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DISEASE IN MILK



THE REMEDY  
PASTEURIZATION



THE  
PASTEURIZATION  
OF MILK

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COMPILED  
FOR MY HUSBAND  
AT WHOSE SIDE IT HAS BEEN  
MY PRIVILEGE TO LABOR  
FOR MANY YEARS FOR  
THE SAVING OF  
LIVES

*Lina Luther Straus*



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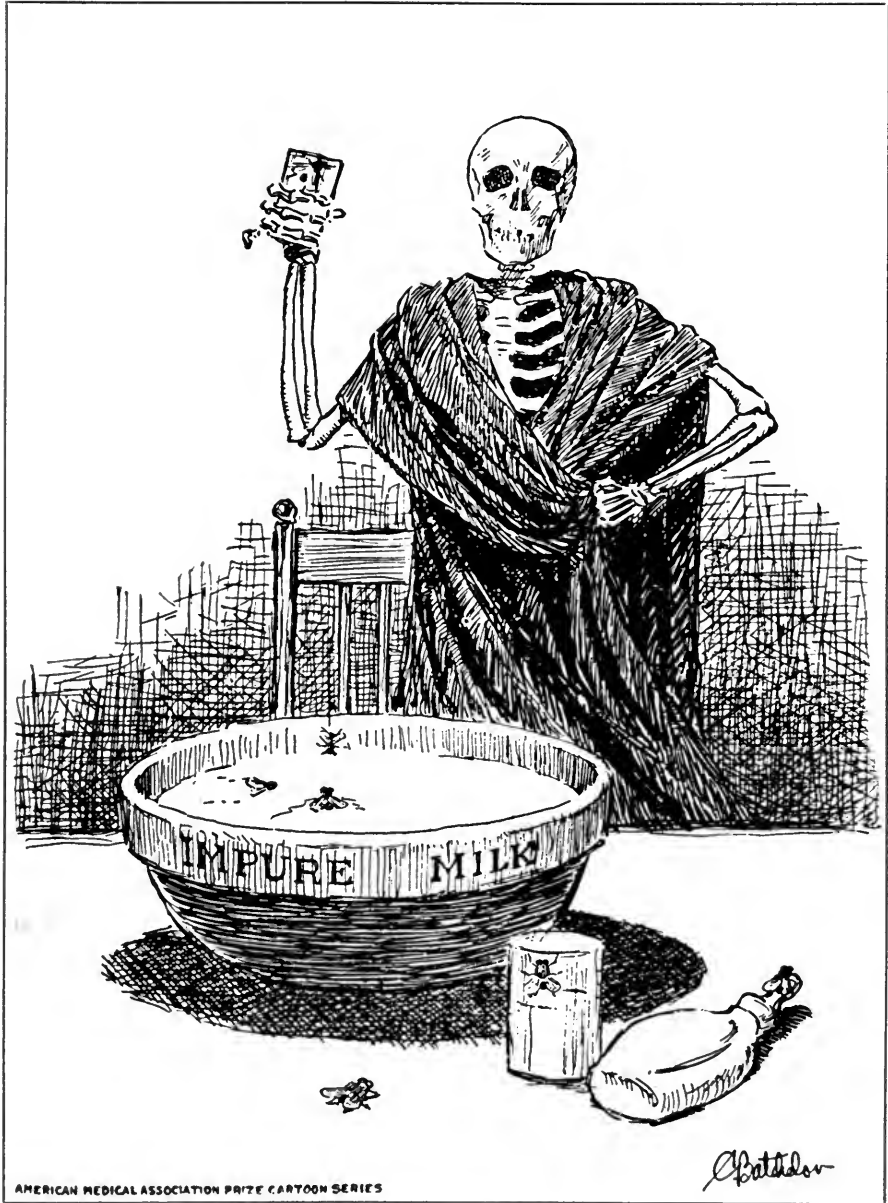
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## FOREWORD.

The presentation to the public of this book has a definite purpose, and is animated by a single hope. In calling the attention of others to the life work of my husband I trust that beneficent spirits may be stimulated to go and do likewise and achieve greater things for humanity. My husband's philanthropic service for the last three decades can in all literalness be said to have been dedicated to the one thought of saving human life. From the time when Mr. Straus made his first gift in the fight against tuberculosis, by presenting a small cottage to the Trudeau Sanitarium in the Adirondacks, nearly thirty years ago, until his recent conception of the idea of a PREVENTORIUM against tuberculosis — all through his consistent and energetic warfare against impure milk and his championship of the PASTEURIZATION OF MILK, the ideal which was the guiding star of his career was PREVENTION. This ideal led him to undertake the extension of his propaganda all over the world. And this ideal called forth from Professor Abraham Jacobi in a letter of June 5, 1895, the following encouraging words: "I trust you will be able to extend the blessings conferred by you still further, not only over the city but outside also. I believe a call over your name will suffice to arouse the humanitarian interest of practical philanthropists in other large communities with the same salutary results obtained by you in New York." May this compilation of the record of my husband's work prove such a "call" in the most comprehensive sense. And the more all co-operate in this divine work of saving life the sooner will be realized the law of universal human brotherhood.



**"I DRINK TO THE GENERAL DEATH OF THE WHOLE TABLE."**  
This cartoon was awarded first prize by the American Medical Association.

## INTRODUCTION.

**C**OW'S milk has always been recognized as a desirable food for adults and an essential one for infants. It is a desirable food for adults because it contains in the highest degree of any food known a perfect balance of proteid, carbohydrates and fat. In addition, it is easily digestible. It is an essential food for infants because sooner or later—sooner with the poor, later with the rich—there comes a time when the mother cannot supply the right quality or quantity of milk for her baby. The ideal way of bringing up a baby until this time is always from the breast; but when this period is reached, whether it is after nine days or nine months, pasteurized milk steps in.

Milk, then, in its pure state, is a most desirable food; but conditions to-day make it almost impossible for the person of average means to obtain such milk. Congestion in population, which prevents cows being pastured near by, makes the cities dependent upon milk sometimes two to three days old. The high cost and the difficulty of securing even at high wages dairy hands of scrupulous care and fidelity exclude the possibility of cleanliness in stable and dairy. The impossibility of efficient supervision of the health and cleanliness of the dairy hands and of the herd causes the constant peril of disease germs in the milk. All these conditions tend to make milk as it comes from the farm to-day an unsafe food. Under present conditions milk as it is brought to the market and to the consumer is full of bacteria more or less dangerous to life.

Every effort should be made to have milk produced in a sanitary way. But that even the best milk obtainable is not suitable for use in a raw state is believed by most physicians. Dr. North of the Commission on National Milk Standards

"It is not possible to overstate the far-reaching importance of the question of the reduction of infant mortality. Every man and every woman of every civilized country should feel a deep and personal interest in it. It affects not only the happiness of the home, but the welfare of the Nation and the future of the race."—From letter from President Taft to the American Association for the Study and Prevention of Infant Mortality, November 9, 1910.

"Of 1,324,660 deaths in the United States in 1909, 280,000 were of babies under one year, and 113,000 of these deaths were from intestinal disorders, due to improper feeding, and from infectious diseases, due often to disease germs conveyed to the babies in the milk."

"Begin the attack upon infant mortality with the prevention of the Diarrhoeal Diseases of Infancy. \* \* \* The prevention of these diseases—which are pre-eminently Filth Diseases—will wipe out one-fourth of the total number of deaths of babies under two years of age."—From pamphlet prepared by the Bureau of the Census, November 9, 1910.

Dr. Sims Woodhead, of the British Royal Commission on Tuberculosis, writes: "Every tuberculous cow is either an actual or potential centre of infection. We cannot get rid of the great White Plague until we take bacilli of bovine origin into consideration."

Dr. Schroeder, of the U. S. Agricultural Experiment Station, says: "Milk is frequently infected with living, virulent tubercle bacilli. There is nothing hypothetical, circumstantial or inferential about this. It is a fact, a plain, experimentally demonstrated fact."

The great German scientist, Prof. von Behring, to whom the world is indebted for the finding of Diphtheria and Tetanus Antitoxin, said: "The milk fed to infants is the chief cause of tuberculosis."

Dr. William H. Park, Director of the Research Laboratory of the New York Health Department, said (Jan. 27, 1912): "More cases of typhoid come from milk than from any other source, and the only actual safety for the consumer lies in pasteurization. Fifty per cent. of the children fed on cows' milk who die from tuberculosis got the disease from the milk."

said on January 12, 1912: "Certified (highest recognized grade of tuberculin-tested milk) does not insure immunity from other diseases of the cow besides tuberculosis, or from diseases (including tuberculosis) which the dairy attendants themselves are likely to convey to milk, which is so sensitive to bacterial influence. Only pasteurization can absolutely guarantee this protection." Prof. W. H. Conn, of the department of biology of Wesleyan University, said: "All we bacteriologists agree that even the best obtainable milk supply is not absolutely safe for babies without pasteurization. For adults the danger is less. Get it as good as you can and use it freely. Pasteurize it if you want to. For my own use I certainly want it pasteurized."

Dr. John F. Anderson, director of the Hygienic Laboratory at Washington, examining 223 samples from the Washington milk supply, after the Agricultural Department had diligently weeded out tuberculous cattle, found 6.72 per cent. contained tubercle bacilli. At the annual meeting of the American Medical Association held in Denver, June, 1911, the Committee on Standard Measures of Procedure for the Control of Bovine Tuberculosis in Relation to the Milk Supply decided: "That milk must come from cattle tested once a year with the tuberculin test, or subjected to careful physical examination every three months, or it must be pasteurized."

Bulletin No. 41 of the Hygienic Laboratory in Washington, "Milk and Its Relation to Public Health," by various authors, quotes in a hundred pages epidemics of diseases which were entirely traceable to milk. Here you will find summarized the essential details of 317 outbreaks of typhoid, 125 of scarlet fever, and 51 of diphtheria, all owing their origin to infected milk, though it is admitted that not all the statistics available from foreign sources have been included.

There then presents itself the necessity of rendering this milk coming from the average farm safe for human consumption. The problem is how to destroy the noxious germs without destroying the milk.

Heating to various degrees has for years been the recognized means of procedure.

The first is boiling. Boiling means raising the milk to an exceedingly high temperature (212°) for a short period. This destroys the pathogenic organisms in the milk, but at the same time impairs its nutritive qualities and renders it difficult of digestion.

The second is pasteurization. Pasteurization gets its name from one of the greatest scientists of this century, Louis Pasteur, of Paris, France. Pasteurization consists in heating the milk to a temperature of from 140 to 157 degrees Fahrenheit and holding it at this temperature for twenty minutes and then rapidly cooling it. *This process destroys the pathogenic organisms quite as fully as boiling without in any way impairing the nutritive qualities in the milk and without tending to make it indigestible.*

Cows' milk pasteurized is then a perfect food for adults; but cows' milk needs something further to make it an ideal food for infants. Their immature organs are capable only of digesting the ingredients in such proportions as they are found in mother's milk. Again science steps in, and by a process called "Modification" makes cows' milk all that baby's system and condition require.

Milk, then, in order to be suited to a baby's needs, must meet with these three requirements: It must be as pure as possible, it must be pasteurized, and it must be properly modified. The Nathan Straus Pasteurized Milk Laboratory solves these problems in the following way:

"The most important thing in the care of infants," said Professor Abraham Jacobi, "is just this, 'Use no raw milk.'"

"I hold in the near future it will be regarded as a piece of criminal neglect to feed young children upon milk that has not been sterilized (pasteurized). Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it special susceptibility to tuberculosis."—Nathan Straus in "The Forum," November, 1894.

The late Dr. Walter Wyman says: "Pasteurization prevents much sickness and saves many lives."

"Virulent tubercle bacilli were found in 17 among 107 specimens, that is, in 16 per cent. of the milk retailed from cans in New York City."—Dr. Alfred Hess, in the Journal of the American Medical Association, March 27, 1909.

"Only one of the many important steps in the universal adoption of pasteurized methods," said Dr. North, "was the award made by the Board of Health last week to the Dairy Demonstration Company to furnish pasteurized milk for the fifty-seven milk depots taken over recently by the city."—January 26, 1912.

