

Reprint of Vanished Official Document

REPORT OF THE Joint Committee on Tuberculin Test 1911

Pages 1 to 79 inclusive are printed from zinc etchings (photographic process) made from the original Report, itself "printed under the direction of B. H. McCann, Clerk of the House of Representatives, State of Illinois."

Costly Investigation Smothered Because Verdict Displeased Medical Powers

**Publisher's Preface Tells How Milk Producers and
Consumers Alike Are Deceived and Robbed by
MEDICAL VAMPIRES
("Health and Veterinary")
That Fasten on the Government and Suck the Nation's
Life Blood.**

**AMERICAN MEDICAL LIBERTY LEAGUE, Inc.
59 E. Van Buren Street
Chicago, 1925.**

PUBLISHER'S PREFACE

to

Photographic Reprint of Report Joint Committee on
Tuberculin Test. Ill. 1911.

THE subjoined reprint of an exceedingly valuable official report has been made necessary by the events which followed its publication fifteen years ago.

The law that was enacted in conformity with its findings and recommendations (Chap. 8, Sec. 105, Ill. Statutes) reads as follows:

An Act to prohibit the Establishing and Enforcing of the Tuberculin Test for Dairy Animals by any City, Village, Incorporated Town, County or other Corporate Authority in the State of Illinois.

Section 1. Be it enacted by the people of the State of Illinois, represented in the General Assembly: That it shall be unlawful for any city, village, incorporated town, county or other corporate authority in the State of Illinois by ordinance, rule or regulation other than may be established by the law of this State, to demand, fix, establish or require the tuberculin test to be applied to dairy animals as a means or measure of regulating or purifying milk, skimmed milk, cream and dairy products of said animals in any manner whatever, and every such ordinance, rule, by-law or regulation heretofore or hereafter passed, demanded, fixed, established or required by any such city, village, incorporated town, county or other corporate authority other than the State of Illinois, is hereby declared to be void and of no effect.

JUDGE E. D. SHURTLEFF stated at a hearing in Springfield last spring that 1,000 copies of the two-volume cloth-bound Report and Evidence were printed in 1911 by the State, and 10,000 copies of the paper-covered Report proper. It is the latter that we here present.

What became of those 11,000 Reports is a mystery. If they were placed in City Libraries or Agricultural School Libraries, no evidence of the fact has been found. Inquiry at the Crerar and Newberry Libraries failed to turn up a copy. The Chicago Public Library has Vol. II which contains part of the evidence, but Vol. I which contains this valuable Report and hundreds of pages of evidence is missing. Inquiry of the Wisconsin Agricultural School brings the information they have never heard of it. A requisition on the Secretary of State six or seven years ago elicited the statement that it was "out of print."

IT GOES without saying that if the verdict of the Investigating Committee had been in favor of the Test instead of against it, the "health department" of Chicago—which was at the bottom of the trouble in the first place—would still be quoting it, it would be in every Agricultural College, and by now probably used as a textbook in the public schools.

Two or three copies can be seen in the State Library in Springfield. Mr. Elmer J. Fellows of St. Charles, who was connected with the investigation, had several copies from which he recently supplied us.

The Legislature was urged by Judge Shurtleff, last spring, when the Tice Bill was under consideration, to reprint the Report, saying there was no reason why people should remain ignorant on the subject of the Tuberculin Test, and pointing out the exceptional advantages his Committee had enjoyed in the way of having access to a large amount of expert evidence which had been released about that time.

See pp. 8-14 for the sources of the information gathered.

But the Legislature failed to act, leaving the public still in the dark, to be the prey of the fearsome propaganda of "health" officials, of a publicity put out at public expense for the furtherance of their own ends.

WHEN the cow-testing contingent (medical health officials and veterinarians) found themselves balked in Illinois and opposed in other States, these bureaucrats began to cook up something in Washington, a plot to which the reader may be forced to apply an ugly name when he understands it. For they had determined to get all the cows in the whole country tested, regardless of State laws and the objections of cow-owners. Two interlocking schemes were devised, and Federal aid was obtained from Congress to use as a bait.

The initial scheme was "Voluntary Testing." Legislatures were lobbied by Federal men and local health officials to obtain an Act authorizing the work and making an appropriation. Federal aid and Test propaganda won. Phrases like "Voluntary," "Health Conservation," "Clean-up," "Economy for the Farmer," were too plausible to withstand. The new lawmakers had probably never heard of Illinois' official investigation and the resulting condemnation of the Test; the Reports had disappeared; the money and time the State had spent on the investigation had been thrown away—STOLEN, by those responsible for suppressing the Report.

The veterinarians, having got the Voluntary Testing Act and the appropriations, sallied forth, being ably assisted by their pal the County Agent. Test propaganda, crafty inducements, veiled threats, as circumstances required, were sufficient to get a large amount of testing done. Besides, the breeders would test on account of the requirements of other States.

When Voluntary Testing approached its limits, it was time to start Scheme No. 2. This was (and is) "County Area Testing." Again the Legislature was besieged; this time the testers were reinforced with the argument of a large amount of testing already done, therefore the "clean" herds were "menaced" by their untested neighbors. The meat packers had been induced (probably by favors from Government Vets) to offer a premium for hogs from tested counties.

COUNTY Area Testing acts are doubtless as "good" as the testers can get. The Minnesota act is very good indeed. It takes but 51 per cent of "signed-up" farmers to condemn the remaining 49 per cent to the compulsory test. In Illinois, the Tice Act requires that 75 per cent of the cattle in a county must be tested before the remaining 25 per cent can be CONFISCATED, for it is nothing less.

We see that the County Area scheme is patently a violation of the Fourth Amendment to the U. S. Constitution. We also see that the Voluntary Testing scheme was put over on false pretenses, since compulsion was contemplated from the beginning, and that the two together constitute a huge CONSPIRACY against the rights of cattle owners and the public; for all the people are concerned in this enormous waste of money, destruction of cattle, and prostration of the dairy industry that will inevitably follow an honest application of the test to all cows.

It should be said at this point, however, and borne in mind, that the Tuberculin Test can be manipulated at the will of the testers, and therefore they can pronounce herds "clean," can long keep the graft going without destroying the dairy business entirely, providing they nurse their jobs along, condemn few animals, and content themselves with drawing their salaries. Only in case they adopt this policy can dairying and the Test both survive, and we believe the careful student of this Report will conclude it bears out that assertion.

While the Report, as will be seen, contains the pro and con, and while even some of the conclusions of the Committee seem to us too lenient toward the Test (and that is because the Investigating Committee was medically "orthodox"), yet, after weighing the evidence on both sides, the fair-minded reader of whatever medical faith must agree with the Committee and find the Test unreliable, unnecessary, enormously wasteful, and even dangerous to the herds and therefore injurious to milk consumers.

AMERICAN MEDICAL LIBERTY LEAGUE, 59 E. Van Buren St.
Chicago, December, 1925.

For the reader's convenience we index a few *adverse testimonies*. It will be noted by the reader that most of the *favorable testimonies* are mere opinion without any facts given to support them, while many of the adverse opinions given are backed with the facts.

American Medical Liberty League.

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REPORT
OF THE
Joint Committee
ON
Tuberculin Test
1911

Printed under direction of

B. H. McCANN

Clerk of the House of Representatives

TO THE FORTY-SEVENTH GENERAL ASSEMBLY,
STATE OF ILLINOIS.

JOINT COMMITTEE OF HOUSE AND SENATE TO INVESTI-
GATE THE TUBERCULIN TEST AND THE PASTEURI-
ZATION OF MILK AND ITS PRODUCTS, UNDER
HOUSE JOINT RESOLUTION NO. 20.

REPORT OF COMMITTEE.

Edward D. Shurtleff, Chairman, 100 Washington Street, Chicago.
George L. McConnell, Secretary, 79 Seeley Avenue, Chicago.

MEMBERS.

House.

Edward D. Shurtleff, Marengo.	Thomas Tippet, Olney.
Guy L. Bush, Downer's Grove.	Alexander Lane, Chicago.
Frank W. Shepherd, Elgin.	J. W. Allison, Essex.

Senate.

John C. McKenzie, Elizabeth.	S. C. Pemberton, Oakland.
Albert J. Olson, Woodstock.	C. S. Hearn, Quincy.

The reference books and pages in this report made to the proceedings of the International Congress on Tuberculosis, held at Washington in 1908, are made in order, Volume 1, 2, 3, 4, 5, 6, 7 and 8, for brevity.

Our Volume 1 is Vol. 1, Part 1, Sec 1, and Joint Session of Sec. 1 and 2.

Our Volume 2 is Vol 1, Part 2, Sec. 2.

Our Volume 3 is Vol. 2, Sec. 3 and 4.

Our Volume 4 is Vol. 3, Sec. 5.

Our Volume 5 is Vol. 4, Part 1, Sec. 6.

Our Volume 6 is Vol. 4, Part 2, Sec. 7.

Our Volume 7 is Vol. 5.

Our Volume 8 is Special Volume.

*To the President of the Senate and the Speaker of the House of the
Forty-seventh General Assembly*

The undersigned, being a joint committee appointed, respectively, by the President of the Senate and the Speaker of the House of the Forty-sixth General Assembly, under and in pursuance of House Joint Resolution No. 20, adopted and concurred in May 7, 1909 (Session Laws, 1909, page 492), as follows:

TUBERCULIN TEST COMMITTEE.

(House Joint Resolution No. 20.)

WHEREAS, The General Assembly in 1907 passed an Act providing for the appointment of a Food Standard Commission, with certain powers granted to determine the quality, purity and strength of various foods, and, among other things, provided that the State Food Standard Commission, in determining and adopting a standard of quality, purity and strength of milk or cream, shall fix such standard as may be determined solely by the examination and test of milk and cream and the can or receptacle in which it is placed; and,

WHEREAS, The city council of the city of Chicago, in the month of July, A. D. 1908, passed three separate ordinances which then provided and are in force as follows, viz

ORDINANCES REQUIRING TUBERCULIN TEST OF COWS.

MILK.

Be it Ordained by the City Council of the City of Chicago:

SECTION 1. No milk, cream, buttermilk or ice cream shall be sold, offered for sale, exposed for sale or kept with the intention of selling within the city of Chicago, after Jan. 1, A. D. 1909, unless such milk or cream contained in buttermilk and ice cream be obtained from cows that have given a satisfactory negative tuberculin test within one year. The cows having been satisfactorily tested shall be marked "tuberculin tested" and shall be numbered and a certificate shall be filed with the division of milk inspection of the department of health of the city of Chicago upon forms furnished by the commissioner of health, giving the number, a brief description of the animal, the date of taking said test, and the name of the owner. Said certificate shall be signed by the person making such test: *Provided, however*, that from Jan. 1, 1909, for a period of five years, to-wit, until Jan. 1, 1914, milk or cream or buttermilk and ice cream made from milk or cream, obtained from the cows not tuberculin tested or not free from tuberculosis may be sold

within the city of Chicago if the milk or cream from said cows is pasteurized according to the rules and regulations of the department of health of the city of Chicago.

Sec. 2. Any milk, cream, buttermilk or ice cream offered for sale, exposed for sale or kept with the intention of selling within the city of Chicago, found within the city in violation of section 1, shall be forthwith seized, condemned and destroyed by the milk and food inspectors or other duly authorized agents or employes of the department of health of the city of Chicago.

Sec. 3. This ordinance shall be in full force and effect from and after Jan. 1, 1909.

BUTTER.

Be it Ordained by the City Council of the City of Chicago:

SECTION 1. No butter shall be sold or offered for sale or kept with the intention of selling in the city of Chicago after Jan. 1, 1909, unless such butter be made from milk or cream obtained from cows that have given a satisfactory negative tuberculin test within one year: *Provided, however*, that from Jan. 1, 1909, for a period of five years, to-wit, Jan. 1, 1914, butter made of milk obtained from cows not tuberculin tested or not free from tuberculosis may be sold in the city of Chicago if the milk or cream [from] which such butter was made was pasteurized according to the rules and regulations of the department of health of the city of Chicago.

Sec. 2. It shall be unlawful to sell any butter in the city of Chicago unless there be stamped on the package in plainly legible letters of not less than one-eighth inch type: "Made of milk (or cream) from cows free from tuberculosis as shown in the 'tuberculin test,' or made from milk (or cream) pasteurized according to the rules and regulations of the department of health of the city of Chicago."

Sec. 3. Any butter offered for sale, exposed for sale or kept with the intention of selling in the city of Chicago, which shall be found within the city in violation of this ordinance, shall be forthwith seized, condemned and destroyed by the milk and food inspectors or other duly authorized agents of the department of health of the city of Chicago.

Sec. 4. This ordinance shall be in full force and effect from and after Jan. 1, 1909

CHEESE.

Be it Ordained by the City Council of the City of Chicago:

SECTION 1. No domestic cheese shall be sold or offered for sale or kept with the intention of selling in the city of Chicago after Jan. 1, 1909, unless such cheese be made from milk or cream obtained from cows that have given a satisfactory negative tuberculin test within one year: *Provided, however*, that from Jan. 1, 1909, for a period of five years, to-wit, until Jan. 1, 1914, domestic cheese made of milk obtained from cows not tuberculin tested or not free from tuberculosis may be

sold in the city of Chicago if the milk or cream from which such cheese was made was pasteurized according to the rules and regulations of the department of health of the city of Chicago.

Sec. 2. It shall be unlawful to sell any such cheese in the city of Chicago unless there be stamped on the package in plainly legible letters of not less than one-eighth inch type, "Made of milk (or cream) from cows free from tuberculosis as shown by 'tuberculin test,' or made from milk (or cream) pasteurized according to the rules and regulations of the department of health of the city of Chicago."

Sec. 3. Any cheese offered for sale, exposed for sale, or kept with the intention of selling in the city of Chicago, which shall be found within the city in violation of this ordinance, shall be forthwith seized, condemned and destroyed by the milk and food inspectors or other duly authorized agents or employees of the department of health of the city of Chicago.

Sec. 4. This ordinance shall be in full force and effect from and after January 1, 1909.

Which said ordinances it is claimed are without foundation of law, unreasonable and void; and,

WHEREAS, Under and by virtue of said ordinances the board of health of the city of Chicago are assuming to inspect dairy herds in the State of Illinois, and to condemn milk, butter and cheese that are produced from cows that have not been tested by the tuberculin test and that is manufactured and produced from milk which has not been pasteurized, and the producers of milk, butter and cheese tributary to the city of Chicago are being greatly annoyed, hindered and harassed by agents of the board of health of the city of Chicago, and the sale of their product is being injured, damaged and destroyed; and,

WHEREAS, By reason of the said ordinances and the unlawful and unreasonable rules and restrictions of the board of health of the city of Chicago the price of milk in said city has increased and is being raised and threatened to be raised from six and seven cents a quart to nine cents a quart, to the great injury and suffering to the people of that city; and

WHEREAS, It is a disputed question whether the tuberculin test is an accurate and efficient test to determine whether the disease of tuberculosis exists in the animal, and it is a disputed question whether tuberculosis can be conveyed from the animal to the human being from milk and its products; and

WHEREAS, It is disputed and denied that the disease of tuberculosis exists to an appreciable extent among the dairy herds and breeding animals of the State, and such dispute leads to the damage and loss of values of such dairy herds and breeding animals by reason of such dispute and contention, and loss and injury to the owner of such dairy herds and sale of their products, by reason of said city ordinances and the rules and regulations and inspections of the department of the board of health of the city of Chicago; and

WHEREAS, It is plain that the pasteurizing of milk destroys its value for the manufacture of butter and cheese and renders it impossible to

manufacture any reasonable quality of butter or cheese from such milk and tends rather to increase the bacteria germs naturally in milk where it is not used immediately, and otherwise injures and destroys the strength and food qualities in the milk; and

WHEREAS, A bill is now pending in this Legislature providing for the enforcement of the law for the testing of dairy cows and breeding cattle by the tuberculin test, and the payment by the State of the sum of seventy-five per cent of the appraised value of the cattle damaged, which will lead to an enormous expenditure of money by the State, which may possibly be unnecessary, unless and (of) great damage and injury to the dairy interests of the State; therefore, be it

Resolved, By the House, the Senate concurring, That a joint committee of ten be appointed, six by the Speaker of the House and four by the President of the Senate, to investigate into the reliability and the efficiency and the necessity of adopting the tuberculin test in the State of Illinois, and that said committee investigate and determine the question as to whether or not the disease germ passes from an animal afflicted with tuberculosis, through the milk, to a human being, and the effect of pasteurizing milk as such food product is pasteurized, bottled up, shipped and used in the city of Chicago, taken from the dairy districts at a distance from said city.

That they take evidence and have the power (to) subpoena witnesses and send for documents and papers and acquaint themselves with the laws and results accomplished in other states and that said committee collect the evidence and opinion of expert bacteriologists upon said question, and if said tuberculin test should be found to be an actual and efficient test of the disease of tuberculosis among domestic animals, then that said committee estimate the amount that should be paid for cattle condemned both under an optional law, mandatory law, and make their report to the next session of the General Assembly, and that said committee be provided with an appropriation of an adequate amount to pay clerk and stenographers' fees and hire and actual traveling expenses of the committee while engaged upon the work as herein set out.

Adopted by the House April 8, 1909.

Amended by the Senate May 4, 1909.

Concurred in by the House May 7, 1909.

Would respectfully beg leave to report that said committee met in the city of Chicago on the 30th day of June, A. D. 1909, at room 1603, 100 Washington street, in said city, and proceeded to organize by the election of Edward D. Shurtleff as its chairman and George J. McConnell, its secretary, and the adoption of various resolutions to facilitate the work of said committee in the pursuance of the investigation provided for in said joint resolution.

Your committee would further report that on or about the 1st day of May, A. D. 1910, in the pursuance of a resolution adopted by the

city council of the city of Chicago, there was appointed by the Mayor of said city and confirmed by said council, a Milk Commission, consisting of the following named gentlemen, to-wit:

- Francis W. Taylor, Alderman 21st Ward, City Council, 247 Monadnock Blk.
- John R. Emerson, Alderman 8th Ward, City Council, 9151 Commercial av.
- Prof. P. G. Heineman, Professor of Bacteriology, University of Chicago.
- Prof. John H. Long, Professor of Chemistry, Northwestern University Medical School, 2431 Dearborn st.
- Dr. I. A. Abt, Professor of Pediatrics, Northwestern University Medical School, 2431 Dearborn st.
- Dr. F. E. Bennett, Inspector in Charge, Bureau of Animal Industry, Department of Agriculture, 4193 S. Halsted st.
- Dr. G. B. Young, Surgeon-in-Command, Public Health and Marine Hospital Service, 4133 Clarendon av.
- Dr. Gottfried Koehler, Assistant Commissioner of Health, Chicago, 215 E. Madison st.
- William Rusche, Milk Dealer, 3823 Rokeby st.
- C. N. Boord, Assistant Corporation Counsel, City of Chicago, 200 Randolph st.
- W. A. Boies, Dairy Farmer, Marengo, Ill.
- B. J. Samuels, Attorney, 143 Dearborn st.

Said commission being appointed and directed to pursue the same line of work and investigation as directed to be carried out by the State committee appointed by Your Honorable Bodies, under said House Joint Resolution Number Twenty.

Your committee would further respectfully report that in the latter part of May and the early part of June, A. D. 1910, a copy of the following letter was sent to the county clerks of Lake, Boone, McHenry, Kane, Will, DeKalb, DuPage and Kendall counties, and to the members of the boards of supervisors of each of said counties, as follows:

"DEAR SIR—The above named Committee was appointed a Joint Committee by the House and Senate, upon a resolution introduced by myself, to investigate the subject of the tuberculin testing of cows, the pasteurization of milk and the milk subject generally.

"The Committee has several thousand pages of evidence, including the scientific end of the subject. It has the evidence of Dr. Evans, superintendent of the Health Department of Chicago, Dr. Koehler, his assistant, and the other heads of department of this city. This has led, in my judgment, to a change in attitude on the part of the Health Department of the City of Chicago; at least from their evidence upon the witness stand they concede that if all cows were tuberculin tested and the supply of milk derived only from those that passed the test, it would eliminate only about five per cent of the unhealthful germs in milk.

"The Department of Health of the City of Chicago is now of the opinion that the pasteurization of milk is absolutely necessary to procure a pure supply of milk in this city—and growing out of the fight in the Chicago city council over its ordinances, led by Alderman Hey and others, a committee to investigate has been appointed by the Mayor of the city. I know nothing about the makeup of this committee, except that one producer of milk was named at my suggestion, and one other representative in the city of Chicago, of our Committee.

"Our Committee appointed by the State is now ready to take up the milk subject from the producers' standpoint, and will give practically the balance of its time before the next Legislature convenes to taking evidence and studying thoroughly the milk subject from the producers' standpoint. This field is so large and includes so many in numbers that it is a difficult problem

to determine how to reach the same economically and practically. I have corresponded with the county clerks of Lake county, McHenry county, Kane county, Boone county, DeKalb county, DuPage county and Will county, and I think Kendall county should be included in the list. I would suggest that the boards of supervisors of these various counties, at their next meeting, select in each respective county three practical milk producers of their respective counties, making in all a committee of twenty-four from the eight respective counties, and that this committee of twenty-four meet at some central place and be ready to take up the subject with our committee and furnish us such evidence into all of the local situations as to producing milk as has a bearing upon the subject, and that will form a committee that can confer together and be ready to recommend legislation to the next Legislature and cooperate fully with our committee appointed by the State—which I trust the Chicago committee will also do.

"I might also add that the Health Department of the City of Chicago now concedes that the tuberculin testing of cows is simply a matter that pertains to the economy of the herds and that pasteurization is the more important question in the milk supply.

"Would you kindly cooperate and advise me as to this suggestion?

"Likely it would be agreeable for the counties of Kane and Will to appoint five instead of three. I am,

Very truly,

EDWARD D. SHURTLEFF,
Chairman."

Thereafter it was reported by the respective county clerks that the following were appointed members of the milk producers' committee, by the boards of supervisors, in response to the above letter:

Of DeKalb county—George Gurler, DeKalb, Ill.; George M. Tindall, Kirkland, Ill.; Alvin Warren, Leland, Ill.

Of Boone county—Thomas W. Porter, Garden Prairie, Ill.; Garrett F. Sager, Belvidere, Ill.; Eugene Hovey, Capron, Ill.

Of McHenry county—W. A. Boies, Marengo, Ill.; Henry M. Turner, Hebron, Ill.; Jesse B. Richardson, Spring Grove, Ill.

Of DuPage county—George A. Fischer, Addison, Ill., William Yackley, Glen Ellyn, Ill.; W. E. Janes, Hinsdale, Ill.

Of Lake county—Ray Paddock, Round Lake, Ill., C. G. Small, Rockefeller, Ill.; R. W. Chittenden, Gurnee, Ill.

Of Kendall county—D. M. Baird, Plano, Ill.; O. G. Grimwood, Bristol, Ill.; Alexander Harvey, Oswego, Ill.

Of Kane county—Elmer Fellows, St. Charles, Ill.; George Peck, Geneva, Ill.; E. G. Harvey, LaFox, Ill.; D. E. Wood, Elgin, Ill.; Frank Rees, Dundee, Ill.

Of Will county—Robert G. Salzman, Beecher, Ill.; William Rump, Beecher, Ill.; William Owens, Mokena, Ill.; W. J. Davy, Wilmington, Ill.; Frank Baumgartner, Joliet, Ill.

