	29 per cent
Ascarides	29.5 per cent	7 per cent	4 per cent	3 per cent
Bilharzia	3.2 per cent	.4 per cent	.5 per cent	1 per cent
Anguilulla	0.9 per cent	1.8 per cent	1 per cent	1 per cent

The examination of blood and spinal fluid for syphilis from the Insane Asylum and the Penitentiary gave the following results:

Blood

Insane Asylum	20.86 per cent
Penitentiary	14 per cent

Spinal Fluid

Insane Asylum	32 per cent
Penitentiary	19 per cent

Ever since the laboratory was established, special work has been done when possible, provided it has not interfered with the routine work. In this way the material which we handle and the different problems which are presented to our consideration are taken advantage of.

It is not my intention to enter into the details of all the investigations made during the previous years, but I shall mention some of the most important. The first Director of the Laboratory was Dr. I. González Martínez. He did some original work, but even though we have endeavored to secure the corresponding data, we have been unsuccessful so far.

On the 23rd of March 1918, Dr. Manuel A. Frías reported some cases of jaundice which he had been observing with frequency among his patients. He claimed that the symptoms were identical with those of Weil's disease. With Dr. Giuliani he studied some fifteen cases of the diseases. Dr. Giuliani found spirochaetes in

enormous numbers in the urine sediment which he claimed were similar to those of icterohemorrhagiae. He tried to produce the disease experimentally in guinea pigs and failed to get any results.

In the same year the Commissioner of Health created the Committee of Investigation on Contagious and Transmissible diseases composed of the Chief of the Bureau of Transmissible Diseases, the Director and the Pathologist of the Biological Laboratory, and the Director of the Chemical Laboratory. This commission was to study and investigate the different problems that were to be submitted to them. One of the first to be studied was the action of the oil of chenopodium as an anthelmintic as compared to the action of thymol. The survey was carried out by taking a group of patients over 55 years of age, another group under 55 and a group of children under ten years.

Egg counts, hemoglobine percentage and the history and physical examination were recorded before and after the administration of the drug. They concluded that the chenopodium was more powerful and a better anthelmintic than thymol and that with caution in the hand of a careful person it could be used in old people as well as in children.

About the same year Dr. Salvador G. Ross reported some cases which he had at the Municipal Hospital for Incurables, at La Perla. He had made a diagnosis of cancer of the vulva in two patients under his care, but as he said, he had observed that the disease did not act like cancer. Dr. Salvador Giuliani studied these cases and came to the conclusion that they were granuloma inguinale. This was the first time that the supposed etiological factor of the disease was isolated and grown in Porto Rico under proper conditions.

He (Giuliani) furthermore took up several cases and studied them by biopsy and cultures. He was able to demonstrate the typical Donovan body isolating a large organism with tinctoreal and cultural characteristics identical to the *Calimatus Bacterium Granulomatis*. He inoculated his cultures into guinea pigs, but was unable to reproduce the disease.

The first cases of *Framboesia Tropica* diagnosed in the Island were also studied by the Commission, Dr. Font y Guillot having the clinical work and Dr. Hernández the laboratory work. They were able to demonstrate clinically and bacteriologically that the cases were Framboesia and not Syphilis, and that the disease existed in the Island.

The same Board commissioned Dr. Ortiz to study leprosy. His investigations resulted in the using of the esters and chalmougra

oil by the intravenous route. All the laboratory work done during his investigations was carried out in our laboratory.

In the meantime several cases of dysentery caused by the Balantidium were studied. Studies of avian diphtheria, intestinal parasites of cattle and horses and verminous bronchitis have been carried out in connection with the Veterinarian of the Department and that of the Insular Experimental Station.

During the year 1919 a number of mules were imported into the Island. Complement fixation test for glanders was made. Those found positive were killed according to the sanitary regulations in force. Out of one of the lots, thirty mules in all, seventeen gave a positive complement-fixation test for glanders. These mules were retested and the same results were obtained, but after the physical examination made by the veterinarian, the mules were found apparently healthy. This induced us to study the matter with care. I studied all the mules owned by the municipality of San Juan and found fifty per cent of positive reactions in those considered to be healthy. In testing the horses, however, our results were more satisfactory, as all gave a negative reaction except in cases in which glanders was suspected. Finally after further study and investigation we came to the conclusion that the serum of mules has an excess of a disturbing substance which is not destroyed in one hour at 58° C. Therefore, a positive reaction is the result.

We wrote to the Department of Agriculture at Washington and they corroborated our observations and advised us to stop the use of complement-fixation test in mules and jackasses, but to introduce the intrapalpebral-malein test in its place.

During the epidemic of bubonic plague in the year 1921 a great deal of original work was done which is impossible to take up here. The most important observations made were:

1. Plague rats without plague lesions
2. Chronic plague among rodents
3. Plague carriers
4. Amount of chloride in the urine as an index in the prognosis of the disease
5. Plague bacillus found in a wound of the hand of a patient
6. Method for the study of the sputum in plague patients.

In the year 1923 we were called by Dr. Alfonso Rivera, Veterinarian of the Department of Health, to examine some exudates from the *fetuses* and placenta of cows that aborted, in a herd near Río Piedras. Dr. Ruiz Nazario in stating the exudates found an organism resembling morphologically the *Bacterium abortus* of Bang.

This organism was grown in blood serum and gelatine serum agar. The cultures obtained were inoculated into guinea pigs with intense reactions and chronic infections with characteristic changes in the spleen, liver and joints. These facts confirmed the preliminary diagnosis of *abortus contagiosus*.

Vaccines were prepared from the cultures thus obtained and administered to the cows which were previously tested by agglutination or by the complement-fixation tests. These vaccines apparently gave satisfactory results in that they stopped the animals from aborting, but it has been claimed recently that the vaccinated cows become carriers of the disease, thus transmitting the infection to healthy cows. The matter is worth studying since the disease causes great ravages in the United States, and if it continues spreading in Porto Rico the price of the milk will rise considerably.

This year a survey of the bacteriological content of milk was carried out in dairies classified as good, fair and poor according to their score-card records. Three samples of milk were taken, one immediately after milking, the other in the storeroom and a third after the milk had been in the depot for at least ten hours.

Separate samples were also taken from dairies wherein the stock is kept all day under shelter and from those where they are kept only at milking hours. The results fluctuated in good dairies from 10,000 bacteria per c.c. to 160,000 bacteria per c.c.; fair dairies from 68,000 to 32,000 per c.c. and poor dairies from 240,000 to 250,000 bacteria immediately after milking. In the samples taken as the milk enters the depot the count fluctuated from 36,000 to 256,000 in good dairies, from 70 to 600,000 in fair dairies and from 300,000 to 600,000 in poor dairies. All milk collected at the depots after ten hours milking, regardless of where the milk came from, gave a count of over a million bacteria per c.c. with the exception of a sample that was taken at the Presbyterian Hospital which showed only 144,000 per c.c. bacteria after being kept there for eleven hours.

This entire survey tends to show that transportation has to be inspected more closely and that a better system of refrigeration should be enforced. Milk stations, so far as our survey shows, are very poor places to keep milk for human consumption and are conducive to adulteration or dilution.

Dairies that stabulate only during milking hours gave an average count of 27,800 while those that stabulate all the time gave an average count of 177,000 bacteria per c.c. which demonstrates clearly that changes of contamination are larger in those dairies in which the cows are kept in the stable all day.

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