“There are often more germs in a drop of milk than in a drop of sewage.”  
—United States Bulletin, p. 421.

Dr. John R. Mohler recommends, as a veterinary authority, “That all milk \* \* \* shall come from \* \* \* tuberculin - tested cattle, which shall be re-tested at least once a year, or be subjected to pasteurization under the supervision of the health department in case the herd is not tuberculin-tested.”

First in regard to the raw milk. Only “Certified Milk” is used. Certified milk is the highest grade of milk obtainable. It is certified by the County Medical Society to contain not more than 10,000 bacteria per cubic centimeter. At first glance this does not seem very pure; but when we consider that only one per cent. of the city’s supply of milk measures up to this standard and that ordinary milk frequently has millions of bacteria per c.c., we realize that certified milk is comparatively pure. This purest milk obtainable is modified and pasteurized in the laboratory, at 348 East 32d Street.



*The following page shows an “Extract from the Sanitary Code and Rules and Regulations Relating to the Sale of Milk.”*



DEPARTMENT OF HEALTH  
CITY OF NEW YORK.

EXTRACT FROM THE SANITARY CODE  
AND RULES AND REGULATIONS RELAT-  
ING TO THE SALE OF MILK. APRIL, 1912.

Sec. 56a. All milk held, kept, offered for sale or sold and delivered in the City of New York shall be so held, kept, offered for sale or sold and delivered under either or any of the following grades or designations and under no other, and in accordance with such rules and regulations as may be adopted by the Board of Health, namely:

Grade A.

1. CERTIFIED—

Certified Milk is milk certified by a milk commission appointed by the Medical Society of the County of New York, or the Medical Society of the County of Kings, or as being produced under the supervision and in conformity with the requirements of that commission as laid down for certified milk. The Commission has fixed upon a maximum of 10,000 bacteria to the c.c.

GUARANTEED—

Guaranteed milk shall not contain more than 30,000 bacteria per c.c. when delivered to the consumer, or at any time prior to such delivery.

2. INSPECTED MILK (RAW)—

The milk shall not contain more than an average of 60,000 bacteria per c.c. when delivered to the consumer, or at any time prior thereto.

3. SELECTED MILK (PASTEURIZED)—

The milk shall not contain more than 50,000 bacteria per c.c. when delivered to the consumer, or at any time after pasteurization.

Grade B: For Adults.

1. SELECTED MILK (RAW)—

The milk shall not contain an excessive number of bacteria when delivered to the consumer, or at any time prior thereto.

2. PASTEURIZED MILK—

No milk containing an excessive number of bacteria shall be pasteurized.

Grade C: For Cooking and Manufacturing Purposes Only.

RAW MILK NOT CONFORMING TO THE REQUIREMENTS  
FOR GRADES A & B.

CONDENSED SKIMMED MILK.

CONDENSED OR CONCENTRATED MILK.

# DESCRIPTION OF PASTEURIZATION AND MODIFICATION.



WORK starts at 10 o'clock P. M. Water is filtered and boiled to scald and sterilize all milk utensils, such as filling machines, milk tanks, modifying cans, pails, etc. The floors of the building are all tiled and the walls are enameled, which makes it possible to steam and flush every part, which is done before the work begins. The windows are kept closed during this process. When it is done they are thrown open both top and bottom to air and cool the room. The tanks are chilled to receive the milk.

Dr. Lederle, Health Commissioner of New York City, says: "No inspection can make milk entirely safe for infants. Compulsory pasteurization and the classification of all milk will enable us really to safeguard the milk supply."

The Second International Congress for the Protection of Infants (Gouttes de Lait), held in Brussels, September, 1907, resolved "That milk for children should be boiled, sterilized, or pasteurized—not to be used in its raw state."

"In pasteurization only, supplemented by conscientious and thorough inspection, will be found a solution of the problem of a pure milk supply."—N. Y. Medical Record.

Dr. Leslie L. Lumsden writes that "to prevent the spread of typhoid infection in the milk supply of cities \* \* \* pasteurization of the milk \* \* \* is the best measure."

Water is now filtered and boiled again, and drawn off in sterile cans, which are placed in large pasteurizers, cooled by chilled water and cold air. This time the water is used for modification, which means the preparing and mixing of the milk with other ingredients to suit the age and condition of the child.

Water is filtered and boiled a third time to prepare barley water and oat water, which are used in modification. The barley and oatmeal are prepared in 20-gallon steam kettles and are boiled for two hours in order to bring them to the desired consistency. They are drawn from the boilers by a faucet through sterile cheese cloth into sterilized cans and kept until used. One man gives his entire attention to these preparations, weighing carefully all ingredients—sugar, barley and oat flour.

The milk arrives at 12 o'clock midnight. The outsides of the cans are all washed off before being placed on the elevator to be taken up to the laboratory floor. As many cans as can be handled at one time are then brought up for modification; the remaining ones are placed in cold storage for use as more milk is needed as the work goes on.

The modification starts immediately. The milk, which must be delivered at a temperature of not more than 40° F., is now poured into one of the tanks on the balcony and through a silver-lined pipe run into a heater which warms it to about blood heat (85° to 90°). The heater is also connected by pipes with a "Separator," which separates the milk into its parts of milk and cream. Then it is re-combined in different proportions for the different formulas. Each formula is now made up in its separate turn on the modification table, where each ingredient is measured and weighed.



**MODIFICATION TABLE.**

Showing how Milk Sugar, Oatmeal, Barley Flour and Cane Sugar are kept, weighed, measured and mixed.

The formulas are made up according to the following prescriptions:

### RECIPES.

Formula by Dr. A. R. Green for  
1st to 4th Week:

$\frac{3}{4}$  ounces of 16% Cream.  
3       "       Full Milk.  
19       "       Water.  
 $1\frac{1}{4}$        "       Lime Water.  
 $1\frac{1}{2}$        "       Milk Sugar.

This mixture fills 8 bottles—each to contain 3 ounces. Feed  $2\frac{1}{2}$  hours apart.

Formula by Prof. R. G. Freeman  
for 1st to 3d Month:

$1\frac{1}{2}$  ounces of 16% Cream.  
3       "       Full Milk.  
13       "       Water.  
 $\frac{1}{2}$        "       Lime Water.  
1       "       Milk Sugar.

This mixture fills 6 bottles—each to contain 3 ounces. Feed 3 hours apart.

Formula by Prof. R. G. Freeman  
for 2d to 6th Month:

18 ounces of Full Milk.  
 $16\frac{1}{2}$        "       Water.  
 $1\frac{1}{2}$        "       Lime Water.  
 $1\frac{1}{2}$        "       Milk Sugar.

This mixture fills 6 bottles—each to contain 6 ounces. Feed 3 hours apart.

Formula by Prof. A. Jacobi for  
3d to 7th Month:

18 ounces of Full Milk.  
18       "       Barley Water.  
1       "       Cane Sugar.  
20 grains of Table Salt (less than  
 $\frac{1}{4}$  teaspoonful).

This mixture fills 6 bottles—each to contain 6 ounces. Feed 3 hours apart.

Formula by Dr. Alfred Hess for  
7th to 9th Month:

30 ounces of Full Milk.  
10       "       Oat or Barley  
              Water.  
 $1\frac{1}{2}$        "       Cane Sugar.  
30 grains of Table Salt (about  $\frac{1}{4}$   
teaspoonful).

This mixture fills 5 bottles—each to contain 8 ounces. Feed 4 hours apart.

After 9th Month:

Full pasteurized Milk, 8 ounces  
every four hours.

To make one quart of Oat or  
Barley Water.—Boil 2 tablespoon-  
fuls of the flour in a quart of  
water until it is reduced to half  
the quantity; then add sufficient  
water to make up the quart.



The cans, which are marked to correspond with the formulas, are now filled with these mixtures, which are poured through strainers and several layers of sterile cheese cloth into the corresponding reservoirs on the balcony. The reservoirs are set in tanks which are cooled by the cold storage system to keep the milk at the low temperature of 40° to 45° while the work is going on. The tanks are connected with silver lined pipes, which run into three, six, eight and sixteen ounce filling machines. These filling machines work automatically and just fill the bottles to the required quantities. There is a truck with the bottles (42 bottles to the crate) at one end of the filling machine, with one man to feed, and on the opposite side another man to receive and place the crates with the filled bottles on the table for corking. The corks are made of china and metal connected by a rubber washer, which closes hermetically through expansion in the process of pasteurization. These rubber washers are frequently replaced by new ones.

"The fight won by Dr. W. A. Evans, formerly Commissioner of Health in Chicago, that all milk not supplied from tuberculin tested cows should be pasteurized is merely another indication of the widespread recognition being given to the importance of pasteurization."

Addressing the Canadian Medical Association, at Ottawa, on Wednesday, June 10, 1908, Dr. Hastings, of Toronto, made the following remarkable statement: "If the truth were known, 15,000 children of the 30,000 who die in Canada annually might justly have the epitaph, 'Poisoned by impure milk,' placed on their grave-stones."



(a) MILK HEATER; (b) SEPARATOR; (c) BOTTLE FILLING MACHINE.

The crates are then placed on trucks, each truck holding nine crates, and are rolled into the pasteurizing ovens, each pasteurizer holding three trucks.

The steam is admitted until the temperature in the pasteurizer reaches 157° F. This temperature is maintained for twenty minutes. Then the bottles are cooled; first by the admission of cold air (to take the greatest heat out of the milk and prevent the bottles from cracking) and then by a spray of very cold water. By this method they are cooled in ten minutes to below 50° F.

When the milk is sufficiently cooled in the bottles the trucks are rolled out and taken down the elevator, and each formula placed in its own ice box, where it is left until delivered to the various stations.

So much emphasis is put on the cooling process as it is just as important as the heating. The low temperature prevents new germs from developing and also preserves the milk in the best condition for a longer time.

This finishes the process of pasteurization and the milk is now ready.

From September 1, 1911, to September 1, 1912, two million two hundred and seven thousand (2,207,000) bottles were thus prepared and dispensed at the various stations.



PASTEURIZING OVENS.

All this work of modifying and pasteurizing is carried on at the laboratory. This building was erected for the work with the advice of the best architects and scientists. The milk is sold at eight depots in Winter and at eighteen depots in Summer. The price is nominal, a mere fraction of the cost of production. This has always been the practice, to avoid pauperizing those who use it. But in the case of those who cannot afford even the small price asked, the milk is dispensed free. The physician in charge of the depots recommends many such cases. Throughout the city physicians, settlement and other charity workers are supplied with free coupons to distribute among their charges. These coupons (as below) are honored at any of the depots.

## NATHAN STRAUS PASTEURIZED MILK.

### WINTER DEPOTS.

104

SERIES 1912

*THIS COUPON IS GOOD AT ANY OF THE FOLLOWING DEPOTS:*

348 E. 32d Street.	54 Market Street.	402 W. 37th Street.
303 E. 111th Street.	322 E. 59th Street.	38 Macdougall Street.
Tompkins Square Park, 7th Street and Avenue A.		
Mount Morris Park, 116th Street near Madison Avenue.		

