Annual Report for 1920

The Wassermann Laboratory.

The Wassermann Laboratory was established June 1, 1915 with a personnel consisting of an assistant director of the Division who is in charge of the work, a technician, a stenographer, and a laboratory apprentice. Its activities at that time consisted solely in testing blood and spinal fluid by the Wassermann reaction- a test used in the diagnosis of Syphilis and as a guide in the control of its treatment. Two clerks and three laboratory assistants have been added to this personnel. The duties of the present organization are to perform its tests and to keep adequate records of them.

The Wassermann and gonococcus fixation tests are being made for 125 institutions and over 1200 physicians. The larger part is done for the state, such as for Insane Hospitals and penal institutions. The following table taken from the last annual report shows the extent of the work during the past five years.

Table.

	1916	1917	1918	1919	1920
Wassermann tests.....	25,497	28,524	27,534	31,485	36,953
Gonococcus fixation test	-----	------	------	222	1,726
Diagnostic Examinations for Div. of Animal Industry:					
a) Complement fixation tests for glanders---------- -	985	1,330	646	122	221
b) Examinations for rabies	47	67	61	84	166
c) Pathologic & Bacteriologic examination	10	3	45	79	64

All of the activities added to the original Wassermann tests have been undertaken because the organization and personnel of the laboratory are peculiarly adapted to execute them efficiently.

For example, before the work for the Division of Animal Industry was transferred to this laboratory, its cost was $3,000.00 per year. Not withstanding the decrease in the number of glanders fixation tests, the total volume of this work has increased since June 1, 1916, the date of its transfer. Its present cost, however, is only $2,000.00 per annum. Wassermann tests are being performed at 25 cents per test, which may be compared with 41 cents per test by the New York City Board of Health for the same year. Before the Department of Public Health took over the work of the Wassermann Laboratory, it was done by various departments in the Harvard Medical School with a much larger cost per test than under the present centralized plan. Private laboratories usually charge $5.00 for a Wassermann reaction; charitable hospitals frequently ask $1.00 for it. The last charge barely cover the cost when fewer than 5000 tests per year are made.

There has been more than a saving of money - valuable records have been acquired, results of the tests given out promptly, and a real service rendered by the commonwealth in the control of syphilis among its citizens.

Brief of the Annual Report of the Wassermann Laboratory for the year 1920.

During the past year the activities of the Wassermann Laboratory have been confined to the execution of tests established during previous years. Its personnel has not changed in number but the volume of its work shows a noteworthy increase over that of 1919 as indicated in the following table:--

	1919	1920	Increase
Wassermann tests.	31,485	37,277	(18%)
Gonococcus Fixation tests	222	1,758	(609%)
Diagnostic Examinations for Dept. of Animal Ind:			
a) Complement fixation tests for glanders . .	122	237	(94%)
b) Examinations for rabies	84	161	(88%)
c) Pathologic and Bacteriologic examinations	79	65	(---)

In addition to these activities, investigations carried on by this laboratory on the utility of complement fixation as a clinical aid in the diagnosis of tuberculosis have shown that the test at present is not sufficiently dependable for the purpose.

The work of the Wassermann Laboratory has been confined to execution of its routine duties. These have increased by between 15 and 25%. The number of requests for rabies examinations has so greatly increased that it appears a mild epidemic of this disease is prevalent amongst dogs particularly.

An important statistical investigation on the incidence of syphilis in pregnant women has been concluded. This investigation also bears on the incidence of syphilis in the State as a whole and on the prevalence of the disease in the different race groups of the Commonwealth.

Report
of the
Wassermann Laboratory.
for the
Year ending November 30, 1920.

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	1916	1917	1918	1919	1920
Wassermann tests.....	25,497	28,524	27,534	31,485	36,953
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a) Complement fixation tests for glanders.....	985	1,330	646	122	221
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c) Pathologic & bacteriologic examinations.....	10	3	45	79	64

In addition to these routine tests I am also reporting on the results of investigations carried on to determine the utility of the complement fixation as a clinical aid in the diagnosis of tuberculosis. The literature of the subject was reviewed carefully in 1918. At this time the method employed by Miller and Zinnser appeared to give the best results. Inasmuch as living tubercle bacilli were used for antigen, the most important reagent, in their method, it seemed desirable to study some way whereby the slight danger involved in the use of living organisms could be prevented. Before beginning the actual work of preparing antigen, a study was made of the growth of tubercle bacilli on various culture media because the medium itself might possibly influence the quality of growth as well as its quantity.