Thereafter, pursuant to a notice sent to the various members of the committee appointed by the House and Senate, also to a notice sent delegates appointed by the supervisors of the counties of DeKalb, Will, Boone, McHenry, DuPage, Lake, Kendall and Kane, a meeting of said committee was called to be held at the Elks' Club rooms in the city of Elgin, Kane county, Illinois, at the hour of 2:00 o'clock p. m., upon the 20th day of June, A. D. 1910, and there were present at said meeting the following named persons:

Present of the Legislative Committee:

Edward D. Shurtleff, Marengo.
George L. McConnell, Chicago,

Guy L. Bush, Downers' Grove.
 Frank W. Shepherd, Elgin.
 Thomas Tippitt, Olney
 C. S. Hearn, Quincy

Present of the committee appointed by the boards of supervisors:

George Gurler, DeKalb, Ill., DeKalb county.
 George M. Tindall, Kirkland, Ill., DeKalb county.
 Alvin Warren, Leland, Ill., DeKalb county.
 Robert G. Salzman, Beecher, Ill., Will county.
 William Rump, Beecher, Ill., Will county.
 Willard Owen, Mokena, Ill., Will county.
 Frank Baumgartner, Joliet, Ill., Will county.
 Thomas W. Porter, Garden Prairie, Ill., R. R. No. 2, Boone county.
 Garrett F. Sager, Belvidere, Ill., R. R. No. 2, Boone county.
 Eugene Hovey, Capron, Ill., R. R. No. 3, Boone county.
 W. A. Boies, Marengo, Ill., McHenry county.
 Henry M. Turner, Hebron, Ill., McHenry county.
 Jesse B. Richardson, Spring Grove, Ill., McHenry county.
 George A. Fischer, Addison, Ill., DuPage county.
 William Yackley, Wheaton, Ill., DuPage county.
 W. E. Janes, Hinsdale, Ill., DuPage county.
 Ray Paddock, Round Lake, Ill., Lake county.
 C. G. Small, Rockefeller, Ill., Lake county.
 R. W. Chittenden, Gurnee, Ill., Lake county.
 D. M. Baird, Plano, Ill., Kendall county.
 I. O. Grimwood, Bristol, Ill., Kendall county.
 Alexander Harvey, Oswego, Ill., Kendall county.
 Elmer Fellows, St. Charles, Ill., Kane county.
 George Peck, Geneva, Ill., Kane county.
 E. G. Harvey, LaFox, Ill., Kane county.
 D. E. Wood, Elgin, Ill., Kane county.
 Frank Rees, Dundee, Ill., Kane county.

Also at said meeting there were present Dr. William A. Evans, commissioner of health, and Dr. Gottfried Koehler, assistant commissioner of health, of the city of Chicago; Alderman Taylor, chairman of the milk commission of the city of Chicago, and various other persons interested in the subject under consideration; and at said meeting the said producers' committee or delegates, selected and appointed by the various boards of supervisors, proceeded to the organization of their committee by the election of Mr. Elmer Fellows of St. Charles, Kane county, as chairman, and Mr. Willard Owen of Mokena, Will county, as secretary; and at said meeting, said milk producers' committee became fully organized and established to work along the same lines of investigation and to present evidence to the undersigned State committee. Since which time your committee have pursued its labors, aided and assisted materially and beneficially by the milk commission of the city council of the city of Chicago on the one side and the milk producers' committee, appointed by the respective boards of supervisors of said counties on the other; to which said body of milk producers' committee there were afterwards received three members from the county of Cook, so that said milk producers' committee now consists of the following named gentlemen, to-wit:

NAME.	P. O. ADDRESS.	COUNTY.
George Gurler	DeKalb	DeKalb
Alvin Warren	Leland	DeKalb
George M. Tindall	Kirkland	DeKalb
Robert G. Salzman	Beecher	Will
William Rump	Beecher	Will
William Owens	Mokena	Will
W. J. Davy	Wilmington	Will
Frank Baumgartner	Joliet	Will
Thomas W. Porter	Garden Prairie, R. R. 2	Boone
Garrett F. Sager	Belvidere, R. R. 2	Boone
Eugene Hovey	Capron, R. R. 3	Boone
W. A. Boies	Marengo	McHenry
Henry M. Turner	Hebron	McHenry
Jesse B. Richardson	Spring Grove	McHenry
George A. Fischer	Addison	DuPage
William Yackley	Glen Ellyn	DuPage
W. E. Jones	Hinsdale	DuPage
Ray Paddock	Round Lake	Lake
C. G. Small	Rockefeller	Lake
R. W. Chittenden	Gurnee	Lake
D. M. Baird	Plano	Kendall
I. C. Grimwood	Bristol	Kenda l
Alexander Harvey	Oswego	Kendall
Elmer Fellows	St. Charles	Kane
George Peck	Geneva	Kane
E. G. Harvey	LaFox	Kane
D. E. Wood	Elgin	Kane
Frank Rees	Dundee	Kane
Fred Blume	Palatine	Cook
P. A. Hawley	Barrington	Cook
Fred Wishaar	Matteson	Cook

Your committee would further report that, in the pursuance of its labors it ascertained that a suit was being tried in the courts of New Jersey, following the passage of an ordinance by the city of Montclair, prohibiting the sale of all milk in said city except it came from cows that had passed a satisfactory tuberculin test, which suit was brought by the Borden's Condensed Milk Company against the board of health of the city of Montclair to enjoin the enforcement of said ordinance; and your committee has been able to secure practically all of the evidence taken in said cause, which is far reaching, elaborate and presents, not only the work and experiments, but the views and opinions of the leading scientists, bacteriologists and physicians of the United States, if not of the world, and has it as a part of the record in this cause, and lays it before your honorable bodies in its report.

In the pursuance of its work your committee ascertained that a similar ordinance had been passed by the city of Milwaukee, in the state of Wisconsin, and that a suit was pending in the district court of the city of Milwaukee, brought in the name of John Quincy Adams in his own behalf and in the interest of a large number of dairymen, against the city of Milwaukee to enjoin the enforcement of said ordinance; in which suit the evidence has been taken, presenting a great many scientific and practical facts, all of which your committee has been able to secure and make it a part of its record and lays before your honorable bodies with its report.

Another case was brought in the city of Minneapolis by Ole B. Nelson and Frank N. Nelson and others against the city of Minneapolis and its commissioner of health, the record of which your committee has been able to secure, make a part of its record, and lays before your honorable bodies. But this case apparently went off on technical questions, and does not have so much bearing as the Milwaukee and Montclair cases.

Your committee has called as witnesses Dr. W. A. Evans, commissioner of health; Dr. Gottfried Koehler, assistant commissioner of health, of the city of Chicago; its bacteriologists, milk inspectors and all of its officials, so far as known, having work in connection with the milk supply of the city of Chicago; and your committee have afforded the widest latitude to the health department of the city of Chicago to produce witnesses, furnish evidence and lay before your committee pamphlets and literature having reference to the subject in hand.

Your committee has further called before it and taken the evidence of the officials of the milk commission of the Chicago Medical Society, the sponsors of the so-called "certified milk," and have also called witnesses as to the sanitary conditions as they exist in the city of Chicago.

Your committee has also summoned before it every member of the milk producers' committee and taken the evidence of every member of that committee which has come before our body, and with very few exceptions each member of the milk producers' committee has testified, and the names of all witnesses presented to your committee by the milk producers' committee have been summoned; and, so far as we have been able to secure their presence, their evidence has been taken, and your committee have afforded the widest opportunity to the milk producers' committee to furnish witnesses and evidence and to lay before your committee facts, as well as pamphlets and literature, having a bearing upon the subject that we are appointed to investigate.

Your committee would further report that it has requested and urged the State Board of Live Stock Commissioners of the State of Illinois and the State Board of Health of the State of Illinois to lay before your committee any and all evidence, facts and literature that either of said boards might have or wish to present, having a bearing upon the questions being investigated by your committee; and your committee has been much aided by the personal presence and testimony of Mr. Phillip Hainer, chairman of the Board of Live Stock Commissioners, and other facts and data furnished by the secretary of that board; and your committee have also been much aided by literature and suggestions from the State Board of Health and its secretary.

Your committee invited Alderman Jacob Hey of the city of Chicago to appear before the committee, give evidence and furnish witnesses and testimony upon the subject of the pasteurization of milk, generally and particularly, as it might have reference to the business of the smaller milk dealers in the city of Chicago; and at the request of Alderman Hey, your committee summoned before it several witnesses

and took their testimony upon that subject and afforded the widest opportunity to the dealers of milk in Chicago to furnish evidence upon the subject of pasteurization, both in favor of and against pasteurization of milk, all of which is incorporated in the record of your committee, and with its report, laid before your honorable bodies.

Your committee also reports that it has secured and presents, with the evidence and record in this case, copies of the contracts as made by the Borden's Condensed Milk Company, the Bowman Company, Ira J. Mix & Company, Sidney Wanzer & Sons and the milk commission of the Chicago Medical Society, producing certified milk, made between said companies and its and their patrons producing milk, all of which indicate and show the sanitary requirements under which milk is produced and handled by the larger milk dealers, and being furnished at the present time to the city of Chicago.

Your committee has requested from each state in the Union and from every important city in the United States, a copy of its dairy and food laws and a copy of its laws regulating animal diseases, and especially with reference to tuberculin test; and from the said cities a copy of their laws and ordinances with reference to the milk supply and the regulations of their boards of health.

Your committee further have secured for its own enlightenment a full copy of all the acts, addresses, papers and proceedings of the International Congress to study the subject of tuberculosis, held in the city of Washington, D. C., in the months of September and October, A. D. 1908, and has found much valuable information, suggestions and enlightenment in said reports; a full copy of all of said proceedings being made a part of our record and presented with our report and laid before your honorable bodies.

Your committee would further report that so far as it has been able, and considering the time we have been permitted to give to the work of this committee, we have sought to procure all of the evidence, facts, literature, opinions and experiments that have a bearing upon the subjects set out in the joint resolutions, and we have devoted all of the time possible to be spared from our private business in studying the evidence, facts, literature, experiments, suggestions and conclusions that are presented in our record; and it is with an apology that we attempt to present a conclusion of a committee consisting largely of laymen, upon a subject that in many respects is highly technical; in some of its parts, purely medical; the study of which is in its primary and experimental stage, and in which conclusions can only be inferential.

We make this report to your honorable bodies, however, and there is less occasion for an apology from a layman upon these subjects, along all of the lines upon which the doctors disagree.

The report is submitted with a full sense and comprehension of the vast extent of the subject matter, its intricacy and the liability to error among things where knowledge of yesterday is ignorance to-mor-

row; but in whatever assembling of various facts and conclusions in a systematized form we have been able to make to your honorable bodies to guide you in the action for the present, we shall feel satisfied.

The joint resolution instructs your committee:

First—To investigate into the reliability and the efficiency and necessity of adopting the tuberculin test in the State of Illinois.

Second—To investigate and determine the question as to whether or not the disease germ passes from an animal afflicted with tuberculosis, through the milk, to a human being.

Third—The effect of pasteurizing milk as such food product is pasteurized, bottled up, shipped and used in the city of Chicago, taken from the dairy districts at a distance from said city.

Fourth—If said tuberculin test should be found to be an actual and efficient test of the disease of tuberculosis among domestic animals, then that said committee estimate the amount to be paid for cattle condemned, both under an optional law, mandatory law, etc.

THE TUBERCULIN TEST.—ITS RELIABILITY, EFFICIENCY, AND THE NECESSITY OF ITS ADOPTION.

The resolution provides "to investigate into the reliability and the efficiency and the necessity of adopting the tuberculin test."

A committee might find as to reliability and efficiency in the affirmative, or it might find as to reliability and efficiency in the negative. It is more than likely that when the true nature of tuberculin and the tuberculin test is understood and its proper place is pointed out, that those questions—reliability and efficiency—can neither be answered in the affirmative or the negative, but that the use of the tuberculin test and its efficiency and reliability will have to be specially and very much modified by a full discussion of the disease of tuberculosis, its nature and extent—the many practical facts and circumstances that require to be taken into consideration in its use, and the stage or extent of the disease which its proper application indicates. The third clause of the first question, "the necessity of adopting the tuberculin test," is so closely correlated with the second question that, in order to determine such necessity or lack of necessity, the two questions must be considered together. We shall, therefore, first discuss that portion of the first question as to its reliability and efficiency.

The tubercle bacillus is the foundation and cause of tuberculosis in animals and man. It is a specially defined form of germ or bacteria, tube shape in form, and believed originally to be of the same classification in animals and man until Dr. Theobald Smith, of Boston, by experiments in more recent years, has specially differentiated between the human bacillus and the bovine bacillus found in domestic animals or neat cattle, Dr. Smith having discovered that the two bacilli are of distinct and different type, although likely of the same general species, which is not fully accepted by the entire medical world.

The preparation of tuberculin is briefly as follows: "Tubercle bacilli of bovine or human origin are grown upon a broth prepared from meat, into which peptone and glycerine are added, also certain inorganic salts. After the placing of this broth in flasks and after

sterilization the media which is then completed is ready for innoculation and a part of the pure culture of tubercle bacilli is floated on the surface of the broth in the flasks. This is then grown at a temperature of 37 to 38 degrees centigrade for seven weeks or longer. When the culture is ripe (which can be determined by the length of growth and by the experience of the man who is making the tuberculin) the cultures are heated for several hours at approximately 100 degrees centigrade. The bacilli which are floating in the fluid are removed completely by filtration. The filter is concentrated and this furnishes the concentrated tuberculin. Before use it is diluted." (Record, page 1499.)

Dr. Morris (record, pages 117 and 118) described tuberculin as the product of the tubercle bacilli; that "it is made by the maceration and boiling of tubercle bacilli in glycerine and then filtered and carbolic added to it. That the purpose of boiling is to destroy all living germs, and the result is a toxin of the dead bodies of the tubercle bacilli."

The method of applying the tuberculin test is to inject subcutaneously, under the skin, tuberculin, approximately one cubic centimeter equal to fifteen drops, indicated as 1 c. c., although the amount of injection, into animals, varies. Prior to injection the temperature is taken at different times during the preceding twelve hours to arrive at the average normal temperature of the animal. Commencing a few hours after the injection, temperatures of the animal are again taken periodically for twelve hours, and if the animal, following injection, has a rise of temperature amounting to two or more degrees, it is an indication that the animal is infected with tuberculosis. If the post temperatures, following injection, gradually rise to the high point exceeding two degrees above normal temperature and then decline gradually to the normal temperature, forming what is known as the temperature curve, it is said to be a perfect re-action and a strong indication that the disease of tuberculosis exists, which it is claimed has been verified upon post mortem examinations, when all of the conditions were proper, in over 98 per cent of the cases tested and examined.

"There is no certain normal temperature in cattle. There are many conditions that vary the normal temperature between 99 and 102, such as the age of a cow, for example. A young cow will have a higher temperature than an old cow, that is, a higher normal temperature, higher variation of normal temperature. A cow brought in in summer time to be tested after having been turned out to grass, and put on a plank floor or cement floor, and kept up for the twenty-four hours for preliminary test, the temperature will rise. It will rise considerably if the day is hot. The increase would be considerable in some cases. The normal temperature is a movable feature which must be determined by a lot of conditions by the veterinary and at the time." (Record, page 1651.)

Tuberculin originally was proposed as a cure for tuberculosis. It was supposed to be an anti-toxin which would cure the disease. In this it is reported to have failed.

Meissen said at the International Congress at Washington in 1908 (Inter. Cong., Vol. 2, page 778): "It is not proved that tuberculin has a specific curative action: neither animal experiments nor the results

obtained in man justify such a conclusion. The bewildering mass of new tuberculins and the constantly growing number of the methods of application are sufficient proof that the question is still open and that further experiments are necessary. In judging the value of the tuberculin tests, you must distinguish between tuberculous infection, i. e., the formation of small latent foci, which is exceedingly common even in healthy individuals, and tuberculous disease which manifests itself by clinical symptoms in the lungs. The old sub-cutaneous tuberculin test after R. Koch is a very delicate reagent, both for tuberculin infection and tuberculous disease. It is not quite without danger and it is too delicate for clinical diagnosis in general, and should be employed only in cases in which the local reaction can be observed. It is, however, of value in studying the spread of tuberculous infection and confirms the results of pathology."

Dr. Gill, testifying in the Montclair case for the board of health (Record, page 1663), says: "It is my opinion that a cow will react immediately after she has received the tubercle bacilli into her system. There is no period of time after the reception of the bacillus into the cow during which the cow will not react." Dr. Gill, in this statement, agrees with all of the authority upon this subject, that in all cases of the slightest infection in the system, the most perfect reaction is produced.

It is further to be noted that in cows and other hairy-skinned animals any excitement raises the temperature for the reason that they have no sudorific glands to make sweat and carry off the heat. A drink of cold water affects the temperature of the whole body. A cow taken out of a warm stable and given cold water will reduce its temperature three or four degrees in twenty minutes. And Dr. Brush says (Record, page 217), that a healthy cow can sometimes have a temperature of 105 or 106 degrees and not be diseased, and as far as you can determine, they are perfectly healthy cows and have a temperature which you would call normal of 105 or 106 degrees. While Dr. Gill testified (*supra*), that the normal temperature of a cow should be taken midway between 99 and 102 degrees and then that he required a rise to 104 degrees to make a perfect reaction.

Dr. Park, testifying for the board of health in the Montclair case (Record, page 1578), states that it is a fact that a large proportion of the human race has at one time or another had tuberculosis in some form or another; that a large percentage of humanity has had a slight infection at some time or another which, as a rule, has never been detected, and that they have recovered from that infection and died of something else, and that the tendency of the human body is to fight diligently against any such infection.

Dr. Van Derslice, president of the milk commission of the Chicago Medical Society, testified that over eighty per cent of the human race at some time or other have an infection of tuberculosis, but that it is cured in the most of cases, and he argues that the same rule of infection should hold true as to cattle.

Dr. L. K. Shaw, of Albany, N. Y., testifying in the Montclair case (Record, page 261), speaking of autopsies in the Bender Laboratory, says that in a series of over 1,100 autopsies at the Bender Laboratory, over eighty per cent showed some tuberculous lesions, healed in the majority of cases. The autopsies were performed on all classes of cases. Any physician or any institution can send to the Bender Laboratory and have the autopsy performed.

"Q. Did you form any conclusion there of the number of human beings that acquired, sometimes in their lives, some lesion of tuberculous conditions?"

"A. I believe very few of us escape. The majority of people have tuberculosis in some form."

Dr. Fitsrandolph says (Record, page 1703), that he is aware that a large number of human beings recover from tuberculosis—never die of it, but die of something else.

Professor Bernard Bang, of Copenhagen, said at the Washington International Congress in 1908 (Inter. Cong., Vol. 8, page 211): "This great number of reacting cows made the farmer despair. He had, perhaps, in the course of many years, raised a fine and productive herd and now everything seemed lost; the cows would perish and how could he maintain the stock when he was afraid to raise calves from tuberculous animals. He often regarded himself as ruined. It soon appeared that the great majority of reacting animals suffered only from a very limited, often quite insignificant, form of tuberculosis, and by observing the fate of such animals (as I had an opportunity of doing with a large herd in which the reacting animals were allowed to live, and I examined them all when they were eventually slaughtered), it was seen that in many of them the disease did not develop further, but, on the contrary, tended to decrease."

Dr. Claude D. Morris, of New York, testifying in the Montclair case (Record, pages 148 and 149), says, "simply because an animal has an infaction of tuberculosis does not mean that that animal is going to have generalized tuberculosis. That is the exception to the rule to leave generalized tuberculosis. Inspection goes to show that where they have inspected thousands and thousands of carcasses the percentage of generalized tuberculosis is very low. I do not think it is natural for it to become general. It is only in exceptional cases that it becomes general, and that is under low vitality. I think in most cases cows have the power to overcome the disease. I think that 85 per cent of the cows that have the affection can overcome the disease and get well. We see the evidence of what previously existed, the scar of it, so to speak."

Dr. James Law, for forty years connected with Cornell University, teaching veterinary, and now Professor Emeritus of that institution, educated at Edinburg, London and in Europe, testifying in the Montclair case (Record, page 332 and following), says: "My opinion of the tuberculin test is, to begin with, that applied by the right person, in favorable conditions, with good judgment, it is by far the best means that we have of detecting tuberculosis in the bovine animal. By the

right person, I mean that he should be a man that I think understands the use of tuberculin, so that he will apply it in the right way, and he ought to be a man who is thoroughly skilled in the diseases of stock, to which this tuberculin is to be applied, otherwise he is likely to be misled by other diseases occurring at that time as to circumstances, conditions; cattle are so easily affected, and some dairy cattle, some breeds, are very easily affected by the conditions in which they live. Take, for instance, cattle that have come over a railroad journey. They are very excited and the system is charged with leukomain poison. Well, these animals are so susceptible when they have just come off a journey that the application of the test is hardly fair to the animal. Now, take another case, the case of an animal that has been driven in, probably two or three miles in order that it may have the test applied; it is likely to come in with the temperature greatly elevated. It is not in a suitable condition at that time to have the test applied. We ought to wait until we get the system rid of this and settled down. Take, again—I will take some of these that come to mind—take the case of an animal brought from the open fields, where the air is pure and cool, and put it in a very close building. The temperature tends to rise and they become feverish, and naturally the temperature would be high, whether the tuberculin was injected or not. That means that the man who applies the test ought to be a skilled man and a careful man; absolutely trustworthy and careful. Take another case, that of rough usage of the animals, where the temperatures are being taken and the day after the injection, especially with Jerseys, they will give an appearance of reaction where it should not exist. Jerseys are usually more nervous than other cattle. With our Holstein herds, having a very heavy body, a herd that had not shown any tuberculosis for twenty-six years, had a rise of temperature. They were kept standing on a wooden floor during the period of taking the temperature, and the temperatures, in a large proportion, will rise in the afternoon, but the feet are getting hot and thick, and by turning them out into a covered yard where they have soft manure and straw to walk upon, the temperature goes down and remains down. It is merely a condition of inflammation of the feet, and has no connection whatever with the action of the tuberculin on the system. I recollect a case where a Jersey showed a rise of temperature. A change of milkman brought that about. It was one of our Jersey cows belonging to the university herd, a fine, healthy animal. She stood there with a clear eye and a sleek skin and everything apparently right, but the temperature went up and up until it was well on in the afternoon, and I could not believe it was reaction, and so I made an examination of the treatment of that cow in the morning and up to date, and so I found that they had put a student to milk her that morning. The agricultural college insists on training the students in milking. The cow didn't know him, and he didn't know the cow, and didn't know milking, and the result was she gave him no milk, or next to none, and she kept all the milk all the afternoon and had a high temperature, which would have condemned her, of course. Well, I had her milked forthwith, and down went the temperature from that moment. There are always those conditions

which may come in incidentally. The tuberculin test is not trustworthy unless you surround it by all those conditions. It is not unless you remove any cause for distrust, any grounds for distrust. There is again the question of giving or withholding water; which is a very easy matter to blunder in. If a herd is accustomed to have its water at a given hour and being tied up, for the taking of the temperature, is not allowed to drink at the regular hour, the temperature is likely to go up and then go down when you give it the water. Water always lowers the temperature, even when you have a reaction, but it does not remain down, it will go up perhaps an hour later. I am sorry to say that there is the possibility of the herds being treated before the formal test takes place. We have kept our university herd clear for twenty-eight years, but now they have begun to buy more cows, buy thoroughbreds with a record, and I have had to kill the majority of these cattle, and the worst feature of it is that the first test of these cattle, after they were bought and given the tuberculin test, gave no reaction. They could not contract the tuberculosis unless they brought it in with them, for, on the second test, given after six months, they gave a very marked reaction, showing that they had been, as they say, 'salted' for the sale."

"Q. Doctor, have you any views of the affect of the tuberculin test upon animals that are possibly slightly infected, or where there has been an encysting of the tuberculous condition of the animal that had been infected to some slight degree?"