*AND AT THE FOLLOWING SUMMER STATIONS:*

Battery Park	East 3rd Street Pier
City Hall Park	East 24th Street Pier
Central Park	East 112th Street Pier
Seward Park	West Barrow Street Pier
Educational Alliance	West 50th Street Pier
Roof Garden	

—FOR—

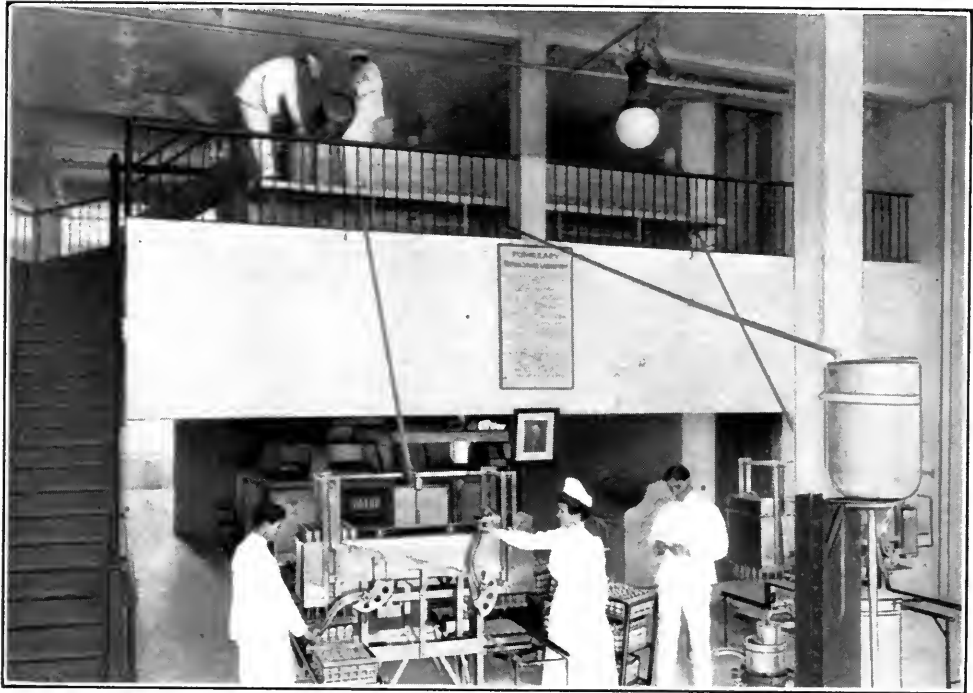
Five 6 oz. bottles, Formula No. 1,	Eight 3 oz. bottles, Formula No. 3,
or Five 6 oz. " " No. 2,	or Eight 3 oz. " " No. 4,
or Two 16 oz. bottles Pasteurized Unmodified Milk.	
or Four 8 oz. bottles Pasteurized Unmodified Milk.	

*Deposit required on bottles from everyone: 3 cents on each 16 oz. bottle; 2 cents on each 6 or 8 oz. bottle; 1 cent on each 3 oz. bottle; 2 cents on each stopper. This deposit is refunded on return of the bottle.*

---

**THIS TICKET IS GOOD FOR ONE DAY'S FEEDING.**

The delivery men arrive at six o'clock in the morning and sort out the orders which have been received from the various stations the evening before. They place the crates on trucks and roll them into automobile delivery wagons. These wagons are built as ice boxes, with ice on top, and have been cooled the night before, so as to be ready to receive the milk. In Summer, in addition to this, chopped ice is put on the tops of crates. In Summer also, ice is supplied to the people who call for milk in order to enable them to keep it cool until they reach their homes.



**BALCONY AND BOTTLE FILLING MACHINES.**  
(Showing pipe connection.)



**BOTTLE WASHING MACHINE.**



## INTERIOR OF STERILIZING OVEN.

(Showing crates with empty bottles.)



On the return trip the drivers bring back all the empty bottles and china corks from the different stations. The bottles are assorted as to size and formula, and washed in a wyandotte solution in an automatic bottle washing machine (see page 14) and rinsed with live steam. After they are washed and sterilized they are taken to a large baking oven (see above) on the pasteurizing floor and left there at a temperature of 200° F. until they are used in the night. The corks are soaked in a solution of soda preparatory to sterilization and baking before being used again. The cans also are washed in a solution of wyandotte and sterilized with live steam before again being used.

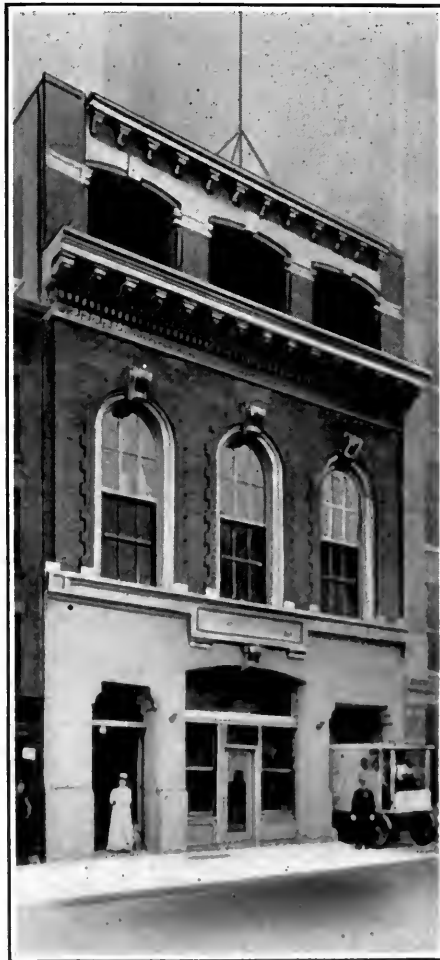




DELIVERY AUTOMOBILE.



The work is carried on at night only; *but the laboratory is open day and night for inspection and for instruction in the method of pasteurization.* Numbers of people from all parts of the United States and Can-



ada, High School classes, trained nurses and others interested in babies' welfare avail themselves of this opportunity until now the Laboratory has become a veritable training school for Milk Pasteurization.



NATHAN STRAUS PASTEURIZED MILK LABORATORY  
348 East 32nd Street, New York.

This Is One of the Recent Weekly Reports Showing the  
Bacteria of the Certified Milk Before and  
After Pasteurization.



**THE MEDICAL SOCIETY OF THE COUNTY OF NEW YORK.**  
**MILK COMMISSION.**

**MEMBERS OF THE MILK COMMISSION.**

CHAIRMAN, E. K. DUNHAM, M.D.  
338 EAST 26TH ST  
SECRETARY, ROWLAND G. FREEMAN M.D.  
211 WEST 57TH ST.  
ELI LONG, M.D.                      W. H. PARK, M.D.  
H. D. CHAPIN, M.D.                WALTER L. CARR, M.D.  
HENRY KOPLIK, M.D.                THOS. S. SOUTHWORTH, M.D.  
A. JACOBI, M.D.                      G. M. SWIFT, M.D.  
W. P. NORTHERUP M.D.              J. E. WINTERS, M.D.

**OFFICE OF INSPECTOR,  
RESEARCH LABORATORY.  
FOOT OF EAST 16TH STREET.**

Mr. Nathan Straus,  
Sir;-

NEW YORK, December 2, 1912

The counts of the raw milk taken at your Laboratory last week for examination are as follows:-

Howell Cans, No. 1-----	100 colonies per cubic centimeter.
2-----	700
3-----	400
4-----	1,400
5-----	300
6-----	2,000
7-----	100
8-----	1,800
9-----	100
10-----	2,200
11-----	400
12-----	200
13-----	3,600
14-----	2,800
15-----	300
16-----	3,000
17-----	1,200
18-----	200
19-----	1,100
20-----	3,000
21-----	300

The counts of the Modified, Pasteurized Milk are as follows:-

Formula No.1-----no growth in 1/100  
2----- 100  
2B---- 100  
3-----no growth in 1/100  
4----- 100  
Whole Milk, 200

*Wm. C. H. Cook*

## MILK DISPENSED BY THE GLASS.

**M**ILK properly pasteurized is supplied by the glass during the Summer at stations in parks and on recreation piers, at a charge of one cent a glass. In this way healthful food, free from any possible infection, is brought within the reach of children who play in these recreation centres, and the eagerness with which they throng the stations to get this milk is evidence of the need for such institutions. Park Commissioners and others interested in making the parks and recreation piers really beneficial to the children agree that there is no way in which the good done by these play centres can be better supplemented than by this provision for supplying wholesome pasteurized milk at a nominal charge.

In addition to the glass milk the pasteurized modified milk in nursing bottles is also dispensed at these stations. As there is provision for heating the bottles the mothers are not compelled to return home at feeding time, but can spend the day in the open with their children.

But it is not only the children and mothers who are cared for by the dispensing of milk by the glass. These depots are also eagerly sought by growing lads and full grown men, who find in a glass of pasteurized milk better refreshment than is afforded by the corner saloon, and at one-fifth of the cost of a glass of beer, or one-tenth the cost of a drink of spirits. In this way this work has had a decided influence in promoting temperance—not by preaching but by the substitution of a nourishing and wholesome drink for that which dulls the brain and undermines the health.

During the past Summer 1,326,100 glasses of pasteurized milk were served at these stations and in the twenty-one years of the work over 17,000,000 gallons of milk was thus dispensed.





INTERIOR OF TOMPKINS SQUARE PARK STATION.



STATION AT 348 EAST 32nd STREET.



**TOMPKINS SQUARE PARK**  
**Milk Booth (South Side) Where Glass Milk Is Dispensed.**



**Milk Station—City Hall Park.**

## PASTEURIZATION AT HOME.

**A**S the number of people supplied with milk at the Straus Laboratory increased it became evident that there were a large number who would be glad to use the pasteurized modified milk, but were too proud to come to the laboratory to obtain it. In addition there is, of course, a large class who can well afford to pasteurize at home—those who do not care to share in the charity of buying milk of the laboratory. For these two classes, then, it was felt that an apparatus for pasteurizing in the home was needed. The apparatus then on the market for this purpose were all of complicated manipulation and most of them heated the milk to a temperature far in excess of that needed to destroy the bacteria. Months of experience were needed to develop the Straus Home Pasteurizer to its present high degree of perfection and to make it what is popularly called "FOOL-PROOF." It was during a prolonged residence in Heidelberg, Baden, Germany, where for some time the pasteurization work was carried on, that experiments were made. They were conducted by inserting a thermometer through the top of the can while pasteurization was going on so that the mercury of the thermometer was in the actual milk in the bottle. The temperature registered on this thermometer was noted every minute for twenty minutes of pasteurization. The proportion of boiling water and cold milk to be pasteurized was exactly determined upon after hundreds of such tests.



The Home Pasteurizer consists essentially of three parts, as shown in the illustration. A can (b), a rack (a) to hold the bottles of milk, and a top for the can (c). The bottles are filled to the neck, the patent corks are snapped on and the bottles are placed in the rack. The rack is then set in the can in such a position as to be supported by three

projections on the inside of the can. The bottoms of the bottles are then some four or six inches above the bottom of the can. Boiling water is then poured into the can until it reaches a certain mark just below the bottoms of the bottles. The cover is then placed on the can and the bottles are left in this position for five minutes to heat them thoroughly through. When five minutes have passed the cover is taken off, the rack is given a half turn so that it is no longer supported by the projections on the inside of the can, and it sinks slowly to the bottom of the can. The cover is then replaced on the can. It is advisable to perform this operation as rapidly as possible. The whole is then allowed to stand for twenty-five minutes. The can is then uncovered, the rack lifted out, the hot water is partially emptied out of the can and cold water is poured in its place. When the bottles are cool enough so that they will not be cracked by contact with ice, ice is added to chill them as thoroughly and quickly as possible.

By this process pasteurization is accomplished with a degree of exactness that is almost unbelievable unless one has seen the experiment performed one's self with the thermometer. For the first five minutes that the bottles rest in the water the milk reaches a temperature of 157° F. The milk then remains at exactly this temperature without variation of more than two degrees for the remaining twenty minutes that the bottles remain in the hot water.