Several strains of tubercle bacilli which had been cultivated for many years on artificial media were kindly supplied me by Dr. H. H. Tyzzer of the Harvard Medical School. These were grown on a number of media, some of which were Dorset's egg, Lubenau's glycerine egg, Petroff's, Bresredke's, glycerine agar and nutrient bouillon, each of the last two with reactions corresponding respectively to neutrality and 1.0% acidity to phenolphthalein. It was found that the amount of growth of the particular organisms employed which included bovine and human types, was only slightly influenced by the medium. In fact the plain glycerine agar with an acidity of 1.0% to phenolphthalein gave results as good as any. Tubercle bacilli grown on all of these media were next suitably prepared in a uniform manner for the production of the antigen, by suspending the organisms in salt solution and vigorously shaking them. It was found that the desired property of these antigens was not influenced by the character of the medium upon which they were grown. Having thus settled this question it was desirable to test the different methods of preparing the antigen itself. Antigens were prepared by suspending the tubercle bacilli in salt solution, by obtaining an alcoholic extract of tubercle bacilli, by obtaining an alcohol-ether extract of tubercle bacilli and by preparing a plain ethereal extract of tubercle bacilli. The substance extracted in these ways and the residue from the extractions were simultaneously tested for inhibiting properties. The simple suspension of tubercle bacilli in salt solution appeared to manifest these properties as well as those obtained by the other methods. In virtue of these facts an attempt was made to disintegrate the tubercle bacilli

as far as possible without chemically changing them. This was done by alternately freezing, thawing, and grinding them with a mortar and pestle. The results obtained in this way were not superior to those obtained by using the simple shaken suspension in salt solution. Having thus determined that the simple suspension of tubercle bacilli in salt solution would yield an antigen as potent as that obtained by any of the more complicated methods, the next step was to actually test its use in the diagnosis of tuberculosis by complement fixation. Numerous simultaneous tests were made on the blood of individuals free from clinical tuberculosis and patients whose sputa contained tubercle bacilli when the specimens of blood were taken. It was impossible to so alter the quantities of any of the reagents used in the tests so as to obtain persistently positive results with known cases of tuberculosis and only a few positive or doubtful reactions with cases presumably free from the disease. In fact some of the known cases with positive sputa showed a negative reaction when a large proportion of the negative controls were positive. Before the conclusion of this investigation Dr. Wislocki, of the Base Hospital at Camp Devens, kindly furnished me with some antigen which he had obtained from Dr. Petroff. I also used it in my comparative tests. This antigen was not superior to the best antigens which I had prepared. The above description is fairly technical and may be briefly summarized as follows: our investigation on complement fixation for tuberculosis failed to indicate that the test in its present state has sufficient diagnostic value to be used as an aid in the clinical determination of tuberculosis.

During the past year the gonococcus fixation test has been utilized to some extent as a clinical aid in the diagnosis of gonococcal infections. Its chief use has been in the determination of "cures" and hence in a decision as to the communicability of the disease. The demand for this test has not been as great as was expected although many of the best clinicians value it as an aid in obscure cases.

In addition to the above, two papers have been published in the American Journal of Syphilis, one being a detailed description of the Wassermann technique devised and employed in this laboratory, the other being an article on "Specific inhibitory reaction of cholesterinized antigen in the Wassermann test". The latter article shows by comparing two groups of individuals the efficacy of our method in the diagnosis of syphilis. The two groups used for this comparison consist of 3701 naval aviation students and 864 inmates of the Reformatory for Women. In the former, the percentage of positive reactions was 0.5 and in the latter the percentage of positive reactions was 40.1. These results indicate that the method which we emply is unusually delicate in the detection of syphilis and that it also has the advantage of giving a positive reaction in few if any cases where syphilis does not actualy exist.

No small part of the work of the laboratory consists in the preparation of standardized amboceptor and standardized antigen which is distributed to municipal, public health and hospital laboratories in the State for use in Wassermann testing. No accurate account has been kept of the amount distributed but it would certainly total a sufficient quantity of these essential reagents to perform approximately 200000 tests.

The laboratory has practiced the strict economy during the past year that was enforced upon it in previous ones. In 1916 the cost per test of Wassermann examinations was a fraction less than 20 cents. This year it was 25 cents per test which includes the overhead of statistical investigations which had not been done previously.

Respectfully submitted,

Assistant Director.