"A. Well, yes. One can hardly state absolutely that the encysting of a tubercle will prevent the reaction, but the reaction implies that there has been a production, a steady production of the tubercles in the system itself. The bacilli have manufactured it. But there might come a time when they have encysted; the tuberculosis might remain, but no reaction show. My opinion is that the giving of the tuberculin test tends to stir up the activity of the existing tubercle. Upon a cow but slightly affected, I should not want to give the tuberculin test if she were my own, and I do not think the State has the right to give it to any cow unless it has been backed with a readiness to pay for the animal, pick it out and pay for it, just as I think a physician has no right to give the tuberculin test to a man without the sanction of that man himself. Anti-pyretics can be given to lower the temperature and negative the tuberculin test."

Record, page 349: "In the majority of cases, with encysted tubercles, they do react. But, I would not say positively that there were no cases that would not react. In a case of encyster tubercle, the disease is not necessarily progressing. It might be that you had a caseated mass there, perhaps a large quantity, in which the breaking-down takes place slowly, and there may be enough of the life of the products of the bacillus in this mass to go on taking up that quantity to make it susceptible to the tuberculin when introduced. Encysting may be said to be the result of the forming of a fibrous sac around the original tuberculous matter so that by and by the tissues immediately around it appear to be sound. There is no material pathological process going around outside, and you can see in some cases that the products may be imprisoned there and not get outside in sufficient quantity

to render it reactive under the tuberculin. I rather think there will be a reaction when the bacilli are all dead. I do not think that the reaction would be a presumption that they were not all dead. I think it quite possible that the products—the pathological products—that are laid up in the encysted mass would be likely to compel the animal to react, even though there are no living bacilli present, but we cannot prove it. In regard to encysted tuberculosis, I do not know of any way of knowing in a cow that has an actual case of tuberculosis begun how soon it will increase, or how rapidly, rather, it will increase, or how soon it will reach a tuberculous state. It varies so much in different cases. In some cases the progress is extremely rapid, what we used to call ‘galloping consumption’ in human beings. In other cases it is extremely slow and never comes to any great extension, and finally we find that we almost have to say, as we say in cases of human beings, that they have recovered. And in other cases it continues to progress year after year for long after.

“I spoke of the ordinary dose of tuberculin. There is no standard measure of manufacture. It is produced by so many manufacturers and put upon the market by so many people, so recklessly, that we cannot say that a dose of tuberculin from one manufacturer is the same as the dose from another. There is no standard of tuberculin products.” (Record, page 359.)

Dr. James Law, prior to 1901, gives the following ten rules to be observed in using the tuberculin test (Record, page 4211):

First—The subject must be in good general health.

Second—The subject must not be within three weeks of parturition, nor about to abort.

Third—The cow must not be within three days of the period at which heat would naturally occur.

Fourth—The tested animal must not be exposed to a hot sun, in a closed area.

Fifth—Cattle taken from a pasture must not be enclosed in a hot, stuffy stable.

Sixth—Exposure to cold draughts between open doors and windows, or to wet or chilly blasts out of doors, should be carefully guarded against.

Seventh—Heavy cows, unaccustomed to stand on hard boards, may have a rise of temperature in connection with resulting tenderness of the feet.

Eighth—Omission of the previous milking or a change of milker, and consequent retention of a part of the milk, will raise the temperature of a nervous cow.

Ninth—Privation of water at the regular time will often cause a rise of temperature.

Tenth—Change of food is liable to cause a slight indigestion and rise of temperature.

Every dairyman knows that it is impossible to observe the second and third rules when the entire herd is tested in a day. A correct test would require a month for every herd.

In Illinois, it is worth while to note that Hon. John Stewart, living at Elburn, in Kane county, formerly a member of your honorable body, and father of the present Senator Stewart, now aged eighty-five years, a pioneer of Illinois, and yet strong and vigorous, has the following to say in regard to Dr. James Law:

"I will tell you my experience. I have imported a number of cattle from Scotland—way back as far as '81—and four years ago I imported some and they had to be tested by sort of a veterinarian there. I remember of buying two from a Scotchman, and when he came to test them he put in a third in case they would knock them down, as he called it. It seems that they did knock one of them down, and two came over. One of them is living yet and the other died last year, but I don't think it died from tuberculosis. The one that did fall down, a few months ago I heard from there that she was as good and in as healthy a condition as the ones that did not fall down.

"I was sending some cattle upto Alberta three years ago and they had to be tested. One young cow in particular fell down, as they call it. She has raised two good calves and is in as good health as any cow I have got. I do not see any difference.

"Some fifty odd years ago I had one or two cattle die some time during the summer. We called it tuberculosis. They got thin and poor looking and coughed. I have had the same experience up to date. I do not lose any more cattle now than I did fifty years ago. Of course, I am not posted in the testing of cattle, and it may be correct; and if it could be done in a proper way, it might be a very good thing.

"About two years ago they had a man come out from Chicago. I met him at the river, and he was drunk and could hardly stand on his feet; he was unfit for anything. He could not talk plain, and he said he came out to test the cattle; that he was doing business under authority of the city of Chicago. I talked with him personally and asked him what his experience was. 'Well,' he said, 'some of them have to be found bad, or we would not have a job.'

"Now, Mr. Shurtleff, in my opinion there may be tuberculosis. I had a good deal of experience twenty-three (23) years ago—in 1887—with a committee up here in Chicago, to clean out the pleuro-pneumonia, as they called it. We had Professor Law from the Princeton University, who had been in that business in Scotland before he came out. I spent considerable time with him up here in examining the cattle. Probably one-fourth or one-fifth of them he would pronounce tuberculosis, and I would say that he did not miss it over once in seven or eight times; probably one in five or six he would say had tuberculosis; some he would say there was nothing the matter with the lungs. Of course, there was no testing done."

"Q. No tuberculin testing? What was his test or examination?"

"A. He would get the animals and turn them out; would take them by the head and punch them, and examine them the best he could. He would spend five or ten minutes, perhaps, and then he would write on a card what this animal had and give up this card. When they were slaughtered they would be opened up and we would

see what was in them, and in that way he seemed to be a good judge; at least he had very good luck in picking those cattle out. He made the statement at that time that tuberculous animals were no fit for food.

"That was his statement at that time. Of course, in regard to my opinion, I do not know anything about this matter of there being tuberculosis. There may be some. It may be true."

"Q. Who was this Chicago inspector you mentioned? Do you remember his name?"

"A. I do not know his name. I think he was German. I cannot remember it. He was not the only one. I have met some others like him. He said he had to find something wrong or he would not have a position."

"Q. Was he a veterinarian?"

"A. He claimed he was a veterinarian and under Doctor Evans."

"Q. He lived in Chicago?"

"A. He lived in Chicago and had been inspecting cattle somewhere around St. Charles or around the river."

"Q. What did you say as to the other inspectors that you know or have met?"

"A. I think a good many of them intend to do what is right. The man that came out to test my cattle before I sent them to Alberta, I had no fault to find with him or no dissatisfaction."

"I would simply have no objections, as far as I am concerned, to having a law or any arrangement to inspect the cattle if the inspectors could be furnished agreeable to the farmer, as well as agreeable to the people in Chicago."

"Q. You have been a member of the Legislature, Mr. Stewart, at different sessions?"

"A. Yes, sir."

"Q. What do you say as to the tuberculin test being a diagnostic to show the disease tuberculosis in cows?"

"A. I am not a doctor and I could not say as to that."

"Q. Speaking of the experience you have had?"

"A. Well, the experience I have had is just what I have told you."

Mr. Stewart further says: "In my opinion, a law never could be carried out to test all of the cows in the dairy district with tuberculin. A good many of them would fight it; a good many more would kick. I know I would kick unless I had some say. I think the people at home should have a little to say. I think six, eight or ten millions of dollars would be too much money to spend to pay for that stock; on something you would not clean up, any way. Its effect upon the dairy industry would be that we would try to raise turnips before we would try to raise cows. We would have to go out of business. (Record, page 3397.)

"If such a law were passed, I think the people would have to raise their babies without milk. I would not be opposed to the law if it were necessary. I would not consider it wise to keep cattle and have them tested in that way. I raise all my own cattle, but the great majority

of the dairymen in our county—I think three-fourths of them—do not raise any cows at all. They buy all of their cattle from Iowa, Wisconsin and other states. And to require cattle shipped in with a certificate of having passed the tuberculin test would shut them off. (Record, page 3398.)

“I think a law should be passed covering sanitary regulations upon the farm. I want to say that I had a man come out this past summer, I suppose under the control of Doctor Evans—I was not at home at the time. He came out to my home farm. My barn is 70 by 80 and it has all cement floors, and my barnyard is 80 by 100, all cement. My water is pumped into a reservoir and then runs through the building, and everything is as good as I could possibly have it. I found a paper on the barn that the barn was 60 per cent. I asked the man what was the fault he found. He said he thought some things were very nice, but we did not have quite as many windows as we should have. He put me down sixty per cent on the barn. There is not a neighbor of mine that has taken one-half the pains that I have with my barn. Those things make the farmer feel as though the Chicago man is not a very good inspector. I do not favor the inspection of the dairy herds and the farm, under the control of the city of Chicago. I would favor an inspection of the dairy herds that produce the milk. I would not object at all to their inspecting the herd if they would have some one appointed from the country as well as from the city. No one should object to a physical examination and inspection of the cow. From the tests that I have had on cattle that I have dealt with, and from inspections I have had on my herd here, and from what I have seen in Scotland, I would not be in favor of the tuberculin testing of dairy cattle.” (Record, page 3400.)

Dr. Theobald Smith, of Boston, Mass., professor of comparative pathology in the Harvard Medical School, and director of the anti-toxin laboratory of the state board of health of Massachusetts, has the following to say of the tuberculin test (Record, page 366):

“A. The tuberculin test consists of the injection of the boiled extract of the tubercle bacillus. This boiled extract is poisonous to animals under certain conditions. When the animal, into which this is injected, has in any way been infected with tubercle bacilli, even to the slightest degree, a temperature reaction takes place, following the injection of this poison. This temperature reaction varies in different animals. It is probably most severe in the earliest and freshest cases of the earliest infection. Its poisonous character can be shown by the injection of the substance into tuberculous guinea pigs, which usually die within twenty-four hours as a result of this injection, although the healthy guinea pigs do not show any disturbance except a slight temporary loss in weight. The tuberculin reaction disclosed the presence of various degrees of disease and infection, from the slightest to the severe types. That is to say, it does not discriminate between different degrees of disease. Its reaction is just as severe, if not more severe, with an early type of infection as it is with succeeding stages of the disease. There may still be a reaction when the process is latent, quiescent or partly healed.”

"Q. Taking now the question of the use of the tuberculin test, have you made any observations as to whether it will always give accurate results, or whether there are inaccuracies in the results?"

"A. The tuberculin test is not an infallible test. In our early observations, I think we found about 10 per cent of errors in our own cases. That is to say, in about 10 per cent of cases there was disease with no reaction—or rather, in a certain number of those 10 per cent of cases there was disease without reaction, and in others there were no foci found, with reaction—no traces of disease with reaction."

"Q. Have you found that there were instances where there were no reactions with a previous injection; and if so, what period had elapsed between the times of the application of the tuberculin test?"

"A. I have not looked over our earlier investigations before coming here in regard to that matter. Those were made nearly fifteen years ago, so I cannot tell whether we made any observations to find out. I think we did, however, and all I can say is that the impression I have is that when an animal is injected with tuberculin there is a period thereafter which would probably vary with the individual idiosyncrasy; it would vary with the susceptibility of the animal; it would vary with the degree of the disease, when there were little or no reactions following the same dose. But when that dose would be increased ten or more fold, there might be what is called an accelerated reaction, which appears earlier than the normal reaction. I mean the second dose increased."

And Dr. Ernest C. Schroeder, superintendent of the experiment station of the United States Bureau of Animal Industry, testifying for the board of health in the Montclair case, does not contradict the position taken by Dr. Theobald Smith of Boston, that a physical examination by a competent veterinarian will discover all dangerously diseased cows, as is shown by the record, pages 1404, 1405, as follows:

"Q. I call your attention to the testimony of Dr. Theobald Smith, as given in this case, on page 425 of the typewritten testimony, on which he says—the question was: 'But do you stand on your belief that a veterinarian can discover every cow that is tuberculous to such an extent as to be a menace to public health?' And Dr. Smith's answer is: 'Taking into consideration the absorbability of tubercle bacilli, their dilution, I think that is a safe method.' Do you as a veterinarian, from your experience as a veterinarian, agree with Doctor Smith's conclusion?"

"A. If I understand it correctly, I certainly do not; but I am not at all sure I understand what Smith is trying to say."

"Q. Referring again to the testimony of Dr. Smith, as given on page 426 of the typewritten copy, I read you from his testimony.

"Q. I understand you to take the position that when tuberculosis in cattle throughout a large area of the whole state has been reduced to a minimum, so that it can be no longer reduced by physical examination, then and not until then you would apply the tuberculin test; is that right?" "A. Under present conditions, yes."

"A. I do not believe that I care to reply to that question at all. You cannot give a reasonable reply to a question which would require a man to sit down and write a volume."

Mr. W. E. Janes, a member of the milk producers' committee, is the superintendent of the Sedgeley dairy farm at Hinsdale, Illinois, owned and operated by Mr. E. M. Barton. This is one of the dairies furnishing certified milk to Chicago consumers, certified by the Chicago Medical Society Milk Commission. Mr. Janes testified before our committee (record, page 3089): "We are milking about 110 cows. We have about 200 head of cattle on the place. Of course, we have noticed that we had tuberculosis to some extent. We have always known that it existed in the cattle, more or less, but my first real experiment with tuberculosis and tuberculin probably commenced about twelve or fifteen years ago, when we first commenced to use tuberculin. On our first test we used the tuberculin without any outside help; and the next morning after injecting the tuberculin I found a cow lying dead in the stall, and a number of others that were reactors—some of our best cows, some of our best cattle, which we proceeded to dispose of. They were disposed of mostly to the Chicago Stock Yards—anything that reacted—and since that time we have tried to—in fact—we have subjected all cattle that came into our herd to the tuberculin test. Those we have raised ourselves we have tested generally every year, and any that were bought outside were tested. I used to buy quite a few through the Chicago Stock Yards; that is, to keep for our milk supply. I would buy them from a dealer who would get them here in Chicago, and he would sell them to me subject to the tuberculin test. Of course, when I was buying full bloods, I generally tested them on the farms when I bought them. About 10 per cent of the cows I used to buy from the dealer used to react. Of course, I would try to judge of them as near as possible—their general health, make an inspection of them, a physical inspection. I think about two or three years ago—about three years ago the cattle that I bought from the dealer, after I got home very few of them reacted. When they had been on the place for about a year and we gave them our regular test with the rest of the herd, about 75 or 80 per cent of the cows reacted, and we had another general cleaning out.

"I have bought from Wisconsin, Minnesota, Iowa and different places and I find occasional cases of tuberculosis in going out around through the country. Our entire herd is now being tested and under the inspection of the United States government.

"About a year and a half ago I was buying some cattle up in Wisconsin, and some of them had been tested and had certificates with them. There was one in the lot, a high-grade cow, and as fine a cow as I had ever bought. She had been tested. I took her home and when we came to make our test, when the government inspectors were out there, she was the only one that reacted. Any reactors that we have we send them down and the government disposes of them. This cow I have reference to was sent to the rendering tank. We have to take all of the risk ourselves, and this cow was thrown in the rendering

tank. She was a mass of tuberculosis; that is, her lungs and her intestines were affected. I was surprised that she should show such a decided case of tuberculosis. I think we had five or six cows last year after the government test that reacted and were slaughtered, and there was decided evidence of tuberculosis in all of them. I was perfectly satisfied that the tuberculin test had been efficient and there was no reason to question it; although they were not all in a bad condition, there were symptoms and indications of it. We raise all of our calves, and when they are about six months old we submit them to the tuberculin test, as well as the cows. We are up against it in a way. In raising thoroughbred cattle, we are always compelled to have all of our cattle tuberculin tested. I do not know of one that has gone outside of the State that I have sold in the last five or six years that I have not been required or requested to give tuberculin certificates with."

(Record, page 3091.) "We furnish milk to the Walker-Gorden laboratory here in Chicago, and in order to comply with their regular city regulations we are under government investigation. We make a certified milk. The milk retails at 15 cents a quart. We use the Bang's system on our cows. Separate the herds. Some of the doubtful cases we put back in the herd again. They pass the test. We quite often find a reactor that would afterwards pass. A man should use judgment in having his herd tested. There should be an amount of intelligence on the part of the person that has control of the herd, one who knows his business, in order to be accurate. I do not think that a man just coming on to your place and testing your herd, and not knowing all the conditions that the cow has been in previous, and the condition of her feelings and everything, is as well qualified as a man that is familiar with the herd

"About three years ago we imported forty head of cattle from Switzerland, and during that importation we had to test the cows twice. In making importations, it requires nine months in transit to get these cows here. They were tested before they left their native country and were tested when they came on the farm, and we were perfectly satisfied that everything was as clean as possible. We sold a portion of those cows to go to Vermont. They were very high priced cows, and one of them went up and was tested after she was sent up there, and she was a pronounced reactor, and we had her shipped back to us. For three months we kept the cow isolated, and tested her at the end of three months, and we did not find any reaction and have never seen anything since. I think there was some cause of that cow reacting. In a herd the size of ours we cannot tell, of course, the condition of the cows, where there are 100 or 125 cows. There are apt to be two or three or more of them come along in that condition at the time you are applying the test.

"I think there are times when the tuberculin test is not accurate. There are a number of conditions to be taken into consideration when you are buying cows. A man may have cows that never had a halter on them, and when they are brought into the barn they are excited, after having chased them all over, and the cows get excited with

strangers around, and I think a certain amount of allowance would have to be made for those conditions. The tuberculin test, of course, is often applied under unnatural conditions. When we make our test the cows are confined in the barn all day, a thing they are not generally accustomed to, and they are uneasy and worried. I think it requires a more general knowledge of the conditions and the cows than a stranger that just comes on the farm and applies the test is able to give them. I have a great deal of confidence in the tuberculin test used intelligently.

(Record, page 3093.) "As to the State passing a law making it mandatory, or compelling the tuberculin testing of every animal from which milk is sold for food, I think that is almost a physical impossibility, from my way of looking at it. I think that if the State would pass a law to prevent the dumping of tuberculous cattle on to the people of this State, it would work itself out. I think that if the government or state controls the sale of tuberculin, it is one of the first things. The tuberculin test is a simple thing, and any man with common sense can learn to apply it. I would rather apply it in my own herd than to depend on a veterinarian to do it. We are more interested in having our herd free from tuberculosis than any one else. It requires a knowledge of cattle. It requires the knowledge of the particular herd of cattle to some extent."

From other evidence before our committee (record, page 3653), at the present time the Sedgely herd comprises 138 head, 110 of which are milkers. The barns on this farm are in excellent sanitary condition—iron stalls, cement floors, running water, expert feeding and several attendants in white uniforms who keep the cows and premises absolutely free from dirt and are in constant watchfulness. The manure and wet bedding is immediately removed from barns on carriers to wagons outside, and as soon as a wagon is filled it is carted to other parts of the large farm, far away from the barns and cows. Mr. W. E. Janes is the superintendent of this farm. One year ago this entire herd was tested with tuberculin and were passed by government officials as non-reactors. About Dec. 1, 1910, these same cows were again tested with tuberculin by government officials, and of the 138 cows, thirteen reacted to the test and were condemned. Five of these condemned cows were slaughtered and showed tubercle bacilli. The remaining eight are kept apart from the balance of the herd in separate quarters and will again be tested in a few months. The cow from which Mr. Janes took the milk for his personal family use was slaughtered, and a gland in her neck was found to be tubercular.

So that, in spite of all precautions of purchasing and having on hand nothing but tested cattle, and under the most complete sanitary conditions, shows that there are practically 10 per cent reactors in such a herd, and under it we must assume, until the contrary is shown, that slight infections of the existence of tubercle bacilli has found a lodgement in the animals.

Your committee witnessed the slaughtering of three animals at the DuPage county poor farm about the first of April, 1910. One animal

that had reacted to the tuberculin test was slaughtered and in addition two animals that had passed the test were purchased by your committee, picked out from the herd and the three animals slaughtered. Upon *post mortem* examination all three animals showed a slight infection of tuberculosis in the tissues, samples of which were taken and submitted to the Chicago laboratory and report made upon the same by Dr. T. L. Dagg, showing tuberculosis with pigments; the result in all three cases being almost identically the same, showing but slight infection in the animals.

Dr. Melvin submitted a list of tables at the International Congress at Washington in 1908, showing the number of cattle tested by tuberculin in the various states of the Union, the number reacting and percentage reacting, and showing 400,000 cattle tested in all of the states, of which 37,000 reacted to the test, making a percentage of 9.25% of reactors. In Illinois the number tested was 7,120, of which 790 reacted, the percentage being 11.9%. (Inter. Cong., Vol. 6, page 505.)

Reports from veterinary surgeons throughout all of the Illinois district shipping milk to Chicago, is submitted with our Record, pages 4919 to 5075, and these reports show that upon administering the tuberculin test to herds in the dairy district, the average per cent of reactors is from ten to fifteen per cent.

"Belgium has a population of about 8,000,000 people and about 2,000,000 cattle, of which 1,000,000 are cows, while the other million represents other cattle. The tuberculin testing was put into practice in 1895, and accordingly we have had fourteen years of experience with the testing for the disease in our country. Of the cows, 400,000 reacted to tuberculin, and of other stock about 10 per cent." (Inter. Cong., Vol. 6, page 522.)

"That close barning or housing is not the cause of tuberculosis among dairy cows is shown from the fact that in Central California tests have been made showing the number of herds infected to be 82 per cent, and that 31.9 per cent of the dairy cows have reacted to the tuberculin test." (Inter. Cong., Vol. 6, page 535.)

Professor Jesse E. Pope, in the International Congress at Washington, 1908, said (Inter. Cong., Vol. 6, page 577): "We are led here to take up the attitude of the farmer toward the tuberculin test. I know of nothing that has so hampered the fight against bovine tuberculosis as the almost universal distrust of the tuberculin test which prevails among farmers. No doubt this is due partly to the natural conservatism of the farmer, partly to influence exerted upon him by supposed authorities; and partly to the fact that the test affords the means of attack upon his herds. But after due allowance is made for these factors, there still remain justifiable grounds for the farmer's opposition. Those who applied the test in the past have made many blunders, and today the mistakes are so many and so widely known that the veterinarians, or those who claim this title, have much to answer for. The custom is to apply the test, and, in case of reaction, to test its correctness by careful *post mortem* examination. This puts the one who applies the test on the defensive, and in case disease is not found,

the farmer is filled with anger and contempt, even though he is paid full market value for the animal which he believes to have been mistakenly condemned. A mistake such as occurred recently in Minnesota, where four out of eleven animals slaughtered, were pronounced perfectly healthy, will prejudice an entire community against the test. What is even more serious, animals far gone with disease are often pronounced sound and left in the herd. Veterinarians venture to assert that physical examination can discover such animals, but the farmer's experience is against this contention, for in many instances such cattle have passed the physical test and yet have died from the disease a few months later."

Professor Arloing said at the International Congress at Washington, 1908, (*Inter. Cong.*, Vol. 6, page 772): "Tuberculin is an almost absolutely reliable agent for the diagnosis of tuberculosis. The reaction caused by tuberculin must be regarded as indicating positive lesions of tuberculosis. It does not sometimes produce a reaction in tuberculous animals, the causes of which are the very extensive lesions in the animal. In cases where animals fail to show any lesions after giving a reaction to the tuberculin, it does not indicate necessarily the absence of the disease in the animal. We have a wrong impression of tuberculosis. The presence of the disease is usually only conceived by the microscopical lesions, but there is also a microscopical tuberculosis which has been and can be demonstrated by animal inoculations. Moussu, Arloing and Heyman's experiments prove that tubercle bacilli placed in a capsule and introduced into the body of an animal will give a reaction to tuberculin. If an animal is injected with tuberculosis and is killed fourteen days after artificial infection, it will show no microscopical lesions, yet such an animal would react to the tuberculin test before slaughter, thus showing that, while the disease exists in such an animal, there are no visible lesions present in any of the organs. It is, therefore, necessary to recognize the microscopical cases of tuberculosis, and all cases which react to the tuberculin test and which do not show lesions may be accepted as affected with the microscopical form of the disease. The tuberculin test is absolutely reliable in all reacting cases, and animals which react should be considered as being affected with tuberculosis."