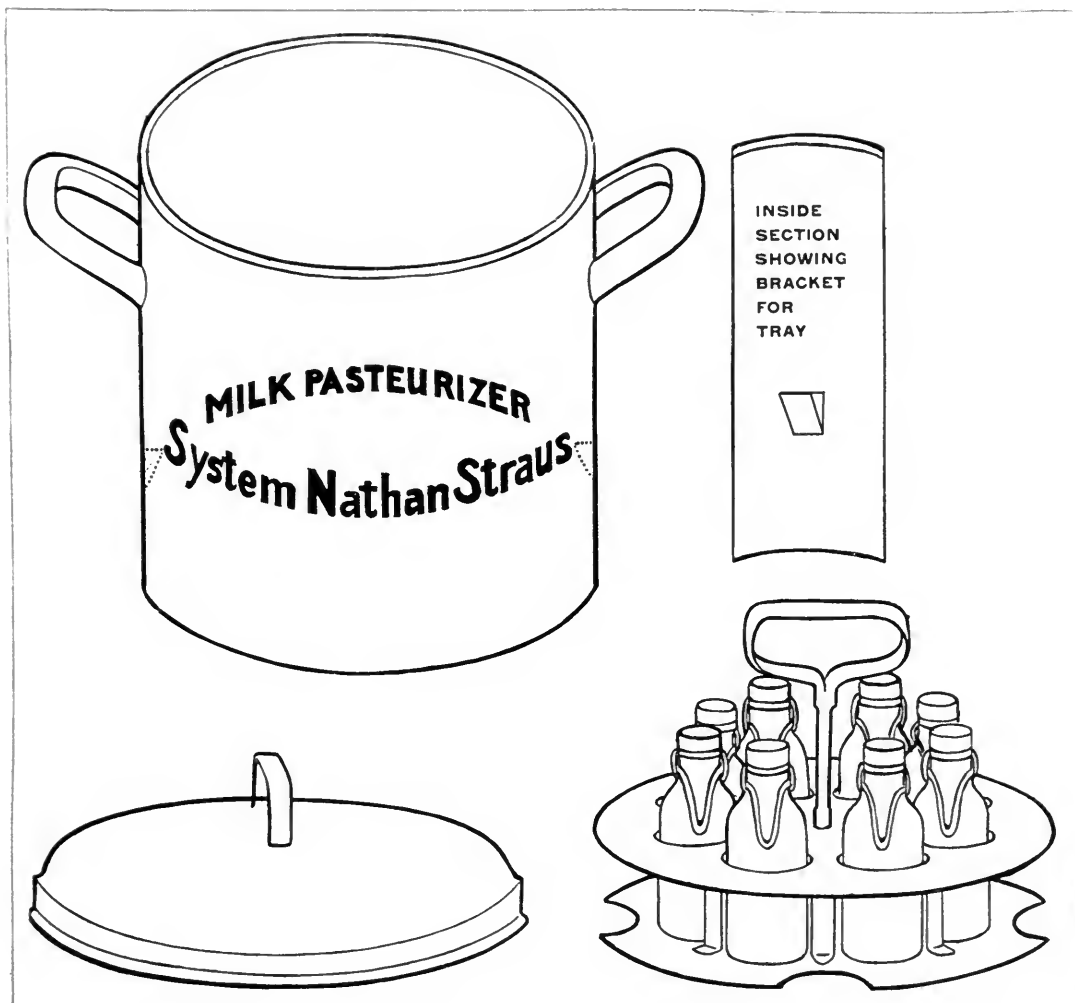
The cost of the Nathan Straus Home Pasteurizer is nominal. It can be obtained at any of the stations with bottles and stoppers complete in any size for \$1.50. In fact, any tinsmith can make it by following the directions for manufacturing which are given at the laboratory free of charge (see cut page 23).

The utility of the Nathan Straus Home Pasteurizer, because of its absolute simplicity, is very wide. In cases of epidemics, where there is dire need for immediate pasteurization of all the milk in nurseries, hospitals, etc., the Home Pasteurizer steps in as a makeshift until a large pasteurizing plant can be installed. As the whole pasteurization process with the Home Pasteurizer takes about forty minutes, it can easily be seen that sufficient milk for dozens of babies can be pasteurized with one fixture in one day.





## Directions For Manufacturing Home Pasteurizer-- System Nathan Straus



	SIZE I Eight 3 oz. Bottles	SIZE II Eight 6 oz. Bottles	SIZE III Six Pint Bottles
Height of Pan . . . . .	10 $\frac{1}{8}$ in.	10 $\frac{1}{8}$ in.	14 $\frac{3}{4}$ in.
Diameter of Pan . . . . .	10 $\frac{1}{8}$ in.	10 $\frac{1}{8}$ in.	10 $\frac{1}{8}$ in.
Distance of Top of Bracket from Bottom of Pan	3 $\frac{7}{16}$ in.	4 $\frac{5}{8}$ in.	6 $\frac{1}{8}$ in.
Amount of Water . . . . .	5 quarts	6 $\frac{3}{4}$ quarts	9 quarts

## MEDICAL ASSISTANCE IN CONNECTION WITH THE MILK DEPOTS.

**A**T the outset it must be said that no important step has ever been taken in connection with the Nathan Straus Pasteurized Milk Laboratory without the advice or approval of the most eminent children's physicians in the country. These physicians have also supplied all the formulas. To carry out further the idea of complete medical supervision a doctor is attached to the laboratory. This experienced children's physician meets the mothers who buy the milk regularly at the various depots. His schedule of hours is so arranged that he is at each of the depots two or three times a week (see page 25). Any mother who wishes to have either directions as to the care and feeding of her child or directions how to treat it in case of illness can obtain this advice gratis from the physician. By attending each one of the stations regularly he is able to keep in constant touch with each baby fed on the Straus milk and to prescribe at what time it is best to change from a formula suitable for a younger child to a formula suited to an older one. The physician keeps a written record of the condition and weight of each child that comes under his care and the progress is noted from time to time.

It is the object of this laboratory to put up such formulas as will meet the needs of nine hundred and ninety-nine out of a thousand babies. In view of the great quantity prepared daily it is impossible to prescribe individually, and the experience has been that one of the formulas usually suits every case. In addition to the oral advice, instructive leaflets in several languages are distributed at each one of the depots (see page 26).

It is always the endeavor of the Nathan Straus Pasteurized Milk Laboratory to secure whatever advice can be obtained both in the preparation of its formulas and in the application of the same to the individual needs of the children. But all this explanation would be incomplete if due credit were not given to Professor Abraham Jacobi, dean of the American medical profession, that greatest of all specialists on infant feeding. To his guidance and to the cordial co-operation and assistance of Dr. Rowland G. Freeman much of the success of pasteurization is due. It has been a long and often bitter fight against ignorance and prejudice. But the light has dawned and exact science and practical experience agree that by pasteurization, and only by pasteurization, can disease germs surely be destroyed and milk made safe to feed to young and old.

"One serious difficulty heretofore has been that we have not understood thoroughly the science of pasteurization. This has been removed and objections to pasteurization with it. Rapidly the opposition to the methods for which Mr. Straus has fought so long is disappearing. It can be safely said **MR. STRAUS HAS WON HIS FIGHT**" (Dr. Charles E. North, Consulting Sanitarian, Member N. Y. Milk Committee, to the Commission on National Milk Standards, Jan. 23, 1912).

## SCHEDULE OF PHYSICIAN'S OFFICE HOURS AT DEPOTS.

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
10 A. M.	303 E. 111th St.	348 E. 32d St.	303 E. 111th St.	348 E. 32d St.	303 E. 111th St.	348 E. 32d St.
10.30 A. M.		Tompkins Sq. Pk.		Tompkins Sq. Pk.		Tompkins Sq. Pk.
11 A. M.	322 E. 59th St.		322 E. 59th St.		322 E. 59th St.	
11.30 A. M.		54 Market St.				54 Market St.
3 P. M.	402 W. 37th St.	Mount Morris Pk.		Mount Morris Pk.	402 W. 37th St.	Mount Morris Pk.
4 P. M.	38 Macdougall St.				38 Macdougall St.	

LEAFLET DISTRIBUTED AT ALL THE STATIONS IN SEVERAL  
LANGUAGES.

*Nathan Straus*

## PASTEURIZED MILK LABORATORIES

Founded 1892

NO. 348 EAST 32d ST., NEW YORK.



### ADVICE TO MOTHERS.

**B**RING the baby to the milk depot and the doctor will decide, according to its age and general health, with which mixture it should be fed.

During the first month give the bottle every three hours, later every four hours. Never any sooner because the baby cries. It does not cry because it is hungry; on the contrary, it probably feels uncomfortable because it has had too much, or because it is soiled, or because it is sleepy.

Wash out each bottle, as soon as the child has finished, with hot water in which some soda has been dissolved, then fill it with clear water. After each nursing wash the nipple and leave it in fresh water.

Let the baby sleep from six to ten hours during the night without a feeding.

If you have no bath tub, give the baby daily a sponge bath from head to foot and dry it carefully with a warm towel. Also wash it off each time you change the diaper.

The diapers must always be washed when soiled or wet; otherwise the baby will get chafed and sore.

Keep the bottles of milk in a cool place and warm each one, just before use, by immersing it, still corked, in hot water. Never pour the milk into another vessel, but let the child nurse from the bottle in which it comes. Do not add anything to the milk.

Shake the bottle, so that the cream or barley water, as the case may be, becomes mixed with the milk.

Then remove the cork, rub off the neck of the bottle with a clean cloth, and put on the freshly washed nipple.

Let the baby nurse slowly—it should take from ten to fifteen minutes for a feeding. Raise the child several times during nursing, so that the gases can escape.

Give the child

During first month—

8 three-ounce bottles a day, 1 every 2½ hours.

From first to third month—

6 three-ounce bottles a day, 1 every 3 hours.

From second to sixth month—

6 six-ounce bottles a day, 1 every 3 hours.

From third to seventh month—

6 six-ounce bottles a day, 1 every 3 hours.

From seventh to ninth month—

5 eight-ounce bottles a day, 1 every 4 hours.

After nine months—

4 eight-ounce bottles pasteurized full milk, 1 every 4 hours.

Do not let the baby have anything but milk.

If baby does not seem perfectly well or does not digest the milk properly, consult a physician at once.

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## DEPOTS.

### OPEN ALL YEAR

348 East 32d Street

54 Market Street

402 West 37th Street

38 Macdougall Street

322 East 59th Street

303 East 111th Street

Tompkins Square Park, 7th Street  
and Avenue A

Mount Morris Park

### OPEN IN SUMMER

Battery Park

City Hall Park

Central Park

Seward Park

Educational Alliance Roof Garden

Recreation Piers

East 3d Street

East 24th Street

East 112th Street

Barrow Street

West 50th Street

Tables compiled from the official statistics of the Department of Health, showing the infantile death rate of the old City of New York, now the Boroughs of Manhattan and the Bronx, in the year preceding the opening of the Nathan Straus Pasteurized Milk Depots, and during the twenty years in which that work has been systematically directed to the saving of infant lives.

POPULATION, DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE YEARS OF AGE PER ANNUM

YEAR	POPULATION	DEATHS	DEATH RATE PER THOUSAND PER ANNUM
1891	188,703	18,224	96.5
1892	194,214	18,684	96.2
1893	199,885	17,865	89.3
1894	205,723	17,558	85.3
1895	212,983	18,221	85.5
1896	217,071	16,907	77.9
1897	221,339	15,395	69.6
1898	225,804	15,591	69.1
1899	230,480	14,391	62.5
1900	235,585	15,648	66.4
1901	242,747	14,809	61.0
1902	250,153	15,019	60.0
1903	257,813	14,402	53.3
1904	265,738	16,137	60.7
1905	273,938	15,287	55.8
1906	282,424	15,534	55.0
1907	291,208	15,645	53.7
1908	301,417	14,910	49.4
1909	309,852	14,940	48.2
1910	319,809	14,672	45.8
1911	329,170	13,765	41.8

POPULATION, DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE YEARS OF AGE FOR THE MONTHS OF JUNE, JULY AND AUGUST.

YEAR	POPULATION	DEATHS	DEATH RATE PER THOUSAND PER ANNUM
1891	188,703	5,945	126.4
1892	194,214	6,612	136.1
1893	199,886	5,892	117.0
1894	205,723	5,788	112.6
1895	212,983	6,183	116.1
1896	217,071	5,671	104.5
1897	221,339	5,401	97.6
1898	225,804	5,047	89.4
1899	230,480	4,689	81.4
1900	235,585	4,562	77.4
1901	242,747	4,642	76.5
1902	250,153	4,389	70.2
1903	257,813	4,037	62.6
1904	265,738	4,805	72.3
1905	273,938	4,892	71.4
1906	282,424	4,426	62.7
1907	291,208	5,030	68.6
1908	301,417	4,336	57.5
1909	309,852	4,067	52.5
1910	319,809	4,426	55.3
1911	329,170	3,673	44.6



DIPLOMAS AWARDED NATHAN STRAUS FOR HIS WORK IN THE FIELD OF MILK PASTEURIZATION.

(Wall of Library at Residence)





REPRINTS *of* CIRCULAR  
LETTERS *to* MAYORS *and*  
PRESIDENTS *of* HEALTH  
BOARDS :: ADDRESSES  
DELIVERED *at* CON-  
GRESSES, *and* VARIOUS  
OTHER PUBLICATIONS







*How the  
New York  
Death  
Rate  
Was  
Reduced*





## HOW THE NEW YORK DEATH RATE WAS REDUCED.

Reprinted from *The Forum* of November, 1894.

**W**Y efforts to do something to lessen the appalling sum of human suffering and sorrow which the figures of infant mortality in New York but faintly indicate were begun in the summer of last year, when I opened a depot where pure milk, both in its natural and sterilized form, was sold. From this experiment I received such striking demonstration of the good that could be accomplished by raising the standard of the milk supply of the poor that I resolved, if it were at all possible, to resume the work on a greatly enlarged scale this year. For the protection of the children of the poor, the milk must be sterilized before being sold.<sup>1</sup> I believed that if this could be done on a scale large enough to make an impression on the supply, the sum of infant mortality in New York might be sensibly reduced. I determined to make the attempt, at least, and in opening six milk depots at the beginning of the past Summer deliberately addressed myself to the task of reducing the death rate of the city.

There is a great deal of waste in the world, but none quite so reckless as that of human life. Here in New York the lives of thousands of children are sacrificed every Summer, simply and solely because they are fed with impure milk. Of people who die in the State of Maine every year, children under five years of age count for less than 20 per cent.; of those who die in New York City, over 40 per cent. are children under five years of age.

It is the mortality of June, July and August that chiefly accounts for the large percentage of this annual harvest of death. Within a radius of twelve miles from the New York City Hall, three children die during the heated term for every adult; and certainly two out of every three represent a sacrifice which is a disgrace to our civilization to allow. Within the area of what may be called the metropolitan district, the record of one week showed the total mortality to be 1,038, of which 713 deaths were under five years, 664 under two years, 529 under one year, and only 325 over five years of age. Here was 64 per cent. of one week's

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<sup>1</sup>Here let me say that the penalty of disease and death, paid for the neglect of simple precautions in the use of milk, is by no means paid exclusively by the poor. Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it a special susceptibility to tuberculosis. In milk intended for infant nutriment perfect sterilization is an absolutely essential precaution; but, simple as the process is, it is not always certain, even in the homes of the rich, that it will be properly done. I hold that in the near future it will be regarded as a piece of criminal neglect to feed young children on milk which has not been sterilized.

death-roll composed of babies under two years, who drank but little water, and were almost wholly dependent on milk for their nutriment. Could the "destruction that wasteth at noon-day" have been more palpably present than death in these children's milk-bottles?

The conditions of a wholesome milk supply are simple, but, like a good many other simple things, difficult of attainment. These conditions are healthy cows, clean stables, clean and careful processes of milking, and prompt transfer of the milk, in perfectly clean and close vessels, from the cow to the consumer. In the milk supply of all great cities every one of these requisites is flagrantly violated. The inspection of cow-stables to detect the presence of disease is neither careful nor constant; milking is done in most cases under conditions indescribably filthy, and most of the milk consumed by the children of the poor is at least thirty-six to forty-eight hours old before it reaches them. It is a simple matter to understand—as Professor Sedgwick of Boston puts the case—

"—how this rich animal fluid—sterile at the start, but drawn by unclean hands into half-clean pails, and meanwhile sprinkled from above by the dust of the stable, by hairs, dandruff, dirt, and particles of excrement from the skin and udder of the cow vigorously shaken by the milker or brushed by his hat—becomes infested with organisms. That these multiply swiftly and enormously in the warm and rich fluid, well aerated by the act of milking, is also a natural consequence of favorable conditions; and if we allow time also, the wonder is, not that it contains so many germs, but rather that it is still potable at all."

Mr. William M. Babbott, of New York, who has issued an instructive little monograph on the connection between milk supply and disease, uses still stronger language in regard to the character of the milk sold in New York and Brooklyn. He says:

"If milk gave the same outward appearance of decomposition or fermentation as is shown by vegetables, fish or meat, more than three-quarters of all the milk consumed in the metropolitan district would be condemned as unfit for human food; if its pollution could be perceived, it would be loathed; and if the disease germs could be as plainly seen as a pest-house, the death-dealing milk would be as soon dreaded and shunned."

It is unquestionably true that no plague by which the city was ever ravaged has yielded so plentiful a crop of deaths as that which is reaped from the seeds of contagion deposited in the infant system every Summer by millions of noxious bacteria developed in milk.

The sterilizing laboratory which I established last year was this year very much enlarged, and every preparation was made to meet the demands likely to be made on it. The cows from which the milk was obtained were examined by the veterinary surgeon of the New York Board of Health, and the stables and dairies made a subject of careful inspection. The milk was iced in transportation and kept on ice till it was turned into the bottles for sterilizing. The apparatus used for

the purpose was made under the direction of Dr. R. G. Freeman, of New York. The milk is exposed for twenty minutes to a temperature of 167° Fahrenheit. It has been demonstrated that tubercle bacilli die at 158° Fahrenheit, when submitted to that temperature for ten minutes. It is therefore reasonably certain that by this process all noxious germs in the milk are completely destroyed, while the nutritive qualities of this most perfect of nature's foods have not been in the slightest degree impaired. In the preparation of modified milk for infant feeding, two formulae were adopted, one by Dr. R. G. Freeman, and the other by Dr. A. Jacobi. Both of these have been, and will during the Winter continue to be, sterilized in six-ounce bottles, sold at a cent each. In addition to these modified milk foods, barley flour was sold. This was intended to meet a want, keenly felt by the poor, of wholesome nutrition at a price within their means, for children beyond the infantile stage.

During the hottest part of the Summer the laboratory was kept running to its full capacity, night and day, to prepare sufficient sterilized milk to meet the demand. This was so active and so constant as to exhaust the stock in the depots daily, but it was a rigidly observed rule that, without respect to demand, no bottle of sterilized milk should be sold twenty-four hours after it had been sterilized. The Health Board's free doctors, the dispensaries, the "World's" free doctors, and nearly all the hospitals and charitable organizations took an active interest in educating the people as to the value of sterilized milk. Order-books containing a hundred of the following coupons were placed without cost, and without restriction as to quantity, at the disposal of any physician giving his services freely to the poor, or to any charitable organization applying for them:

*This coupon is good at any of the following depots:*

Foot of East Third St.; 317 East Ninth St.; 147 Eldridge St.; 22 Market St.;  
201 West 63d St. and 324 East 59th St.

for

5 6-oz. bottles Milk and Barley Water, Formula No. 2; or

5 6-oz. bottles Milk and Lime Water, Formula No. 1; or

4 8-oz. bottles Sterilized Pure Milk; or

2 16-oz. bottles Sterilized Pure Milk; or

One-half pound Barley Flour and 2 8-oz. bottles Sterilized Pure Milk.

Deposit required on bottles from every one; 3 cents on each 6 or 8-oz. bottle;  
5 cents on each 16-oz. bottle.

NATHAN STRAUS.

This Ticket is good for only one of the foods.

By permission of the Dock Department I erected on the pier at the foot of East Third Street, within a few feet of the milk laboratory, a large pavilion provided with comfortable seats, which were given to the unrestricted use of women and children. I also placed benches under the pavilion erected on this same pier by the Dock Department. My purpose in this was to furnish a free fresh-air resort for mothers who could not get through with their home duties early enough to catch a boat which sailed on schedule time. The tent was open all day up to midnight, so that at any hour a mother could bring her child and enjoy the fresh sea air without having tired herself out in a rush to catch an excursion and probably unfitted herself for the proper care of the child. The central depot being situated on this pier, all the resources were at the command of those who used the rest and shelter provided. A physician assigned by the Board of Health was constantly in attendance. On hot days a thousand women and children could be found at almost any hour enjoying the shelter, and so impressed have I been with the benefit thus afforded that I have determined to use all my influence to have such outing places, protected from the sun, erected on the piers that belong to the city. This can be done without interfering with traffic facilities, by putting benches on the roof of the pier, and covering them with an awning.

Free lectures under other auspices were given twice a week by experienced physicians, on the proper care and feeding of infants, and every opportunity was taken to bring home to mothers the knowledge that the best possible food for their children could be obtained at a nominal price. The sale of sterilized milk for babies at the six depots aggregated, up to the end of September, 280,000 bottles, or over 2,500 bottles a day. No record was kept of the number of sick children for whom sweetened and diluted sterilized milk in bottles was prescribed, but it was estimated that a daily average of 700 babies were fed on this modified milk. It is safe to say that some thousands of children, who were sick, owe their recovery during the Summer to its use. On this point the returns of the Bureau of Statistics present eloquent testimony, as the following comparison between the number of deaths of children in New York under five years of age, this year and last, will show:

	1894	1893
January, February and March.....	4,508	4,108
April, May and June.....	4,521	4,386
July .....	2,560	2,796
August .....	1,559	1,686
September (to the 13th).....	317	386

The Summer of 1894 was a much more trying one for children than that of 1893. The average temperature of the latter part of June, of the



whole of July, and a part of August was unusually high, and all conditions tending to the increase of the intestinal disorders which are chiefly accountable for infant mortality were correspondingly aggravated. As a matter of fact, the sanitary condition of the city had undergone no radical change, and the system of tenement-house inspection was not less thorough last year than this. Sick-children's funds, and other forms of charitable effort for the benefit of the poor, were not less liberally supported in the Summer of 1893 than in that of 1894. All the external conditions, in short, led to the expectation of a higher death rate in the Summer of 1894 than in the one preceding; and, even had other things been equal, the increase of population would, without an increase of the rate, have been accompanied by a larger number of infant deaths. But it will be seen that since the opening of the pure milk depots the number of deaths among children has sensibly decreased. During the first quarter of the year there was an increase, as compared with 1893, of nearly 10 per cent.—considerably in excess of a normal percentage—in the deaths of children under five years of age. For the second quarter, forty days of which were covered by the distribution of pure milk, the increase over 1893 was only a little more than 3 per cent. For the month of July there was a decrease, as compared with July, 1893, of nearly  $8\frac{1}{2}$  per cent., in the number of infant deaths; for August the decrease was  $7\frac{1}{2}$  per cent., and for September 18 per cent. Allowing 3 per cent. as the normal average of increase under the most favorable conditions, it will be seen that there has been a reduction of over 10 per cent. in the Summer mortality of infants in this city.

Further analysis of the figures show results even more striking. The month of June started in with an exceptionally high mortality of children under one year. In 1893 this month showed 878 of the infant deaths; in 1894 the number rose to 1,076—an increase of  $22\frac{1}{2}$  per cent. Of children over one year and under two years of age, the deaths for June, 1893, numbered 247, and for June, 1894, 267—an increase of over 8 per cent. Necessarily, it took some time to make the existence of the pure-milk agencies known to those for whose benefit they were intended, and to educate mothers into the necessity of having recourse to them. For July, when the system was fairly in operation, and its advantages generally known, the deaths of infants under one year numbered 1,918, as compared with 2,063 for the corresponding month of 1893—a decrease of over 7 per cent. In the same month the deaths over one year and under two years of age were 381, as compared with 440 for July, 1893—a decrease of over 11 per cent. For August the figures are equally suggestive, there being a decrease in the one-year class from 1,152 to 1,086, and in the two-year class from 402 to 265. This last

decrease represents a ratio as high as 34 per cent., and as every mother knows the dangers attending the second year of infant life, the figures have a very direct bearing on what I must call the preventable average of infant mortality. I think I may safely claim that much of the diminished aggregate of children's deaths which happily distinguishes the Summer of 1893 from that of 1894 has been due to the establishment of the pure-milk depots, and the very large decrease in August of deaths among children between one and two years of age would be quite unintelligible without this explanation. I make these assertions, not for the purpose of claiming personal credit for a work which has yielded me more pleasure than I can well describe, but with the hope that others may be tempted to enter the same field. It is much too large a field for any one man or organization to fill, but I have written to very little purpose if I have not shown it to be one in which there may be gathered a most abundant return for well-doing.