Doctor Rutherford, at the head of the Animal Bureau of Canada, makes the following statement (*Inter. Cong.*, Vol. 6, page 883): "I would like to ask that the members of this section be a little more charitable. If they will reconsider the contents of my paper, they will find that it is remarkable for its absence from recommendations, as I did not have anything to recommend. I am waiting for information and knowledge. Referring to the remarks of my friend from Washington State, I am quite willing that he go on making mistakes; I want everybody to go on. That is one reason why I have been watching other people. If I were to make a mistake in a policy which extended over Canada, I think that in about six months there would be nothing of me. I want to listen and learn, and I am waiting for people who know more than I do to make mistakes. I am not opposed to the tuberculin

test, and I say this in the light of many years of experience. The tuberculin is undoubtedly reliable in the first test, provided there has been no underhand attempt to interfere with it. Tuberculin is an almost infallible diagnostic agent for tuberculosis. Professor Bang says that it is not infallible, but almost so; but when you come to the second, third, fourth or fifth test in the same herd, I do not consider it at all reliable. I can show records in my office of tuberculous animals that have reacted, and again failed to react. Under these conditions, I say that we cannot depend absolutely upon tuberculin in the second, third, fourth or fifth test. I wish to call attention also to the importance of clinical evidences and symptoms in diagnosing this disease. We are losing the practical side of the question when we lose sight of the clinical aspect of diagnosis. Is there a man in this section who can say that it is right and proper for Canada or any other country to base legislation on the tuberculin test? I am not prepared, under existing conditions, to assume official control and take legislative action on the authority of the tuberculin test alone at this stage of our knowledge. I want something more definite. If we can get clinical cases in hand, then we can take legislative action against that herd. We then have evidence of the existence of the disease there."

The State of Massachusetts, after following out a line of tuberculin testing, and spending hundreds of thousands of dollars, finally, in 1897, under the conservative advice of Dr. Austin Peters, passed the following Act (Inter. Cong., Vol. 6, page 897): "The use of tuberculin as a diagnostic agent for the detection of the disease known as tuberculosis in domestic animals shall be restricted to cattle brought into the Commonwealth from any point without its limits, and to all cattle at Brighton, Watertown and Somerville; provided, however, that tuberculin may be used as such diagnostic agent on any animal or animals in any other portion of the State upon the consent in writing of the owner or person in possession thereof; and upon any animals condemned as tuberculous upon a physical examination by a competent veterinarian."

Dr. C. J. Marshall, of Philadelphia, said at the International Congress at Washington, 1908, (Inter. Cong., Vol. 6, page 904): "We realize more and more that tuberculin is a safe, reliable test when honestly and intelligently used. There is no doubt but that its use should be restricted to those who are competent and skilled in its use, as well as in the diseases of animals; who possess good judgment, and are as truthful as tuberculin is itself. There is no better means for defeating the value of this test than to allow it to become a household remedy. Any intelligent person can soon learn to use a hypodermic needle and a thermometer. There are other things about the tuberculin test that are more complicated, and at times men the most skilled in its use are put to their wits' end to know how to handle peculiar questions that arise in connection with this subject. It would be as easy, and far safer for the community, to try to teach the average farmer to be his own blacksmith, wagon builder, lawyer, physician, etc., as to instruct him to do his own testing for tuberculosis. We need more

persons who are skilled in the use of tuberculin and in the control of diseases of animals in general. The states or governments should spare no effort in training men as thoroughly for this work as the importance of the subject requires."

The State of Maine and the city of Portland undertook the work of eradicating tuberculosis by the mandatory tuberculin test, but were finally compelled to recede from that position.

Dr. M. H. Reynolds, of the University of Minnesota Experiment Station and State Live Stock Sanitary Board, at the International Congress for the study of tuberculosis at Washington, held in 1908, read an article, and among other things submitted some conclusions as to the expense of eradicating the disease of tuberculosis among the herds of the State of Minnesota. We submit his statements. Minnesota has 2,993,600 cattle. Two per cent of these, or 59,872, are estimated for pure-breds; total dairy cows over two years of age, 590,728. Illinois has 1,232,000 dairy cattle and of all other cattle, 1,974,000, with an equal number of pure-bred cattle. The estimates are made upon the basis of 15 per cent reactions among the pure-breds, 4 per cent reactions among dairy and breeding cows, other cattle 3 per cent for the first test, and all classes at 0.75 per cent reactions for subsequent tests. The article and figures are as follows (Inter. Cong., Vol. 6, pages 940, 941, 942, 943):

"We frequently hear intelligent people say that all this tuberculosis work is wrong. They say: 'You must test all the cattle in the State and eradicate the disease, and that is the only business-like thing to do.' Sweeping plans have been proposed for eradication, but those who propose them do not appear to have had a close view of the great difficulties in the way of actually carrying out such propositions.

"The problem of tuberculosis eradication is a very different one from the Federal pleuro pneumonia work of some years ago, which cost only the mere trifle of \$1,500,000 and five years' time and involved about six states.

"The eradication of foot-and-mouth disease cost less than \$300,000, including about \$129,000 indemnity paid to owners of cattle. Those tasks were but as child's play, and relatively trivial in expense compared with the work of eradicating tuberculosis from the United States. These two sums combined would be small in comparison with the cost of eradicating tuberculosis from Minnesota or Wisconsin, or Pennsylvania, or any one of a large number of states.

"It is easy enough to insist on complete eradication, and to say, 'Away with tuberculosis,' but when one familiar with this class of work sits down to figure, he is appalled by the way figures run into the millions. And even if an unlimited amount of money were available, there are other and almost insurmountable difficulties in the way of complete, rapid eradication under present conditions. To illustrate this, writer will present a careful estimate as to the expense of so eradicating tuberculosis from a single state. Let us use Minnesota for a study of the general problem and as a national problem.

"Basis of Calculations—Calculations are based on the following standards: Testing all cattle in the State twice a year for two years, and annually for the next five years, stable disinfection after each test; reimbursement to owners of one-half appraisal, owner to receive, in addition, the carcass salvage.

"The appraisal limits are \$78.00 for pure-breds, \$35.00 for grades; average appraisal for pure-breds, \$60.00, and \$26.25 for other cattle; average carcass salvage for registered cattle, \$13.37; other cattle, \$8.79.

"There are about 2,993,600 cattle in the State of Minnesota. Two per cent of these, or 59,872, are estimated for pure-breds; total dairy cows over two years of age, 590,728.

"Our Minnesota records show about 37 per cent of reactions for pure-breds; other cattle, 7.7 per cent. For this present computation, the pure-breds are placed at 15 per cent reactions, dairy and creamery cows at 4 per cent, other cattle 3 per cent for the first test, and all classes at 0.75 per cent reactions for subsequent tests. Pure-bred cattle are valued at an average of \$60.00; creamery and dairy cows at \$35.00; other cattle at \$20.00.

"Expense of office management for the past year in Minnesota, during which 27,216 cattle were tested officially, was about \$70.20 per thousand tested. Of this \$70.00, \$34.00 was for clerical work and general office expenses. This item would continue nearly a level rate even when dealing with very large numbers of tests. The other item of \$36.00 for executive salary would not increase with the amount of work, but would practically disappear as insignificant in the general rate per thousand; \$35.00 per thousand tests is, therefore, used as the rate for expense of office management. The best available figure for a neighboring State is \$103.00 per thousand.

"Average cost of disinfection per barn, \$13.00; and the barns averaged in 1900, according to census, 13 cattle each.

"Cost of test is based on the following:

"Veterinarians employed on full time for testing are put at \$1,200.00; helpers, \$600.00. Each pair (one helper and one veterinarian) is allowed to keep one horse at State expense, estimated at \$150 per year per horse; beyond this they pay their own expenses. Each pair is to make three tests per week, averaging in all sections of the State 25 animals per test, or 75 per week. Enough veterinarians are to be employed for the first two years to test all cattle in the State once in six months. The number of cattle is supposed to remain stationary. After the first two years, one-half as many veterinarians are employed, so as to test annually.

"Objection to these calculations may be raised on the ground that it would be unnecessary to test all herds semi-annually for the first two years. True, there would be a rather large percentage of herds showing no reactions on the first general test; but we have no reliable basis upon which to estimate this percentage. If we could make this correction, but one item in the following list, 'cost of testing,' would be varied, and the general conclusions would not be affected in the slightest degree.

"Computing on these bases, we obtain the following startling figures as to losses and expenses of an active and reasonably thorough eradication work:

TOTAL VALUE OF ALL REACTING CATTLE.

For the first year	\$ 3,289,502 00
For the first two years	4,527,172 00
For the seven years	7,121,847 00

TOTAL NET LOSS TO THE CATTLE INTERESTS OF THE STATE (I. E. VALUATION OF ALL CONDEMNED CATTLE LESS THE CARCASS SALVAGE.)

For the first year	\$ 1,968,430 00
For the first two years	2,492,283 00
For the seven years	3,931,844 00

NET LOSS TO OWNERS FOR ALL CLASSES OF CATTLE.

During the first year	\$ 965,204 03
During the second year	1,264,988 71
During the seven years	2,014,447 92

COST TO THE STATE (REIMBURSEMENT) ALL CLASSES OF CATTLE.

For the first year	\$ 650,897 23
For the first two years	898,021 51
For the seven years	1,515,831 21

"On the basis previously given the cost of testing all classes of cattle by veterinarians and helpers would amount to:

For the first year	\$ 1,893,450 00
For the first two years	3,786,900 00
For the seven years	8,520,525 00

"Suppose it is held that this required number of veterinarians is not available, which is quite true, or that it is unnecessary to employ such expensive men to do the work. By employing farm-school students dairy-school students, farmers, short-course students, and others,—which procedure experienced sanitarians would hardly approve,—we find that the cost of testing all cattle as before would be:

For the first year	\$ 2,019,666 00
For the first two years	4,039,332 00
For the seven years	9,088,497 00

COST OF DISINFECTING ALL STABLES.

For the first year	\$ 4,686,000 00
For the first two years	9,372 000 00
For the seven years	21,087 000 00

COST OF OFFICE MANAGEMENT AT \$34 PER THOUSAND TESTS.

For the first year, testing all cattle	\$ 203,564 00
For the first two years	407,128 00
For the seven years	916,038 00

"AMOUNT OF TUBERCULIN USED—B. A. I.—STANDARD FOR
ALL CATTLE.

During the first year, 11,974 liters, or approximately 2,994 gallons.

During the first two years, 23,949 liters, or approximately 5,987 gallons.

Total for the seven years, 54,885 liters, or approximately 13,471 gallons.

"During the past year the government distributed a total of 259,100 c. c. tuberculin, which cost the government to produce, about \$10.00 per liter.

"To test all the cattle in Minnesota alone on this plan for the first year would require forty-six times this entire Federal output.

"The cost of producing tuberculin needed on this plan would be:

During the first year	\$ 119,740 00
For the first two years	239,490 00
For the next five years ..	299,350 00
Total for the seven years	538,840 00

"Total expense for veterinary services, disinfection, reimbursement, office management, and including the cost of producing tuberculin, which could perhaps be produced by the State at about the same expense as by the government:

For the first year	\$ 7,553,650 00
For the first two years	14,703,540 00
For the seven years	35,004,260 00"

"The total value of all Minnesota cattle in 1900 was \$37,197,198.00. The present value of Minnesota cattle is probably about \$50,000,000.00. These figures give a careful estimate as to the actual cost of rapidly eradicating tuberculosis from one State only.

"It can be said that, if these figures are correct, the tuberculin test would be both reliable and efficient to absolutely destroy the herds."

Dr. Otto B. Noack of Reading, Pa., says: "But there is one drawback to these methods—keeping the source of infection constantly on the premises. Where the infection is in reaching distance, it is hardly possible to keep the disease from the healthy animals. On the other hand, a compulsory tuberculin test, as it was practiced in Massachusetts and Belgium, was soon found to be too radical and expensive, and, therefore, not advisable."

Dr. Bernard Bang of Copenhagen said at Washington in 1908 (Inter. Cong., Vol. 6, page 852): "The tuberculin tests proved that a great number of cattle of all the herds among which tuberculosis had long been prevalent were infected with this disease. *Post mortem* examinations proved, however, that most of the reacting animals were only slightly affected. In many cases only small caseous-calcareous deposits were found in a few of the lymphatic glands, processes that no

doubt often remain unchanged for years, or are even sometimes cured. According to Bang, therefore, there was no reason to kill milch cows that did not show clinical signs of tuberculosis, but only reaction to tuberculin."

Dr. Austin Peters says: "I think the tuberculin test is a very delicate test and in the main a very reliable one. In the cattle that react to tuberculin you can nearly always find tuberculous lesions somewhere in the animal. The trouble is that it is so delicate a test that it will cause a reaction when the animal diseased has not arrived at a point where it is a source of danger to other cattle or to the public health. Where I tested cattle with tuberculin, those that were slightly diseased were the ones, as a rule, that gave the most marked reactions, and animals that were extensively diseased often gave the least reaction. I think the veterinarian making the test should be consulted and not go by the temperature charts alone. I think very often a cow that gave a very slight reaction may be quite badly diseased, and the veterinarian would discover that on physical examination; and the cow giving the high temperature reaction might on *post mortem* examination be found very slightly diseased and occasionally no lesions at all are found." (Record, pages 236 and 237.)

The secretary of agriculture of the Argentine Republic has laid before our committee a report of his department, printed and published in 1909, in which (record, pages 4283-4285) it says:

"The difficulties, more imaginary than real, of diagnosing tuberculosis, owing to the vagueness and feebleness of many of its symptoms, has led to the belief that it is not possible to discover the disease unless by the aid of reactions having tuberculin as a basis. For a long time, owing to the popularity of the said lymph in the Argentine Republic, active professionals completely neglected the clinical examination of the subjects thought to be tuberculous. In the laboratory the diagnostic value of the hypodermic injection was exaggerated to a degree that it was believed to be impossible to discover the existence of the disease without that fundamental measure.

"Later on, when the weakness of tuberculin was recognized, professional opinion altered its course. At present investigators are searching for new formulæ, with the conviction that the principal part of triumph in the struggle against tuberculosis will correspond to the systems which have for a basis early and unerring diagnosis.

"In the Argentine, as in other countries, clinical diagnosis has fallen into disuse. In the inspection of milk cows realized in the province of Buenos Ayres, and in those the division of cattle realizes, the veterinary surgeon goes about armed with his phial of tuberculin, his thermometer and syringe only, caring little for ocular examination, which by itself would have allowed him to diagnose the disease with certainty, inasmuch as many tuberculous subjects do not react under tuberculin.

(Record, pages 4289 and 4290.) "To conclude, it has been proved in the quarantine Lazeretto that by the repetition of the injections the system acquires a toleration, to such a degree, that there is no longer any reaction, or it is produced in such an irregular manner, that it

is impossible to take the results into account. Such conclusions, which have also been obtained in other countries, have taken from the hypodermic injections a great part of the value ascribed to them, as indispensable diagnostical system, and have thrown light upon the frauds committed in the cow sheds and cattle Lazarettos.

"On the other hand, the division of cattle has proved:

"1. That animals which, under *post mortem*, presented no sign of tuberculous lesion, had reacted to 'tuberculine.'

"2. That animals attacked by other diseases, react under its influence.

"3. That it produces no reaction in tuberculous animals."

Dr. Henry G. Piffard, professor of dermatology of the New York University, states that dead bacilli, human or bovine, will produce tubercles resembling those following infection with the living tubercle bacilli, and he states that he has never used tuberculin for any purpose whatever, as he witnessed its evil effects in 1891 and condemned its use in writing. (Record, page 531.) And he says (record, page 534): "It is stated by presumably competent men, experimenters, that dead bacilli will produce lesions that are indistinguishable under the microscope from similar lesions produced by living bacilli; and by dead bacilli, I mean such as have been thoroughly Koch boiled several times and are presumed to be dead."

That dead bacilli will produce lesions, practically tuberculosis lesions, seems to be generally admitted in the medical world, and has the authority of M. J. Rosenau director hygienic laboratory, United States Public Health and Marine Hospital Service; Washington, D. C. (Record, page 3977.) "It is well known that tuberculin cannot distinguish the lesions produced by live tubercle bacilli from those produced by dead ones. In a series of experiments on this point, I found that three out of eight guinea pigs with lesions produced by dead tubercle bacilli died as the result of a sub-cutaneous injection of 2 c. c. of tuberculin. (O. T.)"

In the Montclair case, Dr. Claude D. Morris of Binghamton, N. Y., employed by the Borden's Condensed Milk Company; Dr. Fred DeWitt Halford, a veterinary surgeon of New York; Dr. David Bovaird, Jr., a physician of New York City; Dr. Edward F. Brush of Mt. Vernon, N. Y.; Dr. Austin Peters of Boston, Mass., and head of the cattle bureau of that city; Dr. Henry L. K. Shaw of Albany, N. Y.; Dr. William L. Stowell of New York City; Dr. George Adami of Montreal, Canada, and London, England; Dr. James Law of New York; Dr. Theobald Smith of Boston, Mass.; Dr. Lawrence F. Flick of Philadelphia, Pa., and Dr. Henry G. Piffard of New York City all agree that the tuberculin test is a highly delicate test, affected and influenced by many surrounding circumstances, fairly reliable and efficient in determining, not the existence of the tuberculosis disease, but the existence of any tubercle bacilli or tuberculous infection of any kind in the animal. To this extent the witnesses for the board of health in the Montclair case agree with these other witnesses, including Dr. Schroeder, Dr. Mohler, Dr. William Halleck Park of New York City

and Dr. M. P. Ravenel, Dr. Krumweide, Dr. Gill, Dr. Hess and Dr. Fitzrandolph. And they further agree that the tuberculin test will not discover the disease of tuberculosis in its advanced stages and generalized form; and that the slighter the disease and the earlier its stage, and when merely infectious, will produce the most perfect reactions to the test. All unite in stating that it requires great skill and in connection therewith a large amount of practical knowledge of all diseases of animals, and the particular condition of the animal while being tested, in order to make a reliable and efficient test. The large number of these men are the leading scientists of the world and men of large and world wide reputation; and they would all say, as was found by the commissioner of the court in the Milwaukee case (record, page 4179): "That the tuberculin test, while not infallible, is a reliable, trustworthy and useful diagnostic agent for determining the existence or non-existence of tuberculosis in cattle."

From all of the evidence in this case, your committee must report that all cases of tuberculosis in cattle are not necessarily the existence of the disease of tuberculosis, if the evidence of the medical world is to be relied upon, as we gather generally from all the evidence presented before us.

That in the human race, over 80 per cent of all human beings at some time during their life are infected and have tubercle bacillus in their system, and yet the larger portion of the human race throw it off and die from other diseases. And likewise, as it is testified to by many witnesses and the inference drawn by others, that in the cattle kind nearly all animals at some time during their life take into their system tubercle bacilli and the foci of infection formed, at which time they will react to the tuberculin test; yet over 90 per cent of all cattle so infected throw off the infection, overcome the danger and live out their allotted time and die of other diseases. During which time of infection among cattle they are not throwing off tubercle bacilli, either through the milk or the excreta, and are not dangerous to themselves or to others.

Your committee is compelled, by all of this evidence, to find that there are two phases of tuberculosis among animals:

First—The conditions under which the animal may be inoculated, infected and have within its system tubercle bacilli, a lodgement of the cause of the disease, and among which animals, it is overcome, the tubercle bacilli becoming caseated and encysted and the lesions, so-called, cured.

Second—The stage where the infection becomes seated and the animal is not able to overcome it, and it develops into what may be known as the disease of tuberculosis.

Your committee finds that the tuberculin test in the hands of a skillful veterinarian, having practical knowledge of cattle and having a practical acquaintance with and understanding of the particular herd and animal diseased, is a fairly good diagnostic agent to determine the existence of tubercle bacilli and infection in cattle; and that the tuberculin test is a fairly good diagnostic agent to determine the exist-

ence of tuberculosis, the disease, in cattle during its earlier stages, but that it is not a good diagnostic agent to determine the existence of the disease tuberculosis in its latter stages or generalized tuberculosis.

Your committee further find that the tuberculin test, as a diagnostic agent, is easily negatived and its results frustrated by the use of anti-pyretics and by the use of febrifuge, and that by many practical means and measures the perfect and proper result of the injection of tuberculin as a diagnostic agent may be overcome.

Your committee further find that the use of tuberculin, as a diagnostic agent to discover tuberculosis in animals, is rendered practically useless after an animal has been injected with the tuberculin at two or three different times.

Your committee would further recommend that authority be granted to the State Board of Live Stock Commissioners to make the tuberculin test and grant certificates to owners and otherwise of dairy and breeding cattle to be shipped to foreign states and countries outside of the State of Illinois, where such foreign states and countries require the tuberculin test upon dairy and breeding cattle shipped into such states.

And your committee would further recommend that all dairy and breeding cattle shipped into the State of Illinois from foreign states and countries outside of the State of Illinois be required to bear with them, upon entrance into the State of Illinois, certificates that they are free from all contagious and infectious diseases, including the disease tuberculosis.

And your committee would further recommend that all dairy and breeding cattle, shipped from the Union Stock Yards at Chicago, Stock Yards at Peoria and the Stock Yards at East St. Louis to any point within the State of Illinois, be inspected under the authority of the Board of Live Stock Commissioners of the State of Illinois, and be certified as free from all contagious and infectious diseases, including the disease of tuberculosis.

PART II.

THE NECESSITY OF ADOPTING THE TUBERCULIN TEST, AND WHETHER OR NOT THE DISEASE-GERM PASSES FROM AN ANIMAL AFFLICTED WITH TUBERCULOSIS, THROUGH THE MILK, TO A HUMAN BEING.

These two questions are so closely correlated that they should be discussed together, and for the purposes of this investigation it is probably necessary only to answer the first question, as to the necessity of adopting the tuberculin test.

Here again the doctors, scientists, bacteriologists and wise men nearly all agree as to the facts, but they only differ as to the extent of the transmission; and in drawing conclusions, your committee, in this report, will discuss the whole subject and make a finding based upon the evidence and conclusions of the most radical scientific knowledge as to milk infection.

A committee appointed by the legislature of New York to investigate these same subjects made a report in February, 1900, and among other things said:

"In the report of the Royal Commission they find that the percentage of deaths from human consumption has been steadily falling during the past fifty years; the percentage of decrease being 39.1 during that time. The following from their report will show the percentage of tuberculous meat passed in Saxony as fit for human food:

"We bear in view the remarkable returns of the results of rigid but discriminating inspection in twenty-nine towns in Saxony during the year 1895. Meat inspectors at the public abattoirs in these towns are all qualified veterinary surgeons. Tuberculosis was found to exist in 22,758 carcasses, being 27.48 per cent of the whole number slaughtered. The whole of these, according to the practice of some authorities in this country, would have been confiscated and destroyed without compensation. But in Saxony they were dealt with as follows: Of the total number, 22,758 carcasses showing tuberculous lesions, 21,062, or 92½ per cent, were passed as fit for food; 1,256 carcasses, or about 5½ per cent, were disposed of in the Freibank as inferior meat at a fixed cheap rate; and the remainder, 440 carcasses, or 2 per cent of the whole number, pronounced tuberculosis, in a greater or less degree were condemned as unfit for food and destroyed.