By way of divesting the public mind of the idea that sterilized milk was a medicated compound, and in order to supply poor people with a wholesome and strengthening Summer beverage, I obtained permission to open booths for its sale in the public parks. There were nine of these, and soon I found that the demand for sterilized milk at a cent a glass was so great as to transcend the resources of my laboratory. This I had occasion to reinforce by the provision of another apparatus elsewhere for the preparation of one of the infant foods; but even then I was compelled to have recourse to the Appleberg Company for a supply of sterilized milk for sale at the park booths. Desirous as this company was to second my enterprise, the demand exceeded all possible supply by fully one-half, and what was lacking in the sterilized product had to be furnished in the form of raw milk from the dairies. At all of the regular depots I also sold raw milk in sealed cans. My purpose was to give a practical demonstration of the fact that pure milk can be obtained and sold at low prices. The demonstration has, I trust, been a convincing one, and its effect has undoubtedly been to elevate the standard of milk sold by small grocers throughout New York City. With the advent of cool weather the depots were closed, but the sterilizing laboratory will be maintained during the year, so that any one desiring to obtain the sterilized milk, either in its simple or modified form, during the winter, can do so.

At the Park depots there were sold (up to September 30) 572,150 glasses at one cent each, and in the height of the season the number of people employed was 58. The sales of milk in all of the places (depots and booths) aggregated 400,000 quarts.

I have been frequently asked as to the possibility of placing such an enterprise as the one I have outlined on a commercial basis, that is, of conducting it at least without loss. I must say that my experience sheds but little light on such a question. I set out with the definite purpose of reducing the infantile death rate of the city, and that could be done only by dismissing all considerations of trouble or expense. Every new depot that was added necessarily increased the cost of the business, for the expense of distributing the sterilized milk for babies to the branch depots was about as much as the price charged for it. The work, in short, as conducted, was one in which the only possible gain was that of human lives; but that is surely a gain to which all commercial and economical considerations must be held to be subordinate.

My work could undoubtedly be duplicated at a very much lower cost than it entailed. I had but little experience to guide me in arranging the details of the business, and the high price of milk which was a consequence of the Summer drought, no less than the unexpected magnitude of the demands made by my customers, contributed to the increase of expense, which in the future might be avoided. Pure milk in its natural form could probably be sold without loss from one great depot situated close to the point of delivery by rail or steamer, at prices slightly higher than those which I established. Milk in the sterilized form, put up in bottles for use in the nursery, would cost, on a commercial basis, quite double the prices paid for it at my depots.

I beg leave to repeat here what I have elsewhere said, that I consider the furnishing of pure milk the most important benevolent undertaking with which I have been connected, and I may be pardoned for referring with some personal satisfaction to the fact that my New York experiment has been in all of its details repeated with most satisfactory results in Yonkers and Philadelphia.

*Nathan Straus*



NATHAN STRAUS.

SIXTH AVENUE AND FOURTEENTH STREET.

New York, June 8, 1895.

To His Honor,

The Mayor.\*

Dear Sir:

I have received so many letters of inquiry from municipal authorities, physicians and others throughout the country in regard to my work in providing pure milk nutriment for the sick children of New York, that I have been prompted to prepare the following items of general information for the guidance of those whose public position or personal sympathies may give them a special interest in trying to reduce the sum of infant mortality. It is a fact which unfortunately requires no demonstration, that many thousands of infant lives are annually sacrificed for the lack of a pure milk diet. The harvest of death is especially abundant in Summer when intestinal complaints are most prevalent among children under five years of age. The infant nourishment commonly accessible to the poor is in hot weather so often replete with the germs of disease that it is the rule rather than the exception to find in the food relied on to sustain life the instrument of death.

This yearly "slaughter of the innocents" goes on in small communities as well as in great cities. A neglect of simple precautions in the use of infants' food will produce the same results everywhere. I have long held that the day is not far distant when it will be regarded as a piece of criminal neglect to feed young children on milk that has not been sterilized. I have addressed myself during the last two years to the task of placing within the reach of every poor family in this city absolutely pure forms of infant diet. These have been either milk carefully sterilized without admixture, or in combination with barley water and a little sugar. Of course due precautions are taken to see that the milk is drawn in the first instance from healthy cows kept in stables of a proper standard of cleanliness.

\*Letter sent to the Mayors of the principal cities of the United States and Canada.

The best possible evidence of the value of this work in saving life is to be found in the impression which it made on the infant death rate of New York last Summer. In presence of a long and exhausting period of very hot weather favorable to an increased mortality among the children of the poor, there was a decrease in the month of July, as compared with the corresponding month in 1893, of 7 per cent. in the deaths of children under one year, and of 11 per cent. in the deaths over one and under two years. For August the decrease of deaths in the one year class was 6 per cent., while in the two year class it reached as high as 34 per cent. Considering the well-known dangers attending the second year of childlife, these figures bear very eloquent testimony to the possibility of greatly lowering the average of infant mortality. Taking the deaths in New York from diarrhoeal diseases alone, of which 89 per cent. are those of children under five years of age, and there is found to be a decrease of 454 in 1894, as compared with 1892. But, allowing for the increase of population, there should have been in ordinary circumstances 420 more deaths from this group of infantile complaints in 1894 than in 1892. This saving of 874 children's lives has been largely due to the institution of my sterilized milk depots. The application of similar methods have been productive of satisfactory results in Philadelphia, Pittsburg, Cincinnati and Yonkers, and no phase of public hygiene is at present attracting so much attention in Europe. It is simply impossible for any man of ordinary feeling to study the simple appliances of a work like this, and to note their efficacy in fighting the forces of disease and death, without being prompted to engage in it himself

I am frequently asked for estimates derived from my own experience of the cost of placing sterilized milk at a nominal price within the reach of those who in a given community need it most. This is difficult to do for several reasons. I set out with the definite purpose of reducing the infantile death rate of the city, and all considerations of expense were held subordinate to that main object. In bringing the work to its present stage of development I have spent a good deal more money than I would were it to be done over again in the light of acquired experience. Then, the conditions of no two localities as to transportation, distribution and handling can be quite alike, and these figure largely in the element of cost. While, therefore, I may safely claim to be able to speak with authority as to the best processes of preparation, bottling, etc., I should hesitate to give an opinion as to the number of bottles that could be filled for a given expenditure. Some practical details will be found embodied in a little pamphlet which I am having printed and of which I shall send you a copy, but I know of

no absolute standard by which the cost of such a work can be ascertained in advance.

The fact is that much good can be done by a very simple plant and by the most modest expenditure. A more or less elaborate equipment is, of course, necessary for doing the work on a large scale, but it is, perhaps, better that this should be a growth from tentative efforts confined within a limited area than that it should be adopted at the start. Any person of moderate intelligence can become thoroughly familiar with the methods and processes of my Sterilized Milk Laboratory in less than a week, and can readily apply the knowledge thus acquired to the duplication of its work on any scale that may be attempted. I shall be glad to give any such person, duly accredited to me by some responsible authority, free access to every department of my now completed system of preparation and distribution, and all possible data needed to guide him in adapting the work to different conditions. I know of no other way in which a satisfactory trial of its benefits can be secured than by such personal investigation and preparation as I have indicated. Should there be a desire to make such a trial in the municipality of which you are the head, I beg that you will consider all I am able to show of the practical working of the system entirely at the service of any one whom you may be pleased to designate. I am so deeply impressed with the benefit which work of this kind is fitted to confer on humanity, that my freedom in addressing you on the subject may be held not to require apology.

I have the honor to be,

Yours respectfully,

*Nathan Straus*



## HOW TO REDUCE INFANT MORTALITY.\*

To the Board of Health.

Gentlemen:

**S**OME eighteen months ago I took the liberty of addressing a letter to the Mayor of every city in the United States, setting forth at some length my conviction of the absolute necessity of making the supply of sterilized (pasteurized) milk for the children of the poor an object of municipal solicitude. I received sympathetic responses from so many quarters that I am encouraged to believe in the existence of a widespread interest in the subject. I feel it, therefore, to be my duty to supplement the appeal then made by a more complete and exact statement of the reasons which prompt me to believe that there is no field of public effort whose neglect admits of so little excuse. I address this communication to you as the agency of local government whose purpose it is to provide against all preventable loss of human life and to enable the people, from childhood to age, to live under sanitary conditions alike as to their food supply and their surroundings.

It is hardly necessary to call your attention to the fact that the most thorough system of public inspection of milk is almost solely directed to the correction of two abuses—skimming and adulteration with water—and to cutting off the supply of one kind of diseased milk—that drawn from tuberculous cows. The latter duty is usually performed by State officers; the former is an exclusively municipal function. The public inspection of milk in the United States is thus directed mainly to the prevention of fraud, and rarely, if ever, to the discovery of pollution. Except as to the stamping out of tuberculosis, considerations affecting the public health receive only incidental attention. As Prof. Sedgwick said some years ago in regard to Boston, "Public milk supplies may not be legally watered, but they may be stale, or polluted, or infected." May I be permitted to echo his query as to whether the time has not come when we should no longer be satisfied with chiefly preventing the cheating connected with the adulteration of milk or its dilution with water?

The statement is made on the excellent authority of Dr. Shakespeare, of Philadelphia, that nearly if not quite one-half of the deaths

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\*Letter sent to the Presidents of the Health Boards of American cities and Canada.

in the cities, towns and villages in this country are due to the class of diseases which are known to be preventable. He adds that the present annual mortality from the ordinary preventable diseases fails to impress the public mind, partly because it is so common, but mainly because of the customary and long continued inaction of the medical profession in matters relating to public sanitation. Chief among this preventable class of diseases are the diarrhoeal disturbances of young children, and the prime agent in the production of these is impure milk. These disturbances prevail among infants pretty much in the proportion in which such milk constitutes their food. They are related to a group of symptoms which medical science has declared to admit of no other satisfactory explanation than that they are of toxic origin, due to the absorption from the intestines of ptomaines produced by bacteria. The causative factor, in short, of these disturbances is bacteria, and these act in most cases by inducing changes in the food. It is nonsense to argue that because healthy adults may drink polluted and stale milk without injury, invalids and infants may do the same. Milk is babies' proper food, but the milk with which they are fed is too often a fluid in which the germs of disease and death have taken the place of Nature's most perfectly combined elements of nutrition. Samples of average city milk, perfectly good according to all the customary tests of color, taste, smell, and the galactometer, have been found to contain 2,350,000 bacteria to the cubic centimeter, or more than twice the amount of the bacterial contents of the same quantity of city sewage.

Thus a fluid possessing almost ideally perfect qualities for the preservation of health and nutrition may by easy and rapid stages of pollution become a deadly agent in the propagation of disease. Were the precautions taken to secure cleanliness in cow stables and in the clothing and persons of the milkers tenfold greater than they are, a wide mouthed pail held under the shaken udder would be necessarily a receptacle for many impurities. What actually takes place in almost uniform practice is that this rich animal fluid, sterile and presumably wholesome at the start, but drawn by unclean hands into half-cleaned pails, and meanwhile sprinkled from above by the dust of the stable, by hairs, dandruff, dirt, and particles of excrement from the skin and udder of the cow shaken from the milker or brushed by his hat, becomes infested with organisms. That these multiply swiftly and enormously in the warm and rich fluid, well aerated by the act of milking, is also a natural consequence of favorable conditions; and if we allow time, as has been well said, the wonder is not that it contains so many germs, but rather that it is still potable at all.



I hold, therefore, that there is practically no milk delivered for general consumption in cities that is fit to be fed in its natural state to young children. There is no system of tests capable of application that can alter this fact, and the tests in actual use do not touch it at all. If proof of this assertion were needed, a glance at the abnormal infant death rate of any of our great cities would amply bear it out. In New York City, the recorded births of the three years, 1890-'92, were 135,602. Allowing for the fact that only five-sixths of the whole are believed to be reported to the Board of Health, the actual number may be placed at 162,721. During the same period, the deaths of children under five years of age were 52,213, or over thirty-two per cent. of the whole number of births. That one child out of every three that were born should die before attaining the age of five, is in itself a most significant and alarming fact. The further fact that from fifteen to eighteen per cent. of all these deaths occurred in the five weeks between July 3d and August 6th indicates the true source of the trouble. In 1891 the number of infant deaths in these five weeks was 2,658; in 1892 it was 3,440, an increase of 782. Coming down to the specific causes, we find that diarrhoeal diseases accounted for nearly one-half of the whole. In the five weeks in question, the deaths of children under five from this cause were 1,209 in 1891, and 1,617 in 1892.