"The consuming public have been led to believe that a large portion of the milk consumed contains the tubercle bacilli. The evidence taken by the committee would go to show that this rarely occurs. Dr. V. A. Moore, M. D. V. S., professor of comparative pathology and bacteriology, New York, State Veterinary College, Cornell University, New York, testified on this point as follows:

"Q. How many times did you find the tubercle bacilli?

"A. I never found it—oh, a very few times—and I could not be positive as to the number; but in microscopic investigations I found it in three or four animals, but they were advanced cases of tuberculosis. (Record, pages 3676-3677.)

"The expert in his laboratory sees the bacilli multiplying at the rate of 16,500,000 from a single germ in twenty-four hours, and if this ratio of increase should be carried on for five days, it would make a mass that would completely fill as large a space as is occupied by all the oceans on the earth surface, supposing them to have an average depth of one mile. He seems almost led to believe that the whole human race is soon to pass to the unknown from this infection. The dairyman looks at this picture from a different standpoint. He is told by the veterinary that every animal from the mouse to the elephant is subject to tuberculosis. He sees the tuberculous mother fondling her children, and the children playing daily with tuberculous cats and other animal pets; the dairyman many times daily associated with tuberculous cows, and all mankind often exposed in many ways to both human and bovine infection; and notwithstanding this the per cent of deaths from consumption annually grows less. While the honest farmer does not desire to sell diseased meat and milk to the

consumer, he does feel that it should be well established that his herd is responsible for successful infection of man, before his property should be destroyed and his business ruined." (Record, pages 3677-3678.)

Dr. W. A. Evans, commissioner of health, Chicago, testified before our committee: "I do look upon the tuberculin testing of cattle more as an economical proposition than I do as a matter of public health." (Record, page 1073-a.)

Dr. Gottfried Koehler, assistant commissioner of health of the city of Chicago, testified before our committee: "I am willing to admit that the question of tuberculin testing is probably a greater economical question than a health question." (Record, page 1102.)

Dr. William Halleck Park of New York City, heretofore and hereafter quoted in this report, has this month, under date of December 10, 1910, made the following report, following years of investigation: "My experiments do not indicate the occurrence of bovine tuberculosis in man." Dr. Park declared today that there is absolutely no danger of persons over sixteen years of age becoming infected with tuberculosis from impure milk, and slight danger of children between the ages of five and sixteen becoming infected. (Record, page 3652.)

Dr. L. Emmett Holt, of New York, has declared that eight per cent of the deaths among babies result from meningitis, and that seventy per cent of those deaths were from tuberculous meningitis, which is absolutely incurable. He further says that tuberculous meningitis is of human origin, and in a great majority of cases results from exposing the babies to persons affected with pulmonary tuberculosis. (Record, page 3651.)

In the city of New York, Dec. 2 and 3, 1910, a milk conference was held under the auspices of the New York milk committee. This conference was composed of scientists, producers, dealers, health officials of important cities, both in the United States and Canada. It was attended by Dr. W. A. Evans, commissioner of health of the city of Chicago, who delivered an address before the conference. This conference on Friday, December 2d, overwhelmingly defeated a resolution urging the government that it prohibit the sale of cows which had reacted to the tuberculin test. Upon Saturday, December 3d, this conference defeated a resolution to the effect that it be the sense of the conference that "all milk which does not come from tuberculin tested cows, kept under conditions which satisfy the highest medical and sanitary standards, should be pasteurized." (Record, page 3657.)

Dr. James Warren Vanderslice, president of the milk commission of the Chicago Medical Society, testifying before our committee, said: "What I want to say is this: It is altogether adventitious, but I would like to say that I believe that if we could pass a dairy law requiring all skim milk to be thoroughly pasteurized—not commercial pasteurization; I am talking about real pasteurization—at the creamery, that in five years tuberculosis will be extinct in the State of Illinois if we pass a law against the bringing into the State of cattle that have not passed the tuberculin test. I mean protect the dairy herds by putting a fence

around the State. I didn't refer to any milk shipped for market. I simply refer to the milk taken back to the farm and fed to the calves and hogs. If that is done, in my judgment, it would absolutely weed out tuberculosis in the State in five years. The dairy herds—I believe that is now practically universal that a dairyman does not allow the calf to nurse the mother even during the first two weeks when the milk is not allowed to be sent to the market, because it has a deteriorating effect upon the amount produced by the mother, so that we may say all milk drunk by all calves in the dairy district is skimmed milk and that skimmed milk has passed through the factory." (Record, page 3624.)

Woolstein said at the Washington International Congress, 1908, (Inter. Cong., Vol. 3, page 429) : "Medin found among 595 autopsies on tuberculous infants under one year of age, but six cases of primary intestinal tuberculosis, while in 273 the tuberculous process involved the lungs and bronchial lymph-nodes alone. Hamburger reports that in four years, among 335 autopsies on children with tuberculosis, no case of positive primary intestinal infection was encountered, while 85 cases were primary bronchogenous. German authorities, as a rule, agree that cases of primary intestinal infection in infants and young children are rare. Heller is an exception, having found it in 37.8 per cent of his cases. English statistics on this subject are also high, Still reporting 29 per cent, and Thorne 30 per cent. Furst estimates that about 160 cases of primary intestinal tuberculosis have been reported, including both adults and children."

Dr. Robert Koch said, at the Washington International Congress in 1908 (Inter. Cong., Vol. 6, pages 645, 646-649, 650-741, 742, 743, 744, 745, 746) :

"The question, whether or not human and bovine tuberculosis are identical, is indeed of high theoretical interest. But the practical importance of the question which concerns the prevention of tuberculosis is of far greater importance. For this reason I will confine myself solely to a consideration of the practical side of the subject.

"To Theobald Smith, of Harvard, belongs the credit of having been the first to call attention to certain differences between the tubercle bacilli found in man and in cattle. It was his work which induced me to take up this same study. In co-operation with Schutz, I have undertaken a series of experiments for which we selected cattle, these animals being specially suited for such work.

"The results of these experiments have led me to conclusions which I have first communicated to the British Congress on Tuberculosis in 1901. They are in substance as follows:

"*First*—The tubercle bacilli of bovine tuberculosis are different from those of human tuberculosis.

"*Second*—Human beings may be infected by bovine tubercle bacilli, but serious diseases from this cause occur very rarely.

"*Third*—Preventive measures against tuberculosis should therefore be directed primarily against the propagation of human tubercle bacilli.

"I did not expect that many personal views on the relation of human and bovine tuberculosis would be accepted as final, but I have asked that the experiments of Schultz and myself be repeated. This has been done since by a host of investigators.

"Many sources of error must be considered in research on tuberculosis and only work in which these errors have been definitely excluded can be accepted as conclusive.

"My personal estimate of the value of the work of other authors depends on how far these errors have been eliminated. For this reason I will now summarize briefly the requisites for conclusive work on the differentiation between human and bovine tuberculosis.

"We may now take up the results of recent investigations. I believe that what has come to my knowledge so far may be summarized briefly as follows:

"All competent investigators agree that the tubercle bacilli of human origin differ from the tubercle bacilli of cattle, and that, consequently, we must differentiate between a *typus humanus* and a *typus bovinus*. The British commission also admits the existence of these differences, but as some of their cultures showed definite changes in their characteristics after passage through animals and various cultivations, they have differentiated a third group, which they call 'unstable.' As I have repeatedly emphasized, it is not of the slightest importance to us whether, after animal inoculation or breeding experiments, the tubercle bacillus is stable or unstable. What concerns us is behavior in the fresh condition. I am therefore unable to accept this third group of the British commission, and I am satisfied with their admission that the fresh tubercle bacilli of the human type differ distinctly from those of the bovine type.

"The tubercle bacilli of the human type are characterized by the fact that they grow rapidly and abundantly in a thick layer on glycerin serum. They are virulent to guinea pigs, slightly virulent to rabbits, and almost non-virulent to cattle.

"The tubercle bacilli of the bovine type grow very slowly and in a thin layer on glycerin serum; they are of equally high virulence to guinea pigs, rabbits and cattle. To my knowledge, the bacilli of the human type have never been demonstrated in cattle.

"The bacilli of the bovine type, on the other hand, can occur in man. They have been found in the cervical lymph-glands and in the intestinal tract. With few exceptions, however, these bacilli are but slightly virulent for man and remain localized. The few known cases in which the bovine tuberculosis is said to have produced a general and fatally progressive tuberculosis in man appear to me not to be above suspicion.

"No special proof is required if I say that these results constitute the confirmation of the statements which I made at the London congress.

"In closing, I have still one point to discuss which seems to me of high importance.

"Of all human beings who succumb to tuberculosis, eleven-twelfths die of consumption or pulmonary tuberculosis, and only one-twelfth of other forms of the disease. One would have expected, therefore, that

those investigators who are interested in establishing the relations between human and bovine tuberculosis would have searched for bacilli of the bovine type preferably in cases of pulmonary tuberculosis. This, however, has not been the case. Evidently animated by the desire to bring together as many cases as possible of bovine tuberculosis in man, they have investigated particularly cases of gland and intestinal tuberculosis, and have neglected the much more important pulmonary tuberculosis. In spite of the bias under which the researches hitherto have suffered, there yet remains at our disposal a sufficient number of investigations of pulmonary tuberculosis to warrant a provisional expression of opinion.

"The gist of it is—and I beg you to take note of it—that up to date in no case of pulmonary tuberculosis has the tubercle bacillus of the bovine type been definitely demonstrated. If, on further investigation, it should be established that pulmonary tuberculosis is produced by the tubercle bacillus of the human type exclusively, then the question will be decided in favor of the view which I have upheld, and we must direct our regulations for combating tuberculosis by all means primarily against the tubercle bacilli of the human type.

"On account of the great importance of this question I intend to undertake as soon as feasible experiments along this line on a broad scale. At the same time I wish to make my plea to other tuberculosis workers, in order that as many cases as possible may be examined, to join with me vigorously in this task. But I wish to lay stress on the fact that the conditions laid down by me for the carrying out of these investigations must be followed. I consider it quite possible that in this manner the essential facts for deciding this important question may be collected in about two years and be presented to the next International Congress."

"CONFERENCE IN CAMERA."

Prof. Koch: "A great difference of views seems to prevail with regard to the question of human and bovine tuberculosis, and I am glad that we have an occasion to enter into the subject in detail.

"I would especially propose two points for discussion, the first referring to the remarks of Mr. Fibiger, who contends that bovine tuberculosis is very frequent in man. I wish to state again on this occasion that I have never denied that bovine tuberculosis is found in man, but I contend that these cases are rare. Secondly, I would refer to the statement I made on Wednesday, last in the congress, to the effect that not one single authentic case of phthisis has ever been found in man where for any long period of time bovine tubercle bacilli have been coughed out by the patient. I would specially ask the question whether any case of pulmonary tuberculosis exists in which tubercle bacilli of the bovine type were found, not once, but repeatedly.

"I propose that we should discuss this second point first, and I ask: Has any one of the gentlemen present ever seen such a case of bovine tuberculosis in man? (Pause.) It appears that nobody knows

of such a case. The German commission for research,—that much is known to the members present,—found no such case among 22 cases investigated.”

The Chairman: “Is there any one here who can report such a case as Professor Koch has asked for?”

Prof. S. Arloing (Lyons, France): “I claim to have identified such a case, or discovered such a case in which the bovine bacillus was isolated. An autopsy was performed, and in a cavity the tubercle bacillus was found, and a culture made from it which possessed all the cultural characteristics of the bovine tubercle bacillus, and which, when injected into an animal of the bovine species, produced a generalized tuberculosis.”

Prof. Koch: “The case on which Professor Arloing reports and his contentions are known to me, but the finding of a single case of bovine tuberculosis in a cavity cannot be considered as proof; the case would only show proof if the bovine tubercle bacillus had been found repeatedly and during a certain period of time. In this connection I would call attention to the possibility of accidental contamination with milk or butter or other food substances, which must always be kept in view; even if the bovine tubercle bacilli are found in a cavity after death, the possibility must always be thought of that the patient, in the course of his last hours of life, may have inhaled particles of vomited contents of the stomach or contents of the mouth cavity, and that the infection of a tuberculous cavity with the bovine type may have come to pass in that way. One isolated observation of this kind has not the necessary power of proof, and only experiments of utmost exactness, and excluding every possibility of secondary contamination, can be taken into account.”

Prof. S. Arloing: “I admit that my researches were not strictly in conformity with all the requirements of Professor Koch,—that is, constant and prolonged research in this matter,—but these bacilli were found during the life of the patient, and, therefore, precluded the supposition of Professor Koch that the occurrence of this infection was at a moment of agony. I wish to repeat that the multiplication of these bacilli in the tissue shows adaptability of human tissue to the bovine bacillus.”

Prof. Theobald Smith (Boston). “The question before us is one of methods. In the study of the tubercle bacillus with special reference to its differential characters we would hardly apply the same methods to-day which we applied ten or fifteen years ago. Now we must determine not only whether the bacilli associated with a certain disease are bovine or human, but we must guard against being deceived by mixed cultures or by the accidental presence of one or the other type. I think the demand made by Professor Koch is a reasonable one. In the final determination of bovine tubercle bacilli as a cause of pulmonary tuberculosis there should be repeated examinations of the same case, to find out whether the bovine bacilli actually multiply there and continue to be thrown off in sputum. Unfortunately, I am not familiar with the details of the original paper by Professor Arloing, and I am, therefore, unable to make any comments on it which may have any weight. However,

in a problem of such importance as this, where the existing evidence may be made to point both ways, we must begin over again in the collection of scientific evidence. What has been reported thus far can only be considered presumptive. The presence of large numbers of bacilli in the lungs, in the case mentioned by Professor Arloing, cannot be safely used as an argument, because they may have been human bacilli admixed with a few bovine by accident, as Professor Koch points out. We know that there are human bacilli of such low virulence toward guinea pigs that they may be lost after inoculation, and only the virulent bovine type persist. Finally, the difficulties and pitfalls surrounding the bacteriological study of diseased organs in open communication with the air and the digestive tract are well known. The study of lymph-nodes presents fewer difficulties."

Prof. Fibiger: "I would ask whether Professor Koch remembers an authentic case of bovine tuberculosis in man which is described by Dutch authors."

Prof. Koch: "I know that case very well. It is a case of this type; but it has the defects which have been inherent in the earlier investigations. Besides, the same objections apply to this case as to that mentioned by Professor Arloing, viz, that the case represents but one single finding. In order to arrive at definite conclusions, the greatest care with reference to the conditions stipulated by me must be taken in future in all cases investigated and reported. I do not consider this question as settled either in one sense or in the other, before all inexact cases which are unsuitable for proof are absolutely cleared up."

The Chairman: "Unless there is objection, we will now pass on to the consideration of the second question, and I will ask Professor Koch to speak."

Prof. Koch: "I would ask the following question: How often does primary intestinal tuberculosis or tuberculosis of the mesenteric glands occur in children? It has been said by some that primary intestinal tuberculosis occurring in children is due to bacilli of bovine tuberculosis. I contend that this form of tuberculosis is not frequent, and in support of this assertion I refer to Virchow, Orth, Albrecht, Baumgarten, and others as authorities who have said, and still say, that primary intestinal tuberculosis is an extraordinarily rare disease. (Professor Koch read the following passage from the newest work of C. Flügge, "Die Verbreitungsweise und Bekämpfung der Tuberkulose auf Grund experimentaler Untersuchungen im hygienischen Institut der Königl. Universität Breslau"—"The Experimental Researches Carried Out at the Hygienic Institute of the Royal University of Breslau," 1908, p. 411.)

"If some few authors are of a different view, and Fibiger and Jensen, for instance, find primary intestinal tuberculosis in the case of about 6 per cent of all patients and of about 11 per cent of all tuberculous patients, and in children even of 16 per cent., Baumgarten considers this figure 'as far too high,' and says: 'Primary intestinal infection is very rare, according to my experience, and most pathological anatomists agree with this view,' Virchow, Orth, Ribbert, Albrecht, and many

others have expressed their opinions to quite the same effect. Orth found among 131 children only 1.5 per cent of unquestionable tuberculosis of the intestinal and mesenteric glands; Biedert, among 3,104 sections of tuberculous children, found primary intestinal tuberculosis 16 times, i. e., 5 cases in 1,000. Baginsky found no case in 933, Grosser only one case among 1,407 sections of tuberculosis in the Pathologic Institute of Tubingen.

"Thus it is seen that the views of the pathologic anatomists widely differ from each other. I have discussed the question with Orth, among others; his personal view certainly differs from that of Heller's assistants, as far as autopsies in Berlin are concerned.

"I would now ask: Whence comes this great difference? Are there local differences in the pathological material of the various localities, or must the difference of opinion be looked for in the subjective understanding or subjective interpretation on the part of the various prosecutors and pathological anatomists who carry out the autopsies? This question remains undecided. The question of the frequency of primary intestinal tuberculosis I consider settled thus far, that, in my opinion and in that of other authorities, the occurrence is very rare. If we consider that eleven-twelfths of the tuberculous deaths are due to pulmonary tuberculosis and only one-twelfth is caused by all the other forms of tuberculosis together; if we take into account that, of these again, only a small part can be due to primary intestinal tuberculosis, and that, once more, only a small part of them belongs to bovine infection, we must admit that bovine infection is a rare clinical occurrence."

Prof. Woodhead: "I must say that when Professor Koch stated in London that primary feeding tuberculosis was very rare and actually seldom or never occurred——"

Prof. Koch: "I said it was rare."

Dr. Theobald Smith said at the International Congress at Washington, in 1908, (Inter. Cong. Vol. 6, p. 651):

"The tendency of practical medicine to move faster in theorizing than the demonstrated facts and accumulated data of observation and experiment warrant is again manifest in the hypotheses which have recently been advocated concerning the relation existing between human and animal tuberculosis, and the portals of entry of the tubercle bacillus. A survey of the investigations thus far published reveals a practical unanimity among investigators that there exists a sharp, easily recognized difference between the type of bacilli isolated from sputum or from the lung tissue in pulmonary tuberculosis of man, and the type isolated from tuberculous cattle. The designation 'human' and 'bovine,' which I applied tentatively to these types in 1898, has been generally accepted."

Professor Mazyck P. Ravenel, said at the Washington International Congress, 1908, (Vol. 6, pages 682-683.):

"I would consider it an extreme misfortune, not only for this country, but for every country on the face of the earth, if any impression should go out from this meeting that even the small proportion of deaths due to the bovine bacillus was a negligible quantity.

"Professor Koch has told us that, as far as he knows, never has the human type of bacillus been found in cattle. This, as far as we know, is the experience of us all. Of the two types, which have been so amply described this afternoon, I will not speak further.

"Since that time our work has been confirmed by many men in this country, by the German commission, by the English Royal Commission, and by Fibiger and Jensen; and in fact, from every part of the world have come proofs of the work which we announced in the year 1902. In our own laboratory in the State Live-stock Sanitary Board of Pennsylvania this investigation has been repeated. Now the question is often brought up, 'Why don't you cut it off?' It is perfectly true that if you take the whole sum and substance of the cases throughout the world, they are few as compared with the total number of deaths."

Dr. Adami, testifying in the Montclair case, (Record Page 318) speaking of Dr. Ravenel's position at Washington, says: "I think Dr. Ravenel put aside all the meningeal cases as non-bovine; but coming to the mesenteric, I think, from his earlier views, there was something like three out of five cases. I cannot say that absolutely. Dr. Ravenel strictly antagonized Dr. Koch's position, and he does yet, but he modified his own opinion that a large majority of infantile mesenteric cases are not of bovine origin. It is my impression that he has very much modified his position since 1899, that then he was very strong in his opinion in favor of the bovine origin being the most frequent in cases of intestinal tuberculosis, and that now he admits that the majority of cases of intestinal tuberculosis are of human origin, and a smaller, a definite percentage, of bovine origin, when he previously believed all were of bovine origin. I suppose I would be right in saying that Dr. Ravenel regards that out of four cases there is one,—25 per cent."

Dr. Ravenel of Wisconsin and Dr. Park of New York city, have been the most radical in believing in the bovine infection in man. We quote Dr. Ravenel's evidence in the Milwaukee case:

(Record, page 2327) "Of proof I bring forward for these cases which I have worked on myself and from which I have isolated the bovine germ, and I have also accepted the statement of the German Royal Commission, of which Koch himself was a member, saying that of 84 children examined by them, 21 or 25 per cent, showed lesions due to the bovine tubercular bacillus."

(Record, page 2328) "The government also appointed at this time a Royal Commission. I may say that I visited the laboratories of the Royal Commission and went over their work, of course, not all of it, but a good deal of it, very-carefully, personally. They have found in sixty cases examined by them 23 per cent approximately. I do not recall the exact number of figures, due to the bovine tubercular bacillus."

(Record, page 2329) "Professors Fabiga and Jenssen of Copenhagen have also studied this question very carefully, and in a series of twelve cases have found seven of them due to the bovine tubercular

bacillus. In three of these cases, I think, certainly several of them, they have traced the case directly to cows with tuberculosis in the udder, giving a chain of proof which is very strong. Altogether, we have been able to collect some 306 cases studied with reference to this particular point from the literature. From these reports that I have mentioned, 306 cases of which 63 or over 20 per cent have been due to the bovine germ. I have isolated from the intestines, from the mesentery glands of three children, the bovine tubercular bacillus."

(Record, page 2345) "I think, with reference to age, infants are more liable to suffer. I think adults are liable, but the percentage of adults would be very small, I cannot tell you,—cannot give the exact proportion. I only know of two reported cases among adults of tuberculosis coming from milk, none of my own knowledge. The proof is not absolute that it came from milk. I have no absolute proof as to whether they came from milk or not."

(Record, page 2355) "Professor Arloing found one case in Lyons, France, and the other was found by the English Royal Commission. These cases were not confirmed by myself. I have no knowledge that they came through milk."

(Record, page 2390) "As to the percentage of tuberculosis in infants of bovine origin, I put my personal estimate a little higher than 20 per cent. The figures which I gave are 20 per cent, but they include other cases than strictly children. My estimate is of children. I have not gone into the question of adult tuberculosis at all. As to the number of cases experimented upon, it is entirely a matter of expense. Only two governments in the world have had the back bone to come up with the money for this examination. It is a tedious and expensive business and private laboratories cannot afford it. I believe it is entirely a matter of expense. There is a further fact, that a majority of us feel that the only thing necessary is to prove that bovine tuberculosis does kill human beings, and if it is only one case in every ten thousand, we feel the case is proven and must be guarded against. I believe the real question is the case of expense. Dr. Park has done a large series recently with his unusual facilities. Only two governments in the world put up the money, the German and English."

Dr. William Halleck Park, testifying in the Milwaukee case, says:

(Record, page 2795) "Up to the present time we have tested the following number of specimens from children; those from bones and joints, five cases; those from tubercular meningitis, five cases; generalized tuberculosis, two cases; tuberculosis of the glands of the neck, twenty-seven cases; pulmonary tuberculosis, eleven cases. In the five cases from bones and joints, all the cultures were of the human type; of the five cases of tubercular meningitis, all the cultures were of the human type; under generalized tuberculosis, instead of saying eight cases, I should have said twenty-one cases, of which eight cases were from the Foundling Hospital and thirteen cases from the Babies' Hospital. Of the eight cases from the Foundling Hospital, four were due

to the human type and four were due to the bovine type; of the thirteen cases from the Babies' Hospital, twelve were due to the human type and one to the bovine type. The two cases of abdominal tuberculosis were due to the bovine type. The eleven cases of pulmonary tuberculosis were all due to the human type. The twenty-seven cases, glandular tuberculosis, were in nine cases due to the bovine type. In the adult cases, which were not mentioned, at the present time something over one hundred have been examined. These have all been due to the human type."

(Record, page 2818): "In my mind the cultural experiments which have shown that in a considerable proportion about 22 per cent of the children, whose material I have examined, that bacilli of the bovine type are present, this is to me by all means the most conclusive of any proof that I could obtain. I have a certain amount of circumstantial evidence which has, in my opinion, much less value, such as, for instance, a case of abdominal tuberculosis in which we obtain the tubercle bacilli from the material obtained at operation which were of the bovine source. I found that the material which that child received, or rather the material from the dairy from which the child received its milk, contained bacilli of the bovine type on two different examinations. Another bit of circumstantial evidence is the fact that of eight cases of general tuberculosis received from the Foundling Hospital, four were of the bovine type; while of the larger number received from the Babies' Hospital, only one was of the bovine type. The children at the Foundling Hospital are sent out to be taken care of by women throughout the city, and as a rule receive cows' milk or some other form of food than mother's milk; while the children received at the Babies' Hospital are the general infants of the city, of which at least nine-tenths have received human milk. The only case from the Babies' Hospital in which we found bovine bacilli had been fed on cows' milk. This evidence is to me of very much less value than the fact that we have actually found the bovine bacilli in milk. I might also say that the milk of New York City, the general milk supply, is pretty badly infected with bovine bacilli. We have tested in the laboratory 100 consecutive samples from the grocery stores, and we found in fourteen of these samples bovine tubercular bacilli."

(Record, page 2825) "My opinion founded on these consecutive cases is that about 20 per cent of tuberculous disease in children and death from tuberculosis is due to the bovine bacilli. Probably a little less percentage of death than that is. I think the percentage of disease is a little greater than the percentage of death, but they are nearly alike."

(Record, page 2854) "I think the difference of opinion upon the subject is caused by the fact that the tubercular bacilli, both of cattle and man, are so generally distributed that it is almost impossible through circumstantial evidence to be sure whether any given case had derived the infection, which usually was months before any development took place, I say whether such infection came from human or from animal sources, and for that reason men being guided by Koch's statement in 1901, and the reverse being guided by the statement of English and

French investigators, have taken either one or the other side, either believing that a great deal of tuberculosis is due to bovine source, or that almost none is. But I think that the great majority, I should say practically all enlightened physicians, will say that the actual testing out of the cases as done by Dr. Smith and as done by these commissioners is the only way in which the amount can be determined. And I think the great majority abide by such determination in settling in so far as they have gone the proportion of cases."

Dr. Park also testified in the Montclair case:

(Record, page 1588) "So far as adults go it might almost be considered, as folks say, as a 'negligible quantity.'"

(Record, page 1589) "At the Washington International Congress in answer to Dr. Koch as to pulmonary tuberculosis, Dr. Arloing replied that he found one such case. Dr. Woodhead of England claimed to have found practically such a case. That was the only case they had."

(Record, page 1604) "I have made an estimate of the actual number of deaths from bovine tuberculosis that occurred in the city of New York annually; I made the estimate in two ways: First, judging by these forty fatal cases, or I think it would be safe to say, forty-three fatal cases, at the Babies' Hospital which appear to be representative cases, using those and the records of the health department as the records are given, I estimated that $1\frac{1}{2}$ per cent of all deaths from tuberculosis in New York are due to bovine bacilli. Eleven thousand deaths, that would make about 165; but if I take into account what I believe to be true that a proportion of the cases of bronchial pneumonia, meningitis and marasmus are due to tuberculosis, I estimate between $2\frac{1}{2}$ and 3 per cent of all deaths in New York are due to tuberculosis of bovine infection, which I believe to be due to milk or, possibly in a few cases, butter."

(Record, page 1606) "In November last before the New York County Medical Society, I read a paper and gave a table of percentages of the various diseases in which I found the human type was the cause of infection. That was not only on our work, but on the world's work. Of pulmonary tuberculosis I estimated the human type were in 98 per cent. Of meningeal tuberculosis, the human were in 95 per cent. In bone and joint tuberculosis the human type were found in 95 per cent. And in the cervical and bronchial glands the human type were found in 75 per cent. And in the mesenteric glands 50 per cent."

(Record, page 1607) "As I stated I made up these figures which I am giving now on the cases that we have studied up to date, which are many more than those and for New York—that was for the world. I have percentages made in the same way up to date on the world, based upon the result of these investigations, taking the whole world's figures that we can get together and dividing them as to over 16, under 16, over 5 and under 5. Of pulmonary tuberculosis in adults, 532 cases over 16 years; under 16, 22 cases, no bovine. I might say that these are our interpretations of the world's results. Of lymph glands in those over 16, 5 per cent bovine; between 16 and 5, 39 per cent bovine; under 5, 7 per cent bovine. Of abdominal tuberculosis, over 16, 12 per cent; between 16 and 5, 63 per cent bovine; under 5, 75 per cent bovine;

of general tuberculosis, alimentary origin, over 16, 14 per cent bovine; between 16 and 5, 75 per cent bovine; under 5, 65 per cent bovine. Of general tuberculosis, not of alimentary origin, as has been so far determined, over 16, no bovine; between 16 and 5, 9 per cent bovine; under 5, 8 per cent bovine. Bones and joints, over 16, no per cent bovine; between 5 and 16, 4 per cent bovine; under 5, 3 per cent bovine. I have the total of all the cases just lumped together, that is, the total number of cases we have got together from the world, the number of bovine and human, if you wish it. These percentages are made on a certain number of cases. Taking all the cases together they add up in the hundreds. Over 16, 610 human, 4 bovine; between 5 and 16, 87 human, 32 bovine; under 5, 143 human, 54 bovine; total, 840 human and 90 bovine."

These are practically all the cases that these investigators studied.

It will be noticed that Dr. Ravenel testified at Milwaukee, June 16, 1909, giving the total number of cases investigated 306, of which 62 were claimed to be of bovine origin, practically 20 per cent. Dr. Park gave the preceding testimony in Montclair, May 25, 1910, about one year later, showing the total number of cases investigated as 840, 90 of which, or 10.7 per cent, claim to be bovine.

Dr. Park's figures are based upon certain experiments made by Dr. Krumweide and himself (Record page 1563). "There were altogether four hundred and thirty-six cases at the Research Laboratory from which we obtained cultures and completed the tests. We had altogether forty cases from the Babies' Hospital of fatal tuberculosis in little infants. Mostly under one year. There were three others less than five years that I believe have died."

(Record, page 1564) "Of lymph glands there were twenty-seven cases under sixteen years and over five years, and eighteen cases under five years. They were all surgical cases,—operative cases,—glands from the neck were removed by operations and sent to the laboratory for investigation. The other cases were scattered."

It will be noticed that the lymph glands cases and others do not show deaths, but merely cases of operations and are used to show the possible extent of the disease and are not mortuary figures.

Dr. Park with Dr. Krumweide, investigated eighty-four cases under five years. (Record, page 1566) "Of pulmonary tuberculosis there were five cases all of the human type. Of tubercular cervical adonitis, tubercular lymph glands, there were eighteen cases, of which twelve were due to the bovine type and six to the human type. Of abdominal tuberculosis there were three, of which three were due to the bovine type. Of generalized tuberculosis of intestinal origin there were two, of which one was due to the bovine type and one to the human type. Of generalized tuberculosis there were sixteen, of which twelve were due to the human type and four to the bovine type. Of generalized tuberculosis in which the meninges were involved there were nineteen cases, of which eighteen were due to the human type and one to the bovine type."

This would make a percentage among children under five years of age of exactly 25 per cent of fatal tuberculosis, other than pulmonary tuberculosis, and eliminating Professor Park's other estimates in which he

estimates 2 per cent of all pulmonary tuberculosis as bovine, without any evidence or facts upon which to base such a conclusion, it will be found that Professor Parks and Professor Ravenel agree in their estimates that 25 per cent of fatal tuberculosis among children under five years of age, of the intestinal, abdominal and glandular form, is or may be caused by the bovine form of the disease.

Professor Park further says (Record, page 1567): "These were all below the age of five years and the majority were below one year. Of all these eighty-four cases, fifty-nine were fatal, of which fifty were due to the human type and nine to the bovine type, making practically 15 per cent due to the bovine type."

Dr. Frederick Tice, member of the Milk Commission of the Chicago Medical Society, testifying before our committee, (Record, page 3646) speaking with reference to forty-five children under one year of age, dying of tuberculosis in the city of Chicago in 1906, says that "In all probability they were of the human type;" and referring to seven babies under one year of age in the city of Chicago, during 1906, dying from abdominal tuberculosis, he states, "Without any reference to pulmonary tuberculosis I would question the statistics,—the report,—because the abdominal involvement is often secondary to a pulmonary one, and tuberculosis that has existed in the pulmonary tissue and then for one reason or another becomes latent and an infection later involving the peritoneum and producing abdominal tuberculosis. They may include their intestinal tuberculosis, an infection of the peritoneum, or all of those things, which could be secondary entirely to a pulmonary tuberculosis. If it included intestinal tuberculosis, it is probably bovine. I do think it very unlikely that the reported cases of meningeal tuberculosis in children under one year of age was caused from the bovine infection through the milk. The ten cases of miliary or general tuberculosis is usually more likely to be of the human type, and in the cases of glandular tuberculosis, they might or might not have been caused by bovine through the milk. Of the one hundred and two babies, under one year of age (Record, page 3648) who died from all these different kinds of tuberculosis during 1906, forty-five from pulmonary tuberculosis, seven from abdominal, ten from general, three from glandular, three from meningeal, and four from other forms, generally, I would say that the percentage of those taking the disease from a bovine infection through the milk, must be very small; that the number must be relatively very small. I would say it was much less than one half of that number. I would say probably less than an eighth or a tenth at the most, at the very most. And this ratio or the same rule of percentage would apply to a similar description of the deaths among a similar number of babies under five years of age. I think even more so. That is the percentage would relatively decrease. As the age of the children increased, the percentage dying from the bovine infection would be reduced."

(Record, page 3649) "Q. Then in your judgment what Koch said, that the danger from the bovine infection to the human race, was really a negligible quantity when you consider the whole disease?"

"A. Generally considered, yes, sir."

Bovaird states (Record, page 179) that 2 per cent of tuberculosis in children which causes death up to the age of six or seven years is caused by intestinal tuberculosis.

Stowell says, testifying in the Montclair case, (Record, page 284) that "these figures I personally copied from the mortality statistics records for the years 1906-1905. Nineteen hundred five goes back four or five years before. The registration area in 1906 took in 40,996,317 people, 48½ per cent of the population. All deaths,—all causes, 658,105. Of this number there died under five years of age, 186,978. That is, 28 per cent of all deaths were children under five years of age. That corresponds with general knowledge, 25 to 33 per cent. There died from all causes, under five years of age, 186,978, that is, 28 per cent of all deaths were children under five years. Then I speak of tuberculosis in all forms: 75,512 died at all ages. Of those dying from tuberculosis of all forms there were 5,443 deaths under five years of age, that is, 7 per cent of the tuberculosis deaths were under five years. The contrast I wanted to make was that in general 28 per cent of the deaths are in children under five years of age, but when it comes to tuberculosis, there is only 7 per cent.

"As far as pulmonary tuberculosis is concerned, there were 65,341 deaths. Pulmonary tuberculosis in children under five years, 2,054, therefore, are only three per cent of all cases of pulmonary tuberculosis. I now give percentage based on five years from 1901 to 1905, a percentage of the forms of tuberculosis without regard to age: Abdominal tuberculosis, 3 per cent; pulmonary tuberculosis, 87 per cent and 88 per cent; meningeal tuberculosis, meningitis, 4½ per cent to 5 per cent; Pott's disease, .9 per cent; general tuberculosis, 1.4 per cent to 1.7 per cent. The actual number of cases of abdominal tuberculosis under 5 years in 1905 (which is not an average but the actual) was 373. There were 147,384 deaths in all under five years, making the deaths from abdominal tuberculosis only two-tenths of one per cent."

Dr. Shaw states (Record, page 257):

"At that time I made a study of the frequency of tuberculosis in young children, believing that if the bovine source was of great frequency, we would find it in young babies. At St. Margaret's, out of nearly six hundred admissions, we have had about twelve clinical cases of tuberculosis. The autopsies in these cases did not reveal any primary intestinal tuberculosis. I then looked over the records of the Bendor laboratory, and out of eleven hundred autopsies in general, one hundred and fifty-seven under five years of age were tuberculous and three were primary intestinal."

Adami (Record, page 305-307), speaking of the British Royal Commission investigating the subject, says:

"They have been at work seven years and their conclusion is, what I may say, has been my conclusion all along, that there is a certain amount of infection from cattle to man, but this only under special circumstances, and not a common form; it is one of the rarer forms

of tuberculosis, not the common, I may say, intestinal and mesenteric tuberculosis, especially in the young. And at the end, instead of finding that the main cause of the mesenteric and intestinal tuberculosis is, their conclusion is, that 'there can be no doubt but that in a certain number of cases tuberculosis occurring in the human subject, especially in children, is the direct result of the infection into the human body of the bacillus of bovine tuberculosis.' But they found 'of the sixty cases of human tuberculosis investigated by us, fourteen only contained the bovine bacillus. Of these sixty cases examined by us, not one was of the commoner type of the pulmonary phthisis.' They were all cases of other rarer glandular diseases, and other forms than what we call the typé human tuberculosis, the pulmonary form. So that their conclusion bears out ours at Montreal, that it is only a relatively small, not the main proportion of intestinal tuberculosis cases that are due to the bovine bacilli. I may say this: they have come from the position of believing that here they would be able to demonstrate absolutely the great proportion of intestinal tuberculosis was bovine, to the position of regarding only sixteen out of sixty-four due to the bovine sources, which confirms the general work elsewhere.

"At the congress in Washington, in his public address, Professor Ravenel again, like the British Commission, admitted that there was not only a percentage, but a definite percentage of cases of tuberculosis in children, that were due to the bovine origin. He again is coming to this view that while it does exist, it is not nearly so common as it was thought some years ago.

"I may say that up to the present time, the more we have studied the more we have reduced the number of cases that are of bovine origin and increased the number of human origin." (Record, page 317).

"Speaking of Dr. Ravenel, I think Dr. Ravenel put aside all the meningeal cases as non-bovine." (Record, page 317.)

"Common authority would put the cases in children of true intestinal tuberculosis as high as thirty to fifty per cent, but from my experience I think it is twenty-five to thirty per cent, and refer to Duval's work, Theobald Smith's work, and Ravenel's work." (Record, page 323.)

"Tuberculosis is on the decline." Dr. Arthur Newsholme. (Inter. Cong., vol. 8, page 80.)

Dr. Oliver R. Avison, for over twenty years a missionary in Korea, testifying in the Montclair case, attested to the existence of tuberculosis, pulmonary tuberculosis, tuberculosis of the bones, joints, peritoneum and practically all of the structures of the body that are usually infected, of the cervical and mesenteric glands, in Korea, where cows' milk is not used among the people generally to any extent. It is not an article of food in Korea. (Record, pages 440 to 452.)

In Japan, tuberculosis in all forms is much more prevalent than in the United States, and in Japan, cows' milk is not an article of food. (Inter. Cong., vol. 4, page 573, and evidence in the Montclair case.)

Tuberculosis is much more prevalent among the Indians in all forms where milk is not an article of diet. (Inter. Cong., vol. 4, page 574.)

We submit two tables showing the ratio of abdominal tuberculosis and tubercular meningitis, to total admissions at three British hospitals and three American hospitals, as follows, (Inter. Cong., vol. 3, pages 447, 448):

TABLE I.

SHOWING RATIOS OF ABDOMINAL TUBERCULOSIS AND TUBERCULAR MENINGITIS TO TOTAL ADMISSIONS IN THREE BRITISH HOSPITALS.

Royal Hospital for Sick Children, Edinburgh.

	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Average.
Number of patients admitted.....	1,154	1,219	1,361	1,398	1,533	1,597	1,504	1,596	1,844	2,114	1,532
Percentage of abdominal tuberculosis.....	3.63	3.75	2.57	4.36	2.73	3.63	4.98	3.82	3.14	3.20	3.57
Percentage of tubercular meningitis.....	3.29	2.87	2.42	2.21	2.02	1.63	2.12	1.12	1.57	1.27	2.05

Hospital for Sick Children, Great Ormond St., London.

	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Average.
Number of patients admitted.....	1,946	2,067	1,962	1,690	2,111	2,236	2,403	2,537	2,876	3,068	2,286
Percentage of abdominal tuberculosis.....	0.66	1.11	1.32	1.71	1.46	1.61	2.03	2.24	2.60	1.98	1.67
Percentage of tubercular meningitis.....	1.49	0.72	1.52	1.88	1.27	1.11	1.16	1.65	1.53	1.85	1.42

Royal Hospital for Sick Children, Glasgow.

	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Average.
Number of patients admitted.....	691	744	741	714	738	854	996	941	1,125	1,075	882
Percentage of abdominal tuberculosis.....	4.05	4.30	3.91	3.92	5.28	4.58	4.32	5.10	5.24	4.46	4.51
Percentage of tubercular meningitis.....	1.49	0.72	1.52	1.88	1.27	1.11	1.16	1.65	1.53	1.85	1.42

TABLE II.

SHOWING RATIOS OF ABDOMINAL TUBERCULOSIS AND TUBERCULAR MENINGITIS TO TOTAL ADMISSIONS IN THREE AMERICAN HOSPITALS, (U. S.)

Babies' Hospital, New York.

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	Average.
Number of patients admitted	395	475	342	610	946	1,036	1,031	979	728
Percentage of abdominal tuberculosis ..	0.0	0.4	0.0	0.0	0.0	0.1	0.1	0.2	0.1
Percentage of tubercular meningitis....	0.8	1.2	0.9	0.8	0.9	1.9	3.0	2.0	1.4

Children's Hospital, Boston,

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	Average.
Number of patients admitted	581	675	758	765	910	927	.....	.....	768
Percentage of abdominal tuberculosis ..	0.4	0.0	0.4	0.4	0.4	1.0	.....	.....	0.4
Percentage of tubercular meningitis....	1.0	0.3	1.0	2.5	1.5	1.4	.....	.....	1.3

Post Graduate Hospital, New York.

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	Average.
Number of patients admitted	1,035	979	953	934	1,121	1,111	1,059	.....	1,028
Percentage of abdominal tuberculosis ..	0.5	0.2	0.6	0.2	0.6	0.9	0.6	.....	0.51
Percentage of tubercular meningitis....	1.5	0.0	0.5	1.1	0.0	0.4	0.4	.....	0.56

This shows that the amount of abdominal tuberculosis is very much greater in England than in the United States.

Adami, in the Montclair case, says (Record, page 329):

"Yes; but there has been a variation of opinion as to the proportion of cases and the frequency, but we must all admit that a proportion of the cases of tuberculosis, especially in young children is due from taking the milk of cattle, I should say, subject to grave tuberculosis and particularly of tuberculosis of the udder. And I should say further that my opinion is that the difference as between the English and German statistics and our American statistics, also of Canada, is that here we have fewer cases of udder tuberculosis. It took us two years in Montreal to discover cases that we wanted to work with in a radius of 200 miles of Montreal. That probably, I think, is in part, the explanation of the lesser frequency of abdominal tuberculosis here as compared with what it is in Europe."

It is also to be noted that Park and Ravenel, both in making up their percentages base them upon cases, the larger number of which have

been experiments in England and in Germany, which show the existence of abdominal tuberculosis, by the hospital reports, to be ten times more prevalent than in the United States.

Dr. Park (Record, pages 1581-1582) gives the reports of death from tuberculosis in the city of New York for one year practically as follows:

	Total Cases.	Under 5 Years.
Tuberculosis of the larynx	54	
Tuberculosis of the lungs	8,869	166
Tubercular meningitis	815	
Abdominal tuberculosis	177	61
Pott's disease	78	8
Cold abscess	9	2
White swelling	37	4
Tuberculosis of other organs	74	13
General tuberculosis	44	16
Total deaths from tuberculosis	10,157	270

In the city of New York, two hundred and seventy children died of tuberculosis of all causes in one year. Deduct the one hundred and sixty-six that died from pulmonary tuberculosis, and it leaves one hundred and four dying from other causes than pulmonary tuberculosis. Applying to the number the rule laid down by Ravenel, Parks, Adami and the radical rule established by the high percentages found in Great Britain and Germany, then it is demonstrated that altogether in the city of New York, twenty-six children under the age of five years have died, during one year, of bovine infection out of the total number of tuberculous deaths, 10,157.

Take the figures from the vital statistics of the city of Chicago for the year 1906, being the last year for which full tabulated figures are furnished your committee, and the total number of deaths in the city of Chicago, during 1906, were 29,048. Total number from tuberculosis, all causes, 3,837. We furnish the following table of deaths, during 1906, from tuberculosis all causes, and include the number under one year and under five years of age:

	Total.	Under 1 year.	1 to 5 years.
Tuberculosis, pulmonary	3,224	45	45
Abdominal	130	7	16
Articular	16	...	2
Cutaneous	4	...	...
General	213	10	18
Glandular	16	3	1
Laryngeal	20	...	...
Meningeal	163	33	62
Other forms	51	4	5
Total deaths	3,837	102	149

Total number of deaths under five years, 251. Deduct those dying from pulmonary tuberculosis, 90, and those dying from meningeal, 95, of which all of the records in the scientific world admit are not from the bovine cause, and it deducts a total of 185 from 251, leaving 66 cases of children under five years of age that died from tuberculosis, except pulmonary and meningeal during 1906. Applying to this number

the rule of percentages laid down by Ravenel, Park, Adami, and the radical figures as based upon the results of the British Royal Commission, and we find that in the city of Chicago, during 1906, sixteen and one-half children under five years of age died of tuberculosis, and we may say, probably, caused by the bovine infection through the milk, out of the total number of deaths in that city from tuberculosis, 3,837, and deaths of all kinds, 29,048.

Should the lower percentages of abdominal and intestinal tuberculosis that prevail in the United States over Great Britain and the continent, again divide this death rate in the city of Chicago, once or twice (which is likely) it would seem that the public have been greatly and unnecessarily alarmed by bovine infection through the milk.

Bovaird says, with reference to the cases of primary intestinal tuberculosis in the British Hospital and those in the United States:—(Inter. Cong. Vol. 3, page 450.)

"There has been no selection of data. The figures for every hospital whose returns were accessible are here given. The contrasts in several instances are striking, but I shall not turn aside to consider them. The figures make it clear that, on the whole, tuberculosis is much less frequent among children in the United States than in Great Britain. They also show that we have, on the average, four cases of meningial tuberculosis for one of abdominal tuberculosis. Comparing this result with that already obtained for Great Britain, we may safely say that, taking into consideration the frequency of the abdominal localization in cases clinically tuberculous, we find that such localization is eight times more frequent in Great Britain than in the United States. Or comparing the figures for the hospitals individually, the number of cases of abdominal tuberculosis is found to be four times greater in Great Ormond Street than in the United States; in the Edinburgh Children's Hospital it is about eight times, and in the Glasgow Children's Hospital about twelve times, greater.

"If, however, we take the frequency of the two types of tuberculosis in the total number of sick children treated, we see that, on the average, abdominal tuberculosis is fifteen times as frequent in Great Britain as in this country, the figures being 3.25 per cent of the total number treated in Great Britain and 0.22 per cent in the United States.

"These figures surely demonstrate beyond doubt that abdominal tuberculosis is many times more frequent among children in Great Britain than among those in the United States."

In the city of Chicago the percentages of deaths of children, under 5 years of age, to all mortality has gone down from 52.61 in 1857 to 30.27 in 1909, and of children under 5 years of age the death rates per thousand of total population in the city of Chicago has gone from 14.50 in 1857 to 4.21 in 1909. The records show that in the city of Chicago in 1906, 913 children, under 5 years of age, died of various general diseases, other than those hereinafter stated; 2,384 children, under 5 years of age, died of gastro enteritis, dysentery and diarrhoea, the larger number of whom were under 1 year of age; 1,557 children, under 5 years of age, died of pneumonia; 802 children died of cerebro

meningitis and its kindred diseases; various other numbers by various scattered diseases, and sixteen and one-half children from tuberculosis of the bovine infection.