Here, then, was evidence of a steadily increasing infant mortality in the hottest season of the year, traceable to a cause usually associated with the poisons bred in cow's milk more abundantly at that season than at others. It was not a violent assumption that much of this mortality was preventable, and that the most direct and effectual method of prevention was to put milk suited for infant nutriment within reach of the poorest. After making a thorough examination of the subject, and taking counsel with physicians at home and with some who were accepted as authorities in Europe, I began to experiment in 1893 as to what could be done with one milk depot. I found medical testimony absolutely unanimous as to the requirement of perfect sterilization (pasteurization) for all milk intended for infant food in cities. A sterilizing laboratory was accordingly established, and the sale of pure milk, both in its natural and sterilized form, was begun in one of the most thickly populated districts of the city. The system of sterilization (pasteurization) adopted was that prescribed by Dr. Rowland G. Freeman, of New York, in which are combined the preservation of the nutritive qualities of the milk and the complete destruction of all noxious germs. The first year's experience showed me that the indirect results of my efforts were quite as valuable as those that could be directly traced to them. The standard of quality of the milk supply of the poor had been

raised within the whole area adjoining my depot, the people being quick to discern the superiority of the pure article furnished at a low price over the more or less tainted, and also more costly, one they had been accustomed to use. During the hot term I also sold milk in its natural state at a cent a glass, in booths which I was permitted to erect in the public parks. The visiting physicians of the Board of Health and all physicians doing charitable work among the poor have been, from the beginning of my work, supplied by me with all the sterilized and modified forms of milk which they required free of expense.

It was found, as the result of the first year's experiment, that the use of sterilized milk was a matter of education. There was at first a suspicion of medication about it in the minds of the poor people for whose babies its use was most urgently needed, and the fact that the doctors began to recommend it tended to associate it in their own mind with drugs. This prejudice has, however, entirely disappeared. I had a special preparation for babies' food made according to a formula supplied by Dr. Freeman. To this I added another in the following year from a formula supplied by Dr. A. Jacobi, and both have been sold in my depots ever since in six ounce bottles at a cent apiece. In addition to these modified milk foods, barley flour has been sold. This is intended to meet a want, keenly felt by the poor, of wholesome nutrition at a price within their means for children beyond the infantile age. The milk is iced in transportation and kept on ice till it is turned into the bottles for sterilizing. It has been a rigidly observed rule that, without respect to demand, no bottle of sterilized (pasteurized) milk should be sold twenty-four hours after the process of sterilization. Experience has taught my staff not a little as to the details to be observed in the effort to secure the most perfect results, but these are the main lines on which the business has been conducted.

In 1894, preparations were made to supply natural, pasteurized, and modified milk on such a scale and at as many different depots as might make a distinct impression on the milk supply in New York and so reduce the sum of its infant mortality. The character of the summer was well calculated to put the experiment to a severe test. The average temperature of the latter part of June, of the whole of July, and of part of August was unusually high, and much higher than that of the preceding year. For the first quarter of the year, the mortality of the children under five showed more than the proportionate increase which might be expected from the increase of population, which was about three per cent. per annum. There were 4,108 children's deaths in the first quarter of 1894, or ten per cent. increase. For the second quarter, the deaths in 1893 numbered 4,386, and in 1894, 4,483, and, as in the

last half of the quarter my six milk depots were open, I was encouraged to believe that the arrested increase might in part be due to their influence. The mortality statistics for July and August confirmed me in this belief. For July, 1893, the deaths of children under five numbered 2,796, while for the same month of 1894 they were only 2,562. In August, 1893, they numbered 1,686, declining in the same month of 1894 to 1,559. Thus, instead of the increase of ten per cent. in the mortality of children with which the year had started, the two most fatal months of the year showed a decrease of 8.3 per cent. The deaths under five years for July and August, which, had they followed the rate of increase established in the first quarter of the year, would have numbered 4,930, were only 4,111. Here was an apparent saving of 819 lives in two months, or a decrease of the toll levied by death on the children of New York of sixteen out of every hundred.

In the experimental season of 1893, my one depot was open from June to November, and from it were sold 34,400 bottles either of pasteurized milk or of the modified mixture for infant feeding. In 1894 the six depots were opened on May 14th, and were kept open to the end of the hot term. From one of them the supply was at the disposal of the public till the end of the year. The service was thus made a continuous one, and has been one since so maintained, with six depots, in addition to the booths in the public parks, open during the hottest period of the year, and the central depot open all the year round. The sales for 1894, between May 14th and December 31st, aggregated 306,446 bottles of the pasteurized milk and its modifications. In 1895, between January 1st and December 31st, the sales were 589,064 bottles, and in 1896 the total for the year was 658,064 bottles. In the year before the work was seriously begun, 1893, the deaths of children under five during the two hottest months of the year were, as we have seen, 4,482; for the year just closed, 1896, they were 4,126. Meanwhile the population of the city had increased from 1,758,000 on July 1, 1893, to 1,934,077 on July 1, 1896. That is to say, there had been an increase of the population equal to fully ten per cent., and a decrease of children's deaths in the two most fatal months of the year equal to eight per cent. Had the deaths for July and August of 1896 been in the same proportion as those for the same months of 1893, they would have numbered 4,930 instead of 4,126, a clear saving of 804 lives, or sixteen out of every hundred, in two months. As the rule in the past has been that this class of deaths increased more rapidly than the population, even these figures do not tell the entire story.

The experience of Brooklyn is, if possible, more significant of the value of the pasteurized milk food as a preventive of infant disease and

death than that of New York. Ten years ago, Brooklyn had a decided advantage over New York in the possession of a much lower rate of infant mortality. This advantage became gradually less till it not only disappeared, but left New York, apparently, a more wholesome abode for children than its twin city across the East River. In 1894, the proportion of deaths of children under the age of five to the whole number of deaths was 42.6 per cent. in New York and 43.6 per cent. in Brooklyn. The disparity was not decreased in 1895, and with the opening of the summer of last year the Brooklyn Board of Health became still more impressed with the tendency of children's deaths in New York to show a decrease on those of previous years, while with them the tendency appeared to be the other way. In searching around for reasons to explain the lessened infant mortality of New York, they concluded that it was mainly due to the use of pasteurized milk nutriment. They accordingly applied to me for help and advice. As the most practical way of answering their appeal, I offered to supply them, free of charge, a thousand bottles a day of pasteurized milk and its modifications, leaving them to provide the machinery of distribution. In point of fact, in the thirty-eight days from July 29th to September 4th, in which they distributed these milk foods, they received, in all, 42,739 bottles from my New York laboratory.

The result is indicated in the report of the board for 1896, as follows: "The milk was distributed in the various stations of the Diet Dispensary, of which there are five in the city, and was supplied gratuitously to the poor on prescription, precedence being accorded to orders emanating from members of the summer corps, who used a special form. Although this work was not begun until the end of July, and was terminated on the 4th of September, upward of 40,000 bottles of pasteurized milk were dispensed, with the result, as indicated by statistics, of substantially reducing the death rate from infantile diarrhoea." In the same connection the following sentences from the report on vital statistics of Dr. George E. West, the secretary of the board, will be found suggestive: "The only notable increase of deaths during the present year, as compared with the previous one, was due to the intense heat of the first half of August, the deaths ascribed directly to this cause having reached the unprecedented number of 333, of which 215 were reported during the single week ending August 15th. In spite of the almost intolerable heat, the deaths from diarrhoeal diseases in infants diminished markedly in August, which fact is significant when it is remembered that the gratuitous distribution of sterilized milk was begun at the end of July."

From more detailed statistics furnished by Dr. West it appears that in the four weeks from June 30th to July 28th the deaths of infants under two years of age from diarrhoeal diseases had been at the average rate of 148 a week, rising in the third week of the month as high as 184 deaths. In spite of the "intolerable heat" of the first half of August, the number of infant deaths fell in the first week of the distribution of sterilized milk to 82, and in the next to 86, and in the five and a half weeks during which the distribution was kept up the weekly average of infant deaths was reduced to 73, or less than half what it was in the cooler and, for the last year at least, less fatal month of July. The results are no less remarkable when the deaths of children under two from diarrhoeal diseases are compared with the total number of deaths at all ages and from all causes. Beginning with the last week of June, these infant deaths accounted for twenty-two per cent. of the whole mortality of the city. They were twenty-three per cent. in the first week of July, twenty-eight per cent. in the second, twenty-seven per cent. in the third, and twenty-one per cent. in the fourth. The percentage fell to eighteen with the introduction of pasteurized milk in the first terrible two weeks of August, dropped still lower, to thirteen per cent., in the second two weeks of the month, and was eleven and twelve per cent. respectively in the last two weeks in which the milk was distributed.

These figures are more eloquent than any words of mine can make them. They show, I think, conclusively the very intimate connection between the supply of a pure milk diet and the arrest of the process of needless infant slaughter that is permitted to go on every summer in every populous community of the land. When a few cases of cholera find their way into one of our ports, there is a great outburst of public excitement, and money is lavishly spent to ward off the danger. Yet there is eminent authority for the statement that there are more deaths from the preventable diseases of children occurring each year in any city in this country than the total number of deaths caused by Asiatic cholera, in the same city, from the first visitation of Asiatic cholera to the last—that is to say, during a period of sixty-four years. Hundreds of thousands of dollars are readily spent to ward off a plague that happens to inspire people with terror; yet, here among the little ones is a most deadly form of disease, numbering its victims all the year round, but attaining in the summer months a degree of virulence unmatched by any epidemic, for the most effective remedy to which not a dollar is, so far as I know, appropriated by any city in the United States.

It is to draw attention to this anomaly, and to ask your co-operation in trying to remove it, that I have addressed this communication to you. The fact that the appeal is made on behalf of humanity must be

my apology for troubling you with it. To the practical question of how much it would cost to place pasteurized milk and its modifications at a nominal price within the reach of those who in a given community need it most, it is difficult to give a satisfactory answer. I have merely to repeat what I said on this subject in a former communication to the mayor of your city. I set out with the definite purpose of reducing the infantile death rate of the city, and all considerations of expense were held subordinate to that main object. In bringing the work to its present state of development I have spent a good deal more money than I should were it to be done over again in the light of acquired experience. Then, the conditions of no two localities as to transportation, distribution and handling can be alike, and these figure largely in the element of cost. While, therefore, I may safely profess to be able to speak with authority as to the best processes of preparation, bottling, etc., I should hesitate to give an opinion as to the number of bottles that could be filled for a given expenditure.

The fact is that much good can be done by a very simple plant and by the most modest expenditure. A more or less elaborate equipment is, of course, necessary for doing the work on a large scale, but it is, perhaps, better that this should be a growth from tentative efforts confined within a limited area than that it should be adopted at the start. Any person of moderate intelligence can become thoroughly familiar with the methods and processes of my sterilized milk laboratory in less than a week, and can readily apply the knowledge thus acquired to the duplication of its work on any scale that may be attempted. I shall be glad to give any such person, duly accredited to me by you, free access to every department of my now completed system of preparation and distribution, and all possible data needed to guide him in adapting the work to different conditions. I know of no other way in which a satisfactory trial of its benefits can be secured than by personal investigation and preparation. Should there be a desire to make such a trial under your auspices, I beg that you will consider all I am able to show of the practical working of the system entirely at the service of any one whom you may be pleased to designate.