Dr. J. A. Egan, secretary of the Illinois State Board of Health, in the monthly bulletin, March, 1908, has the following to say upon this subject (Record, pages 3706-3707): "The practical evidence is that which shows us the prevalence of tuberculosis among children during the milk drinking period—at a time when we may hope to see some connection between the disease and the infected milk ingested. During 1907, when there were 7,112 deaths from tuberculosis in Illinois, there were but twenty of these deaths attributable to abdominal tuberculosis in infants under 1 year of age, and but twenty-five in children between the ages of 1 and 5 years. That is to say, with 7,112 deaths from tuberculosis, there were but forty-five deaths from abdominal tuberculosis during the milk-drinking age, and yet it is safe to assume that practically all of the children in the State who reach the fifth year of age, must subsist to a greater or less extent upon cows' milk, while many have been dependent upon it as their sole food from birth. This exceedingly small percentage of deaths from abdominal tuberculosis during the first five years of life becomes the more surprising when we consider the facts that (1) 40 to 60 per cent of all milk-producing cows are tuberculous; (2) that bovine tubercle bacilli are alleged by Dr. Schroeder and others to be far more virulent than human tubercle bacilli; (3) the certainty that some cases of intestinal tuberculosis in the child are caused by swallowing sputum after being infected through inspiration, as pointed out by Bovaird and Francine; and what is more significant (4) that the digestive organs of the infant are of such delicate texture that they tolerate only with difficulty the most easily assimilable of all liquid foods.

"The very general infection of milch cows, the unusual delicacy of the infantile digestive organs, the numerous possible means of infection of the digestive tract of the infant, all considered with the extreme rarity of abdominal tuberculosis in infancy and early childhood, constitutes a group of facts upon which we may well spend considerable thought and attention."

Dr. Vanderslice, president of the Milk Commission of the Chicago Medical Society (Record, page 3632), said: "I believe that the tuberculin test does show tuberculosis, but, on the other hand, we must remember that we do not know all there is about what that means. Now, if you will go into the city of Vienna, you will find that every adult reacts to tuberculosis, Vienna is preëminently a tubercular city. It is in a limestone valley. Now, that does not mean that any very considerable proportion of that population is in a condition dangerous or a menace to other members of the population. And so with the reacting animal; it simply shows that there is a nidus of tuberculosis within the animal, that the animal may have had a local tubercular infection which has become encysted, that may remain without any spreading for,—until the death of the animal. In *post-mortem* work at the county hospital, we find many evidences of old tuberculosis in patients dying of other diseases."

Dr. Tice of the Milk Commission of the Chicago Medical Society says (Record, page 3636): "Dr. Vanderslice referred to the tuberculin reactions in Vienna. Here we have done a large number. We find that practically every one of us will react to tuberculin, but that doesn't mean that we have tuberculosis, that is an active one or it doesn't mean that we have a tuberculosis that is dangerous. The same thing, I am positive, holds true in cattle, that a herd tested with the tuberculin, a certain number gives a positive reaction. Those animals are slaughtered and only in the report, or in one of the papers at the meeting on Tuesday a report was concerned with some *post-mortem* findings, and at the *post-mortem* they had to search and search for a small localized focus, one that it would seem in my opinion could have had nothing to do whatever with the general health of that case and certainly nothing to do so far as we can determine with the quality of that milk. It would seem that our knowledge of human tuberculosis may be applied to the bovine; that it is not advisable, it would seem, to institute a general tuberculin test, a compulsory test and then to slaughter all the animals reacting, because it doesn't mean that there is a tuberculosis that is going to, in any way, injure the quality of the milk, and particularly with the conditions that exist among the dairymen at the present time. In the human tuberculosis when we meet a tuberculin reaction we take it only as a corroborative evidence and then determine—there are conditions upon examination—and really confirm the tuberculin examination by our physical examination, and that, I believe, is just as true in bovine tuberculosis as it is in human."

(Record, page 3638) "A large part of the human race, so far as we know, have some infection of tuberculosis at some time during their lives. Clinically we find that. If we make systematic tuberculin tests on individuals not coming to us for tuberculosis at all, they give a positive reaction; and then our *post-mortems* at the county hospital, if we follow them, we find that in approximately 98 and 99 per cent, or, we may say, in round figures, practically everybody will reveal a tuberculosis, but such a tuberculosis that has had nothing to do with the fatal termination."

(Record, page 3640) "The danger to human beings from being infected with tuberculosis as it may be carried from the bovine through the milk, I think it is very much over-estimated, for the reason that we believe that a considerable number of organisms must be introduced. For instance, when an organism or a number of organisms, tubercle bacilli, are introduced into the gastro-intestinal tract, they first must enter the stomach; and it has been estimated that about nine-tenths are destroyed or at least so injured in the gastric contents as to produce no further trouble. That leaves then a remainder of only one-tenth approximately, and a large proportion of that remainder passes on through the intestinal tract and escapes without ever producing any further harm, and only a small amount, even after repeated doses or amounts of tubercle bacilli are even absorbed and actually enter into the organism, into the body."

Tables of vital statistics in thirty-four cities of over 5,000 population in the State of Illinois have a bearing upon this question, compared with the vital statistics of the same time in the city of Chicago (Record, page 3731) including the year 1907:

	Total deaths.	Tuberculosis all forms.	Infantile Enteritis.
Chicago	32,113	4,030	2,495
34 cities, Illinois, over 5,000 population	11,049	1,208	470

These tables show that in thirty-four cities in the State of Illinois having over a population of five thousand each, not including Chicago, in 1907, the total number of deaths was 34½ per cent of the total number of deaths in the city of Chicago. The total number of deaths from tuberculosis in all forms in the thirty-four cities outside of Chicago was only 30 per cent of the total number of deaths from tuberculosis of all forms in the city of Chicago. In other words, tuberculosis of all forms was 15 per cent higher in the city of Chicago than in the cities outside, taking the total number of deaths as a basis in the thirty-four cities outside of Chicago, while the total death rate was 34½ per cent of the total number of deaths in the city of Chicago. Deaths from infantile enteritis in the thirty-four cities outside of Chicago was only 19 per cent of the number of deaths from the same cause in the city of Chicago during the same time. In other words, infantile enteritis in the city of Chicago was 83 per cent higher compared with the total death rate to deaths from the same cause in the thirty-four cities outside of Chicago during 1907. To be more explicit, we have a total death rate in the city of Chicago and in thirty-four cities outside. It is shown by these figures that, based upon the total death rate, tuberculosis prevails in the city of Chicago 15 per cent higher than it prevails in other parts of the State. These tables show that infantile enteritis prevails in the city of Chicago 83 per cent higher than it prevails in other parts of the State.

The population of the city of Chicago consumes less than four-fifths of a pint of milk per capita per day. It would require no proof or argument probably to establish that milk was consumed much more extensively in the smaller cities than in the city of Chicago. If milk infection was a moving cause of tuberculosis to any appreciable degree, the records would doubtless indicate a higher death rate from tuberculosis outside of Chicago than it indicates in the city. The records do not so show. The records do show a very high death rate in the city of Chicago and almost double that in the country from infantile enteritis not connected in any way with tuberculosis. And if milk is the cause of this disease, or impure milk aggravates it, it would seem to be a strong argument that milk in its transportation, handling and care after it leaves the farm, as well as the sanitary conditions around which it is produced, should be looked to more carefully and systematically, if any considerable number of infantile deaths are to be prevented.

The records show that Illinois has 1,000,232 dairy cows of a valuation-around fifty millions of dollars; that the establishment of the

tuberculin test among these herds for the purpose of eradicating the disease of tuberculosis would largely destroy the herds, and during the seven years required to clean up the herds, if it were possible to do so, would be a property loss to the State of Illinois of fully fifty millions of dollars. Conservatively estimated, if the figures of Dr. Reynolds of Minnesota are anywhere near accurate, there is not at the present time dairy cattle in existence that could be gotten to fill their places, and the herds could not in that number of years be completed from themselves.

To establish the mandatory tuberculin test among this number of animals would be ruinous, not only to the farmer and dairyman who own the herds, but it would bankrupt the State of Illinois, if the State should attempt to pay any considerable portion of the expense of the losses of disinfection and of testing, that would be required to carry out this work.

The appropriation of one hundred and fifty thousand dollars to undertake the work of tuberculin testing or to aid and assist in optional testing would be of no benefit whatever to the dairymen, to the State, or to the consumer, and would amount to no more than a surface ripple caused by a pebble tossed into Lake Michigan. It would create here and there slight and insignificant vacuums. If the test were efficient, they would simply be filled with more diseased cattle as is fully shown by the tests at the Sedgeley farm in DuPage county. Other means and measures are at hand, that will allay the danger from tuberculosis and hasten its ultimate extinction, which one hundred and fifty thousand dollars would go far to carry out; but contributed to optional testing of herds would be simply thrown away.

Some suggest securing the tuberculin from the government, while the evidence shows that all of the tuberculin furnished by the United States government, throughout the entire United States, has not gone above 259,000 injections per annum, and it would require plants to manufacture this article by the government of the United States, if such program was carried out, that would shortly rival the Standard Oil Company, and we should be required to cultivate and grow the human tubercle bacillus with which to manufacture tuberculin. It would be ruinous. It is impracticable and a dream, that, when it is fully understood by sane people, will not be considered for a moment, and if it were practicable, while the work was going on even to any very great extent, further than it is being carried on today, it would make a shortage of dairy cows and a shortage and famine in the supply of milk, and very largely increase the price of milk beyond the means of the poorer classes, so that among those classes shortly milk would cease to be an articles of food.

It may be that bovine tuberculosis passes through the milk from the cow to the consumer of milk. Your committee will find that it does and that quite likely and probably it has caused human tuberculosis to the extent hereinbefore set out,—sixteen and one-half cases in the city of Chicago during the year 1906,—twenty-six cases in New York City during one year, and so generally throughout the large cities. It is

remarkable in this connection that we do not find and there are no vital statistics to indicate any such cases in the agricultural districts. There are some people that insist that if by any probability among ten thousand cases even one case can be traced to infection through the milk, then that the entire cattle kind should be condemned until they can prove their innocence.

The Commissioner of Health of the city of Chicago has made the rule that until dairy cows could free themselves from the suspicion that was held against them, their milk should not be used as food. As well might one, by the wave of his hand, order Lake Michigan to give up and destroy any germs of disease that may come through its waters to the consuming public; street cars in the city of Chicago destroy many times more of humanity, than does bovine tuberculosis, and yet society will use and maintain street cars for its common and necessary good. Many articles of consumption, out of whim and caprice, are bartered at the stores and consumed by the people, unnecessarily, uselessly and frivolously, that aid and assist in destroying annually 2,384 of Chicago's infants under two years of age by gastro-enteritis, dysentery and diarrhoea, and yet no public clamour is made, no ordinances are passed and no danger is pointed out through the inspectors or boards of health to the unlearned people.

Tuberculosis is among the human kind, at least, is as old as the Grecian era, and was diagnosed by Hippocrates, the Grecian Father of Medicine; and Aretaeus, a Grecian physician, in discussing the treatment of consumption strongly recommends milk: "It is pleasant to take and is more familiar than any other food to one from a child. In color it is pleasant to see, as a medicine it seems to lubricate the wind-pipe, to clean, as with a feather, the bronchi and to bring off the phlegm, improve the breathing and facilitate the discharges downward. To ulcers it is a sweet medicine. If one then will only drink plenty of this (milk), he will not stand in need of anything else, for it is a good thing, that in a disease, milk should prove both food and medicine." (Inter. Cong. Vol. 8, page 110.)

Your committee find that there is no necessity of adopting the tuberculin test in the State of Illinois.

Your committee further say, that the germ of tuberculosis, the tubercle bacillus, may come from a cow afflicted with tuberculosis, through her milk, and infect a human being, but not to such an extent, or not in any sufficient number of cases, to render the tuberculin testing of dairy cattle either necessary or essential.

Before closing Part II, we desire to submit certain matters which we were not particularly instructed to investigate, but which grow out of the general subject of investigation.

THE BANG SYSTEM.

Dr. Bernard Bang, of Copenhagen, undertook the work of eradicating tuberculosis among the dairy herds of Denmark. The cattle were tuberculin tested, but *post-mortem* examinations proved that most of the reacting animals were only slightly affected. In many cases only small

caseous-calcareous deposits were found in a few of the lymphatic glands, processes that no doubt often remained unchanged for years or are even sometimes cured. According to Bang, there was no reason to kill milch-cows that did not show clinical signs of tuberculosis, but only reaction to tuberculin. The plan was proposed and carried out of isolating all reacting animals, placing them by themselves, dividing and partitioning barns, where it was necessary to keep them upon the same farm, so that the two parts of the barn were isolated and detached from the others and the cattle run in separate pastures or lots. This method has proven very satisfactory in Denmark, and after a great many years of carrying it out, the herds have been cleaned up and tuberculosis practically eradicated. This subject has been considered, studied and written about by Americans and in Canada. In Belgium the tuberculin test was first tried. The state allowed 50 per cent of the market value for the condemned animals, but the losses from this source were so great, that they amounted in the course of a few years, to fifteen million francs, and with hardly any beneficial results. The failure can be attributed to the difficulty which lies in the execution of the Bang system, as the stock-owners are usually careless in the execution of this system. At the present time, it is the aim in Belgium to control tuberculosis of cattle by an improved method, namely, first, to discover all tuberculous animals; second, to destroy the highly infected cases; and, third, immunization. Everything points toward better results from this latter method. (Inter. Cong. Vol. 6, page 522.)

In Pennsylvania, Dr. Lewis A. Kline, V. M. D., of Harrisburg, Pa., says (Inter. Cong., vol. 6, page 549): "The owner has the choice of two methods of disposing of the tuberculous cattle; those not showing physical symptoms can be kept in quarantine under the Bang system, or all of the tuberculous cattle can be slaughtered. Professor Bang's method of repressing tuberculosis has not proved very popular in Pennsylvania. It has been adopted only in very few instances. The reasons appear to be the restricted market for the heated milk and extra work involved in maintaining two separate herds."

Professor Jesse E. Pope of East Orange, N. J., says, (Inter. Cong., vol. 6, page 575): "When first introduced, the Bang method seems to satisfy the farmer, but it soon loses favor with him. It involves much trouble and expense and the farmer receives no financial aid from the state. The necessity of pasteurizing the milk from re-acting cows may mean heavy loss to the dairy farmer, because, under present conditions, pasteurized milk cannot be sold at all, or must be disposed of at a lower price than that of raw milk, although its cost of production is greater; indeed, it is exceedingly doubtful that pasteurized milk from cows known to be tubercular, can ever find a market. Few dairy farmers are in the position to maintain a double equipment; the persistent carrying out of the regulations necessary to prevent infection of the well part of the herd and in general the building up of a sound herd by this method involves trouble and expense which will not pay except in the case of fine milking strains. What has

been said of the dairy farmer applies with even greater force to the general farmer, whose system of farm management makes the application of this method impracticable."

Dr. D. Arthur Hughes, inspector, subsistence department, United States army, Chicago, (Inter. Cong., vol. 6, page 957), says:

"It is comparatively easy in small countries like Denmark or Holland to deal with an infection like tuberculosis. But when we are reminded that the United States has an extent of territory apparently equal to that of the whole of Europe, the truth is made graphic, that extent of territory is the first great difficulty with which we have to contend. Again, in the United States are found the most varied agricultural conditions, vast herds bred for every purpose and numbering many millions of animals, rapid transit of animals, an enormous interstate and export animal industry. Furthermore, the country is new and unsettled conditions prevail. There are still millions of acres unsettled, open ranges of private ownership, state owned or owned by the nation; places in many states where the cattle, privately owned, are stabled or corraled part of the year, and run at large other parts of the year. There is an intermixing of animals of all sorts, regardless of means or possibilities of infection."

Dr. J. G. Rutherford of Ottawa, Canada, head of the Bureau of Animal Industry in that country, says, (Inter. Cong., vol. 6, page 874): "I have nothing to say against the Bang system itself; in fact, I am and always have been one of its most consistent advocates and admirers. I cannot, however, after thirty years' experience as a veterinarian on this continent and with the knowledge acquired in that time of conditions on the ordinary North American farm, bring myself to believe that it is capable of successful general application on this continent."

There is grave doubt whether the Bang system could be carried out in the dairy districts of northern Illinois to any sufficient extent as to make it practicable without revolutionizing the industry, as it is now carried on; and it is quite likely, if an attempt were made to put it into practical operation, it would meet with such opposition either from natural causes or otherwise as would result in its defeat.

SANATORIUMS.

Dr. Woods Hutchinson of New York City points out as one of the great needs for the further growth of knowledge in regard to tuberculosis in children the following (Inter. Cong., Vol. 3, page 417): "The establishment of sanatoriums or camps for the reception and treatment of children suffering from pulmonary tuberculosis. At present these are practically non-existent. Neither our treatment nor our knowledge of the disease can hope to become effective and adequate unless we have an opportunity of studying large numbers of cases together, under conditions suitable for adequate control and observation. The value of the sanatorium as a means of increasing our knowledge of tuberculosis has been even greater than its curative influence.

"Lastly, that the field in which the decisive battle of our future campaign against tuberculosis must be fought is the home; our chief enemy, infection in early childhood; our heaviest gun and our most crying need, camps, '*preventoria*,' for the reception and cure of infected children before they have become unmistakably tuberculous." (Page 421.)

Dr. W. H. Sanders, health officer of Alabama, says (Inter. Cong., Vol. 5, page 480): "Each state must build, equip and maintain at least one sanatorium for the treatment of incipient or curable cases of the disease. Such an institution should be maintained more as an object lesson and educational center for the counties and municipalities than for the purpose of providing for all of the curable cases in the state, as manifestly this would be impracticable.

"Each county should provide two sanatoriums for its own people, one for incipient or curable cases, the other for advanced or incurable cases. In sparsely settled sections two or more counties might combine in establishing and maintaining the same sanatoriums."

Dr. Huber quotes Dr. W. H. Thomas of Chicago, who estimates that the cost of tuberculosis in the State of Illinois amounts to thirty-seven million dollars annually; and the Ohio State Commission estimates the loss in Ohio at seven million dollars annually. (Inter. Cong., Vol. 4, page 17.)

The State of Illinois in 1909 by two separate acts authorized the city council of cities and board of trustees of villages of this State to levy a tax not to exceed one mill on the dollar annually on all taxable property of such city or village, to establish and maintain a public sanatorium for the use and benefit of the inhabitants of such city or village for the treatment and care of persons afflicted with tuberculosis; and by the other act, counties were given power to purchase and hold real estate, upon which may be erected and maintained by the county a sanatorium for the care and treatment of the residents of the county who may be afflicted with tuberculosis; and to purchase, hold and use all necessary personal property for the proper care and maintenance of such real estate and sanatorium.

Your committee is not advised as to what extent the provision of these laws have been made use of by the various cities and counties in the State, but it would strongly recommend that the State of Illinois make an appropriation at the coming or present session of the Legislature to provide for one or two camps or sanatoriums in the State of Illinois for the treatment, care and cure of persons afflicted with tuberculosis.

CERTIFIED MILK.

Certified milk is a milk produced under a contract made between producers and the Milk Commission of the Chicago Medical Society, or various medical societies as they may exist in different cities. The Milk Commission of the Chicago Medical Society has been in existence about three years. It is not incorporated, but a voluntary association. It consists of six members and the president of the Chicago Medical

Society, *ex officio*, making seven members. Its purpose is the certification of milk of certain standards and produced under certain conditions. Those conditions are embodied in a contract submitted and made a part of our record. (Record, pages 3661 to 3666). The commission inspects the farm, the condition of the cattle, the method of producing the milk, examines the milk as delivered to the consumer, as to its bacterial count and as to its chemical composition, and grants a certificate to the dairyman asking for such certification, who must live up to the contract. Under the contract the cows must be tuberculin tested at least once a year, the barns must afford certain ventilation, the floors must be cemented, the milkmen wear white duck suits in their work about the cows, and certain regulations as to cleanliness are observed upon the cows.

The Chicago Milk Commission is now certifying the milk of five dairies having approximately 500 cows, producing 1,240 gallons of milk per day. This milk is sold at retail in the city of Chicago at 15 cents per quart. The dairyman receives, net, 6 cents per quart for the milk at the farm, and in addition there must be added to arrive at the net cost of this milk in the city of Chicago the cost of certification, inspection, the tuberculin test and the carrying out of the sanitary rules in the contract and the cost of transportation. A fair profit is made upon this milk at the present time at 15 cents per quart. With a sufficient amount of milk under contract, the cost of certification could be made to include the cost of inspection at practically 1 cent per quart. This would include also the cost of making bacterial counts.

Dr. Vanderslice is very positive in his evidence that, if the market for such milk could be increased so that the same could be delivered in larger amounts to the extent that it became an integral part of the supply of the city, as one-fourth or one-fifth, that the milk could be sold at retail at from 10 to 12 cents per quart. The price of market milk in the city of Chicago at the present time is 8 cents per quart.

There are other milks being sold in the city of Chicago as certified milk, but what the basis of the certification is, your committee are not able to state. They are not certified by the Medical Society of Cook County or the city of Chicago, nor by the city or county government in any way.

The evidence tends to show (Vanderslice) that the only practical way to have a special grade of certified milk as contemplated by the contract is to place the certification of the same in the hands of the local medical association and not in the hands of a State board, or as a function of the State or city government. It is to be noted in this connection that one of the herds under contract with the Milk Commission of the Chicago Medical Society, the Sedgeley farm, Hinsdale, Ill., E. M. Barton, proprietor (Record, page 3610), is the farm mentioned in this report where about the first of December 10 per cent of the dairy cows reacted to the tuberculin test.

A grade of certified milk either should be furnished or should not be given legal sanction. If not given legal sanction, a law should be passed compelling every dealer selling what purports to be certified

milk to mark the bottle or receptacle plainly in a certain number of words, as to what is the basis of the certification. We believe from our investigation that the Milk Commission of the Chicago Medical Society are sincerely and honestly attempting to furnish a high grade of milk with an eminent amount of intelligence and understanding upon this subject. They are part and parcel of the Medical Society of Cook County. They should be protected in their work, and, if it is not wise for the State by law to establish different grades of milk and provide for the inspection, the State should at least by law penalize the indiscriminate labeling of milk as certified milk.

THE CHICAGO ORDINANCES.

These ordinances were passed in July, 1908. They provide in effect that no milk should be sold in the city of Chicago,—that no butter or cheese shall be sold or kept on hand for sale,—except the milk sold, or milk from which the butter and cheese are manufactured, is produced from cows tested with the tuberculin test, and shown to be free from the disease. The ordinance further provides as to butter, that it shall be unlawful to sell any butter in the city of Chicago, unless it be stamped on the package in plainly legible letters of not less than one-eighth inch type, “made of milk or cream from cows free from tuberculosis as shown by the tuberculin test, or made from milk,—or cream,—pasteurized according to the rules and regulations of the department of health of the city of Chicago.” These ordinances further provide that for five years from their date, in lieu of the animal being tuberculin tested, the milk may be pasteurized but the pasteurization in these ordinances is made merely temporary and the effect of the ordinance is that all dairy cows, from which milk, butter or cheese, may be sold in the city of Chicago, must be tested by the tuberculin test on or before the first day of January, 1914.

These ordinances have caused a great disturbance and more or less annoyance among the dairy district. There has been no attempt made of any kind to enforce the ordinance as to butter, and, we presume as to cheese also. We have made no special investigation upon the subject of cheese. Your committee have personally investigated the subject of butter in the city of Chicago, and we find upon interviewing a great many of the large dealers in butter on South Water Street, whose names we withhold, that no butter sold by any of said firms is stamped on any package or tub handled by them according to the rules and regulations of the Department of Health of the city of Chicago; and every firm interviewed upon the subject expressed surprise to learn that such an ordinance was in existence.

Your committee has further purchased a great many samples of butter at local stores in the city of Chicago recently, in various parts of the city, and submit in our record and attach hereto a few of the labels that were around the packages. (Record, pages 4913 to 4918). And nowhere in the city of Chicago, after a diligent search, is your committee able to purchase a package of butter bearing the stamp as provided in said ordinance.

The cows in the dairy district that have been tested by the tuberculin test, it has been a voluntary test, not under the form of law, not in pursuance of any legal or valid enactment that would render the veterinarian or the dairyman liable for making a false test; nor an insufficient test; nor an uncertain test, and it amounts to simply, that certain tests are represented to have been made and certain schedules or sheets have been furnished by someone, a veterinarian or otherwise, the integrity of which your committee are not presuming to criticise, but the interpretation of which may be good or bad. It is not protected by a federal or state law; in other words, if a false test has been made or a misrepresentation by any dairyman as to a test, there is no remedy either by the city of Chicago or any consumer of milk.

Going back to the question of butter, it is true and as shown by the evidence of the Commissioner of Health of the city of Chicago, Dr. W. A. Evans, that a large amount of the butter on the market in the city of Chicago, and sold to the consumer, is shipped from the states of Wisconsin, Iowa, Minnesota, Dakota and Nebraska; and in fact, the labels submitted (*supra*) show some from Beatrice, Nebraska. It goes without discussion that the city of Chicago by legislation will not be able to regulate the dairies manufacturing butter throughout the north-western states, and they will not attempt it, not even in the State of Illinois. And the only purpose of the ordinances, in regard to butter and in regard to cheese, was that by the passage of these ordinances, the other ordinance in regard to milk could not be held to be class legislation as including only a part of dairy products.

That there is equal and greater danger from the consumption of butter carrying tuberculosis germs, than there is in consuming milk, we quote Dr. E. C. Schroeder, Superintendent of the Experiment Station, Bureau of Animal Industry, United States Government, (Record, page 4191.) "An investigation is now in progress at this station to determine the frequency with which market or commercial butter contains tubercle bacilli. The work has only gone far enough to show that some of the butter sold by dealers is very badly infected. If we take the figures supplied by European investigators of the relative frequency with which butter and milk contain tubercle bacilli, we may conclude that butter is more frequently infected than milk; in fact, we may say that butter contains tubercle bacilli in sufficient number for their detection thirteen times for every ten times they can be found in milk."

There are in the dairy districts sending milk to the city of Chicago 120,000 cows from 12,000 farms producing 30,000 cans of milk per day. Dr. Koehler, Assistant Commissioner of Health, testifies, (Record, page 1193) that if pasteurization was eliminated, and all cows tuberculin tested, so that no tubercle bacilli passed through the milk, it would only eliminate 4 to 5 per cent of the disease germs or of the unhealthfulness in milk, and that "with all of the cows tested with tuberculin," you would still have 95 per cent of the "various disease germs carried through the milk, still in the milk;" that "milk contains and may carry the typhoid bacilli, diphtheria, the colon bacilli, streptococci, staphylo-

cocci, as well as tubercle bacilli, and that 80 per cent and over of deaths among children are caused from diarrhoeal diseases produced by these germs, especially colon bacilli."

It is also shown by the evidence of the Health Department of Chicago that substantially seven-thirtieths of the milk supply of that city is coming from tuberculin tested cows; eighteen-thirtieths of the milk supply is being pasteurized, and that five thousand cans of milk, practically forty thousand gallons are not complying with the ordinances. There have been no prosecutions under these ordinances of any kind; no fines have been imposed; no case carried to a judgment. Dr. Koehler says (Record, page 1101) that the ordinances are not enforced to the full extent because, to use his language, "we find it impossible in many instances to enforce the law immediately. There are many farmers who have not the money or the means to have their cows tested. There are dealers who have not the money or the means to install pasteurizing machinery, but they have all given promises."

We do not in this subject desire in any way to criticise even the passage of the ordinances or their enforcement by the Board of Health of the city of Chicago. We do believe that there has been an advance in the cleanliness of milk in that city during the past few years, brought around to some extent by the work of the Health Department of the city of Chicago. Also materially by the rules and regulations of the large dealers laid down in their contracts as to sanitary conditions upon the farm, which in our judgment, is a greater safe-guard to the milk supply than either the tuberculin testing of cows or the pasteurization of milk. One-sixth of the milk supply in Chicago does not comply with the city ordinances. From Dr. Koehler's evidence it would seem that only a gradual compliance can be enforced, and yet dairymen are notified that their milk, unless the cows are tuberculin tested, by a certain date, will be shut out. A large number of the local dealers in the city of Chicago have refused to comply with the ordinances as to pasteurization and they are not compelled to comply with the same. It has produced, and there still remains a great element of fear on the part of every dairyman, that his milk supply would be shut off from the market at any particular time when the Board of Health of the city of Chicago see fit to black-list him, and it has produced a condition or tended to produce a condition of peonage among the dairymen with which they are not in accord, and a false system of government in the regulation of milk instead of wholesome and remedial rules and regulations with which the dairyman can comply and with which he is in accord, having at least a disinterested third person, as for example, the State of Illinois, to arbitrate his differences with the city of Chicago; and it is the opinion of your committee that at least the question of the tuberculin test is a proper question to be regulated and controlled by the State of Illinois, and not left to the ordinances or rules of any city to establish and maintain.

Your committee would recommend that a law be passed by the State of Illinois preventing and prohibiting any municipality in the State of Illinois from establishing or demanding the tuberculin test of dairy cattle as a means of protecting the milk supply.

PHYSICAL INSPECTION AND SANITARY REGULATIONS.

A great deal of the evidence on this question, while it is to some extent contradicted, yet the preponderance of the evidence tends to show that the physical inspection of dairy cattle and the weeding out of all those that from a physical or clinical examination indicate the existence of the disease or in any way have an udder affection, will largely insure an elimination of the tubercle bacilli in the milk supply.

On this subject, Dr. Claude Morris, Dr. David Bovaird, Dr. E. F. Brush, Dr. Austin Peters, head of the Animal Bureau of the state of Massachusetts, Dr. George Adam of Cambridge, England, and Montreal, Canada, Dr. James Law of Cornell University, Dr. Theobald Smith of Boston, Massachusetts, Dr. Lawrence F. Flick of Philadelphia, Pa., Dr. Henry G. Piffard of New York City, Dr. Bernard Bang of Copenhagen, and Dr. James A. Egan, secretary Illinois State Board of Health, and many other physicians and veterinarians, including the milk commission of the Chicago Medical Society, take the affirmative and insist that the tuberculin testing of all dairy cows and the elimination of those that react to the test is unnecessary, useless and a waste of effort; but that a proper and sufficient physical and clinical examination of dairy cows, and those that indicate any physical appearance from the disease or any affection of the mammary glands or of the udder only need be eliminated.

On the other side of this question, Dr. E. C. Schroeder, Dr. Melvin, Dr. Mohler of the United States Government Bureau of Animal Industry, Dr. Ravenel of Wisconsin, and others, take a contrary view, and favor the elimination of every animal from the dairy herds that reacts to the tuberculin test.

Your committee recommend that the physical examination and inspection of dairy cows be enforced and extended as far as possible, and in accordance with the contracts that are made between the large milk dealers and their patrons as set out in our record; and that only such animals be eliminated from the herd as show, from a physical or clinical inspection and examination, that they are infected with tuberculosis, and in this connection too much cannot be said as to the enforcement of sanitary regulations upon the farms; in the barns, a pure water supply, proper and sufficient ventilation, the icing and cooling of milk. And a law should be passed in the State of Illinois requiring every railroad and transportation company conveying milk to the city of Chicago to furnish refrigerator cars, especially for the conveyance of canned milk, and the milk should be kept at a temperature at least below fifty degrees Fahrenheit from the time it is produced until it is delivered to the consumer.

Sanitary regulations should be carried out upon the farm and equally in a great city. The record is full of facts and circumstances tending to show that tuberculosis goes hand in hand with poverty and want. Its decline during the last fifty years shows the smallest percentages in large cities, and in the tenement districts of such cities. The housing of a great number of people in closely packed tenements

with several human beings living, sleeping, breathing and expectorating in a single room, can spread more tuberculosis among the human race than any other individual cause, and the dust, dirt and commotion of a factory is a fertile spot, among its numerous operatives to carry this disease. Sanitation upon the farm is imperative; it is also imperative in the city of Chicago, and Chicago could do much, not only in the tenement districts and among the factories, but among the milk depots in the city. Many of them are located in dark cellars of the dwelling houses which are merely boarded up at the side, without basements; many are in small milk-houses attached to the barn upon lots twenty-five feet wide and less than one hundred and fifty feet in length, and in these barns horses are kept and about which flies, offal piles and other deficiencies in sanitation are permitted to spread, and in these milk depots, the ceilings are very low and unsanitary. Hot water for washing purposes, washing bottles and cans, is heated generally in the house and carried into the milk room. The floors are generally wet and have quite a bit of stale milk around. The tanks in which the cans are kept are, as a rule, in very poor condition; that is, seldom cleaned, the scum on the sides and on the bottom is at times very thick. The walls and ceiling of the filling room are too frequently bespecked with milk; the bottles are washed in wooden tubs or in ordinary washing tubs used by the women, in water in which you can keep your hand at about 120°; scores of bottles are washed in this same water and then put into another tub where they are rinsed, turned up-side-down and left to drain in racks. The barn is usually about twenty or thirty feet from the milk room; the employes generally use old overalls and jumpers and their hands and finger nails are not in a good clean state. The bottles are filled from the filler and the caps are put on by hand. After the bottles are filled, they are stored away in the ice tank—ice water tank—some of this water seeps through into the milk. They are kept here until taken out on the road. There is no regulation as to sanitary conditions of bottles or sterilization of bottles. Bottles of milk are placed on window ledges, fire-escapes, steps or porches, early in the morning and often are not taken in before they are exposed to the sun's rays. And the enforcement of sanitary regulations in the city of Chicago, in its milk depots, in its cleansing of bottles and cans, and in its delivery of milk, is in its infancy and very much behind the sanitary regulations now maintained on the farm. (Record, pages 3585 to 3603.)

PART III.

PASTEURIZATION.

Upon the subject of pasteurization of milk as commercially pasteurized in various cities and by the city of Chicago at the present

time, we have some evidence and a great deal of literature. This subject is largely a medical subject, a subject for chemical analysis, and for the physicians to decide.

Pasteurization of milk is generally regarded in literature as a temporary means of producing a protected milk supply during some epidemic or particular period during which raw milk cannot be furnished in healthful supply. It is a subject in the opinion of your committee which must be left to the determination of each individual city or board of health to determine and enforce.

There is a great deal said for pasteurization and commercial pasteurization; there is a great deal said against pasteurization and commercial pasteurization. Dr. W. A. Evans, commissioner of health of the city of Chicago (Record, page 1062) testified that a law of the State being passed requiring all milk to be pasteurized and eliminating the question of tuberculin testing, would be practical, after six months were given for preparation; that such a law would be reasonable; "it would make the supply of milk healthful and pure, provided there was proper control of the pasteurization. If there was not proper control of the pasteurization it would probably do more harm than good."

(Record, page 1063) "The cost of installing apparatus for pasteurizing will vary from one hundred and fifty dollars to several thousand dollars. Where the individual equips to pasteurize, he can pasteurize satisfactorily with a total expenditure of about one hundred and fifty dollars. Where companies equip to pasteurize the initial expense will vary according to the preparation that they make for taking care of and preparing quantities of milk. Figures are submitted showing the amount invested in pasteurizers by twenty-five concerns who are furnishing pasteurized milk in the city of Chicago. The cost of pasteurizing milk after the initial expenditure varies some what. As a general rule, the determining cost is the cost of the water supply. That is the largest factor. Another determining factor is the expense of the initial plant. It is more expensive to pasteurize with a plant that was less expensive to begin with. The figures that we have had as to the cost of pasteurizing in the city of Chicago, I have here. We have had figures as low as 1/30 of a cent a gallon; ranging up as high as 85/100 of a cent per gallon for small plants. I have here a list of figures submitted to us by fourteen rather small dealers and the figures on this sheet range from a minimum of 53/100 of a cent to a maximum of 85/100 of a cent per gallon. They include interest on the equipment at five per cent, repairs, labor per year, electricity, coal per year, ice per year, and the cost per gallon. As to the salable qualities of milk from being pasteurized, the fact is that the men who are selling pasteurized milk are the men whose milk business is growing; men in town who are not selling pasteurized milk, are not growing in their business; they are just about holding their own.

"Pasteurized milk will keep about twenty-four hours and maybe forty-eight hours longer than other milk, dependent a little upon how it is done and how it is handled. The quality of the milk is improved,

at least it is not injured. I think I would rather leave it that way. From the standpoint of the consumer the milk supply of Chicago could be protected—made healthful—by pasteurization.”

It is claimed that heating milk to 140° F. and maintaining the heat for twenty minutes will destroy tubercle bacilli and all pathogenic germs. Some authorities insist that the degree of heat must be a little higher than 140 to destroy these germs, and even some authorities insist that they have found tubercle bacilli in milk heated to 175° F. Flash pasteurization is heating the milk to 170 or 175 degrees F. for part of a minute or momentarily, and then in any pasteurization, the milk must be immediately cooled to 45 or 50 degrees F.

It is claimed that lactic acid bacteria in milk are healthful germs in milk and prevent development of unhealthful germs in milk, and that in natural milk the lactic acid germs finally overcome other germs, producing milk souring. It is also claimed that pasteurization does not destroy the putrefactive germs, but that it destroys the lactic acid germs and leaves the putrefactive germs predominant, and that these rapidly multiply and accumulate, and that the milk finally does not sour but maintains its taste and all at once gives way and becomes putrid.

Probably the medical profession is not divided any more upon any great question than upon that of pasteurization. The United States Department of Animal Industry, Bulletin 126, issued November 14, 1910, by A. D. Melvin, Chief of the Bureau, (Record, pages 3819-3873) entitled, “The Bacteriology of Commercially Pasteurized and Raw Market Milk,” has much of information, scientific data, bacteriological counts and tests that uphold and maintain the health department of the city of Chicago; but it is so extended and of such a nature that there would be little gained by our copying from the same.

The State Board of Health of the State of Illinois, in its monthly bulletin under date of December, 1908, submits an article pointing out the danger from pasteurized milk and the pasteurization of the public milk supply. This article states (Record, page 3775): “The commercial pasteurization in which milk is subjected to a temperature slightly below the boiling point for a minute or two or even less time, has been condemned by sanitarians in all parts of the world. Nathan Straus, the founder of the Straus laboratories for milk pasteurization, long ago pronounced the method “a fake and a fraud.” Rosenau, while not entirely condemning the process, is exceedingly faint in its praise. He holds that while the commercial pasteurization of milk leaves much to be desired, and although it is not always thoroughly carried out, it is by no means a fraud. Rosenau naïvely adds: “With a little supervision on the part of the health officers and education on the part of those in charge, the process may be made effective.”

The National Food Magazine in a letter (Record, page 3691) says: “People do not want dead milk and that is what we get in the pasteurized product. The people do want pure, fresh milk that comes from healthful cows and that is handled in a sanitary manner until it reaches the consumer.”

An article is submitted by Dr. E. Mather Sill of New York City, speaking of the use of pasteurized milk in the feeding of thousands of infants subject to his charge in a hospital in New York. This article is very much opposed to pasteurized milk and may have much of value. (Record, pages 3692 to 3699.)

The Copenhagen Milk Commission, a society founded in April, 1878, with the motto "Pure Milk from Healthy Cows," submits an article with reference to their milk which is really in the nature of a certified milk, and also submits both advantages of pasteurization and objections to pasteurization, which may be of interest to the lay and medical world, as follows:

ADVANTAGES OF PASTEURIZATION.

"1. The specific pathogenic bacteria are usually destroyed.

"2. Most of the other bacteria are likewise killed, and the milk therefore keeps better.

"3. Pasteurization necessitates a better method of delivering milk than commonly employed in many places.

"Lactic acid forming bacteria in milk are killed by pasteurizing, while certain harmless bacteria, many bacteria of putrefaction and spore forming bacilli survive; for this reason pasteurized milk seldom sours but gradually putrefies.

"No absolute conclusions can be drawn concerning the effectiveness of pasteurization from the bacterial content of pasteurized milk sold in the retail market, for one does not know the nature of milk before pasteurization, and the length of time the milk has been kept since pasteurization, or the temperature at which it has been kept, and these factors are largely responsible for an abundance of bacteria.

OBJECTIONS TO PASTEURIZATION.

"1. Even by the use of a self-regulating pasteurizer, it is difficult to provide absolute guarantee that all milk has been heated to the required temperature.

"2. Pasteurization incurs expense, therefore the milk costs more.

"3. Pasteurization may conceal a tainted condition which exists before heating.

"Quite an abundance of bacteria of putrefaction and other bacteria may be present, or the lactic acid fermentation may have begun to take place. Lactic acid bacteria are killed by pasteurization, consequently the fermentation and changes that were under way are interrupted.

"Under such circumstances, one cannot tell by appearance or taste of milk that it is damaged and that it contains the products of decomposition of the albumen, or, possibly, even toxic substances.

"On the whole, there is no way at the present time of determining whether or not pasteurized milk was damaged before it was heated, while with respect to raw milk, the keeping quality and bacterial content furnish sufficient evidence regarding the true condition.

"4. The bacteria surviving pasteurization are, for the most part, the quick-growing bacteria of putrefaction which are inhibited in raw milk by the lactic acid bacteria, but in pasteurized milk they multiply very fast and undoubtedly are capable of generating poisonous substances. It has been suggested, therefore, that a pure culture of lactic acid bacteria be added to the milk after pasteurization in order to check the bacteria of putrefaction.

"5. In purchasing pasteurized milk one cannot tell if it be fresh or old from its appearance, if putrefaction has begun or if only a few bacteria are present.

"That this objection to pasteurized milk is valid, is shown by the Copenhagen Health Commissioner in his report, especially for 1899, on the number of bacteria in pasteurized milk as compared with the number in unpasteurized milk.

"It is evident that these figures do not seem to favor pasteurized milk, and the situation is still less favorable if one considers that the bacteria in raw milk are chiefly lactic acid bacteria, while in pasteurized milk the greater part consists of bacteria of putrefaction.

"When we compare the advantages and disadvantages it will be found that there is serious doubt as to whether it is admissible to endeavor to obtain general pasteurization of market milk, as has been suggested by many. A well-organized and well-conducted large milk business may be in a position to carry out pasteurization with safety, and to obtain all the various advantages that result from this process, but undoubtedly it would be necessary for the great majority of establishments to be kept under comprehensive, strict and expensive control by the health authorities, which, even then, could scarcely be effective."

Sterilization has not advantage over pasteurization. (See Jensen's milk hygiene, page 128-140.)

"All these dangers," writes someone in the "Agenposten Journal," "justifies special measures to be taken against the furious clamor for pasteurized milk, and until these precautions are taken, the consumers must be told of these dangers which they are running in drinking milk pasteurized without a control."

The following is an account of the preparation of the milk for infant use, as gone through by the Milk Supply Company of Copenhagen:

"The fresh milk for infants is submitted to the same treatment as the cream; after having passed through the filter and the reservoir of the mixing tubes, it goes into the bottling apparatus, whence it is run into litre flasks. These are corked and sealed, placed into cases covered with ice where they remain until sold. The company, at the request of a large group of physicians, decided more than ten years ago to put on the market as little pasteurized milk as possible to be sold to nurslings. The milk, in these flasks, is delivered to the consumer in four different modifications with water filtered through a Chamberland filter to which a small amount of sugar is added, one part milk, two parts water. One part milk, one part water. Two parts milk, one part water. Three parts milk, one part water. That which is especially prepared for sucklings is pasteurized in flasks manufactured for that purpose. These are heated

for twenty minutes at 85° C. (168° F.) then cooled for twenty minutes and placed on ice. Following pasteurization, the milk is put in covered sheet iron cases and vaporized. This milk, which is kept fresh for at least twenty-four hours, is put on the market in galvanized iron baskets, each basket labeled giving the percentage mixture, also date of pasteurization. Each basket contains the necessary amount for twenty-four hours feeding of an infant. At the beginning of this treatise we made mention of the fact that the company made use of the returned milk and cream for the manufacture of butter. We now add that the buttermilk sold so rapidly that the demand could not always be satisfied. The buttermilk is sold in bottles to a number of people who utilize it as a medicine or as a refreshing drink. On account of its nutritive qualities it has become a delicious beverage." (Record, pages 3806 to 3809.)

We also submit an article upon the commercial pasteurization of milk by B. R. Rickards of Columbus, Ohio, (Record, page 3797-3798) as follows:

SUMMARY.

"1. A large amount of milk is pasteurized in Boston every day. Some of the milk of one contractor is pasteurized in the country and is again pasteurized here.

"2. The amount of milk pasteurized is probably increasing.

"3. Some of this milk is of very high bacterial content.

"4. Bacteria will increase much faster in pasteurized milk than in unpasteurized milk.

"5. The pasteurization of milk affects the microscopic estimate of bacteria and leucocytes."

CONCLUSIONS.

"1. Commercial pasteurization of milk without restriction puts a premium on dirty milk, since dirty and old milk, otherwise unsalable, can then be put on the market.

"2. Pasteurized milk may well mean cooked dirt, cooked dung and cooked bacterial products, and the laboratory is powerless to detect it, unless apparent to the naked eye.

"3. The commercial pasteurization as at present practised in Boston, probably would destroy all disease-producing organisms, with the possible exception of the bacilli of tuberculosis. The latter would probably be killed in the majority of instances. One machine only out of the three tested would be likely always to destroy the latter. The toxins produced by these and by the putrefactive organisms in dirty milk would undoubtedly escape unharmed and in many cases be capable of producing severe intestinal disturbances especially in babies.

"4. A false sense of security is undoubtedly conveyed by the term pasteurized milk. The lack of security may come from either improper pasteurization, the pasteurization of improperly handled milk or improper care of pasteurized milk.

"5. The unrestricted pasteurization of improperly kept, old or dirty milk should be prevented by regulations or ordinances prohibit-

ing the pasteurization of milk containing over a certain specified number of bacteria per cubic centimeter the bacterial limit being set with due regard to local conditions, especially the distance from which the milk comes. Such regulation should, of course, be coupled with a regulation forbidding the sale of milk above the bacterial limit established.

"6. The law should require that milk heated above 140° F. should be marked heated or pasteurized milk. Pasteurized milk should not be sold as fresh milk. The pasteurization of milk in itself is probably not a harmful process, and is, perhaps, to a certain extent, a necessity under modern conditions in large cities, but commercial pasteurization should be carried on only under the most stringent supervision."

We submit numerous series of bacterial counts made by the Department of Health of the city of Chicago, tending to show that the number of bacteria in pasteurized milk is very much less than the number of bacteria in raw milk; all of which, together with evidence and the literature upon the subject of pasteurization, your committee herewith report in its record, with the finding and report that the subject of pasteurization whatever may or may not be the determination and conclusions of the medical world hereafter as to its merits—it is a question that largely is local, pertaining to each individual city or locality and can well be left to local regulation and enforcement until the medical world may, by a majority, at least determine the wholesomeness of such milk.

Respectfully submitted,

EDWARD D. SHURTLEFF,
J. W. ALLISON, M. D.,
C. S. HEARN,
ALEXANDER LANE, M. D.,
S. C. PEMBERTON,
A. J. OLSON,
FRANK W. SHEPHERD,
GUY L. BUSH,
JOHN C. MCKENZIE,
THOS. TIPPITT.