I think I have shown that, as a means to the saving of human lives, there is no form of sanitary precaution comparable to the general use of pasteurized milk for infant food. As I am addressing a body of men who count every diminution of the death rate as the most convincing demonstration of their usefulness, it should need no argument to convince them that this is a legitimate field for them to occupy. It can hardly be a fact indifferent to any of us who have the common instincts of humanity that there should exist within reach of our efforts of pre-

vention a vast aggregate of constantly recurring suffering and death. The tragedy of needless infant slaughter, desolating so many homes and wringing so many hearts, lies like a dark shadow on our boasted civilization. It is nothing more or less than permitted murder, for which the responsibility must lie at the door of the agencies of government that fail to recognize its existence and demand its prevention. The necessity is too great to be adequately met by private effort. Nothing short of an organization as broad as the area of milk consumption will meet the case, and this only public authority can supply.

I have the honor to be, yours respectfully,

*Nathan Straus*



The following letters may serve to support and illustrate the conclusions reached in the preceding communication:

Nathan Straus, Esq.

New York, June 7, 1895.

My Dear Sir: It gives me pleasure to express to you my appreciation of the valuable services you have rendered this city by supplying to the infants and sick children of its poor, at a nominal charge, Pasteurized milk and modified Pasteurized Milk.

Before the existence of your milk depots, physicians practicing among the very poor could never be sure that their little patients who were not breast-fed were getting a clean and sterile food. Through your charity it is possible now to be sure that they have a sterile food, and moreover that they are taking it through a sterile nipple, since such a nipple is furnished with each bottle.

Your milk depots have undoubtedly saved many lives and a charity has been established by you on a large scale which may prove an example for philanthropists in other cities to follow.

Believe me, very truly yours,

(Signed) ROWLAND G. FREEMAN, M. D.

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HEALTH DEPARTMENT  
OF THE CITY OF NEW YORK.  
PRESIDENT'S OFFICE.

New York, January 22, 1897.

Charles G. Wilson, President and Commissioner.

Nathan Straus, Esq.:

Dear Sir—The distribution of sterilized milk to the poor through the depots established and maintained by you for that purpose undoubtedly contributed to the remarkably low death rate among children during the past summer. The Medical Inspectors of this Department are unanimous in their testimony to the usefulness of your charity to the preservation and promotion of the public health, and the Summer Corps of physicians distributed among the poor over 7,000 of your tickets, entitling them to a supply of sterilized milk upon presentation to your agents. The Board of Health greatly appreciates your charitable efforts in this direction for the comfort, relief and help of the sick and destitute, and hopes that you and others may continue this good work during the present and the following years.

With great respect,

Yours very truly,

(Signed) CHARLES G. WILSON, President.



DEPARTMENT OF HEALTH.

Commissioner's Office,  
38 and 40 Clinton Street.

Z. Taylor Emery, M. D., Commissioner.  
R. M. Wyckoff, M. D., Dep'y Com'r.

Geo. E. West, M. D., Secretary.  
Albert R. Moore, Counsel.

Brooklyn, N. Y., January 25, 1897.

Hon. Nathan Straus,

Sixth Avenue, 13th to 14th Streets, New York City.

Dear Sir—I take pleasure in informing you that the experiment begun in this city in the summer of 1896 of supplying sterilized milk to the sick children of the poor has been markedly successful in lowering the death rate from diarrhoeal diseases in infants, and it is my intention to prosecute this good work with vigor during the coming year.

Trusting that you will succeed in having this experiment repeated in other cities, I remain,

Yours respectfully,

(Signed) Z. TAYLOR EMERY, M. D.,  
Commissioner of Health.

Mr. Nathan Straus,  
New York City.

110 West 34th Street,  
New York, June 5th, 1895.

Dear Sir: There is nothing so instructive as a success, and a single practical proof speaks louder than any number of volumes. By your sale of milk, of sterilized milk, and of two varieties of simple infant food—both of them based on scientific facts and proved by long observation to be reliable—you have benefited large numbers in New York City, and presented an example for greater imitation in other cities. It is true that it is impossible to statistically count the lives saved by your timely interference; it is easy, however, to make an estimate when one knows that the principal danger to health, and the great mortality of infants and small children are the *direct results of bad food, principally bad or spoiled milk*. Indeed, the dangers of the "second summer" mean nothing else but bad food and consequent digestive disorders.

I trust you will be able to extend the blessings conferred by you still further, not only over the city but outside also. I believe a call over your name will suffice to arouse the humanitarian interest of practical philanthropists in other large communities with the same salutary results obtained by you in New York.

Very respectfully yours,

(Signed) A. JACOBI, M. D.

Received through a friend.

29 East 24th Street,  
New York, September 12th, 1894.

Dear Sir—Having practiced medicine among the crowded tenements of the East Side during the past fourteen years, and served as physician to the out-patients of hospitals during that period, I have abundant opportunity to test the practical efficiency of the various schemes for the amelioration of the condition of the poor. Of these plans, the one put in operation by Mr. Nathan Straus for providing sterilized milk for infants and children stands easily at the head. Noble in its conception, its execution has been generous, and the benefits derived therefrom immediate and striking.

In my opinion, and while not underrating the efforts of official and private charities, Mr. Straus's philanthropy has been the direct cause of reducing infant mortality during the recent hot season to a greater degree than that of all other factors combined.

Respectfully yours,

(Signed) CHAS. E. NAMMACK, M. D.



# THE INFLUENCE OF A PURE MILK SUPPLY ON THE DEATH RATE OF CHILDREN.

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PAPER READ BEFORE THE NATIONAL CONFERENCE OF MAYORS AND  
COUNCILMEN AT COLUMBUS, O., SEPTEMBER 29, 1897.

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**A**MONG all the forms of waste in the world, there is none so reckless as that of human life. In every great city in this country, the lives of thousands of children are sacrificed every summer simply because they are fed with impure milk. The conditions of a wholesome milk supply are not very complex, but they are somewhat difficult of attainment. These conditions are healthy cows, clean stables, careful processes of milking, and prompt transfer of the milk in perfectly clean and close vessels from the cow to the consumer. In the milk supply of all great cities every one of the requisites is flagrantly violated. The inspection of cow stables to detect the presence of disease is neither careful nor constant; milking is done in most cases under conditions indescribably filthy, and most of the milk consumed by the children of the poor is at least thirty-six or forty-eight hours old before it reaches them.

It is hardly necessary to call your attention to the fact that the most thorough systems of public inspection of milk are almost solely directed to the detection of two abuses—skimming and adulteration with water—and to cutting off the supply of one kind of diseased milk—that drawn from tuberculous cows. The latter duty is usually performed by State officers; the former is an exclusive municipal function. The public inspection of milk in the United States is thus directed mainly to the prevention of fraud, and rarely, if ever, to the discovery of pollution. Except as to the stamping out of tuberculosis, considerations affecting the public health receive only incidental attention. As Prof. Sedgwick said several years ago in regard to Boston, “public milk supplies may not legally be watered, but they may be stale, or polluted, or infected.” May I be permitted to echo his query as to whether the time has not come when we should be no longer satisfied with merely preventing the cheating connected with lowering the nutritive qualities of milk, and whether some systematic effort should not be made to restrain its influence in the propagation of disease? It is nonsense to argue that because healthy adults may drink polluted and stale milk without injury, invalids and infants may do the same. Milk is the proper food of chil-

dren, but the milk with which they are fed is too often a fluid in which the germs of disease and death have taken the place of nature's most perfectly combined elements of nutrition.

I hold that there is practically no milk delivered for general consumption in cities that is fit to be fed in its natural state to young children. There is no system of tests, capable of general application, that can alter this fact, and the tests in actual use do not touch it at all. No plague by which a city was ever ravaged has yielded so plentiful a crop of deaths as that which is reaped every Summer from the seeds of contagion deposited in the infant system by millions of noxious bacteria developed in milk. When this subject first engaged my attention I found as to New York City the following state of facts: The recorded births of the three years, 1890-92 were 135,602; allowing for the fact that only five-sixths of the whole are believed to be reported to the Board of Health, the actual number may be placed at 162,721. During the same period the deaths of children under five years of age were 52,213, or over thirty-two per cent. of the whole number of births. That one child out of every three that were born should die before attaining the age of five seemed to me like part of a system of permitted murder. The further fact that from fifteen to eighteen per cent. of all these deaths occurred in the five weeks between July 3 and August 6 indicated the true source of the trouble. In 1891 the number of infant deaths in these five weeks was 2,658; in 1892 it was 3,440, an increase of 782. Coming down to the specific causes, it was found that diarrhoeal diseases accounted for about half of all this infant mortality. In the five weeks in question the deaths of children under five from this form of disease were 1,209 in 1891, and 1,617 in 1892.

Here was the evidence of a steadily increasing infant mortality in the hottest season of the year, traceable to a cause usually associated with the poisons bred in a cow's milk more abundantly at that season than at others. It was not a violent assumption that much of this mortality was preventable, and that the most direct and effectual method of prevention was to place milk suited for infant nutriment within the reach of the poorest. After making a thorough examination of the subject, and taking counsel with physicians both at home and abroad, I began to experiment in 1893 with one milk depot. More than a thousand sick babies were fed on the pasteurized and modified milk preparations as to whose necessity for infant food I found medical testimony absolutely unanimous. Most of the children were ill with cholera infantum and the benefit due to the improvement in their food was immediate and amazing. The system of pasteurization adopted was that prescribed by Dr.

Rowland G. Freeman of New York, by which the milk is exposed for twenty minutes to a temperature of 167° Fahrenheit. It has been demonstrated that tubercle bacilli die at 158° Fahrenheit, when submitted to that temperature for ten minutes. It is therefore reasonably certain that by this process all noxious germs in the milk are completely destroyed, while the nutritive qualities of the most perfect of nature's foods are not in the slightest degree impaired. I had a special preparation for babies' food made according to a formula supplied by Dr. Freeman. To this I added another from a formula supplied by Dr. A. Jacobi, and both have been sold in my depots ever since in six ounce bottles at a cent apiece. In addition to these modified milk foods, barley flour has been sold. This was intended to meet a want keenly felt by the poor, of wholesome nutrition at a price within their means for children beyond the infant stage of growth.

The first year's experience showed me that the indirect results of my efforts were quite as valuable as those that could be directly traced to them. The standard of quality of the milk supply of the poor had been raised within the whole area adjoining my depot, the people being quick to discern the superiority of an article furnished at a low price over the more or less tainted and also more costly one they had been accustomed to use. During the hot term, I also sold milk in its natural state at a cent a glass, in booths which I was permitted to erect in the public parks. The visiting physicians of the Board of Health and all physicians doing charitable work among the poor have been, from the beginning of my work, supplied by me with all the pasteurized and modified forms of milk which they required, free of expense. It has been my effort from the first to have the milk sold at my depots so drawn, handled, and transported as to reduce to a minimum the chances of pollution. The milk is cooled thoroughly before shipment, kept cool in the process of transportation, and on arrival at New York it is at once taken to the main laboratory and placed on ice preparatory to being turned into the bottles to go through the process of pasteurization. Before this, however, it is run through a separator for the purpose of freeing it from all mechanical impurities. It has been a rigidly observed rule that, without respect to demand, no bottle of pasteurized milk should be sold twenty-four hours after its preparation. Experience has taught my staff not a little as to the details to be observed in the effort to secure the most perfect results, but these are the main lines on which the business has been conducted.

In 1894 preparations were made to supply natural, pasteurized and modified milk on such a scale and at as many different depots as might

make a distinct impression on the milk supply of New York, and so reduce the sum of its infant mortality. The character of the Summer was well calculated to put the experiment to a severe test. The average temperature of the latter part of June, of the whole of July, and of part of August was unusually high, and much higher than that of the preceding year. For the first quarter of the year, the mortality of children under five showed more than the proportionate increase which might be expected from the increase of population, which was about three per cent. per annum. There were 4,108 children's deaths in the first quarter of 1894, or ten per cent. increase over the same period of 1893. For the second quarter the deaths in 1893 numbered 4,386; and in 1894, 4,483. As in the last quarter my milk depots were open, I was encouraged to believe that this arrested increase might in part be due to their influence. The mortality statistics for July and August confirmed me in this belief. For July, 1893, the deaths of children under five numbered 2,796, while for the same months of 1894 they were only 2,562. In August, 1893, they numbered 1,686, declining in the same month of 1894 to 1,559. Thus, instead of the increase of ten per cent. in the mortality of children with which the year had started, the two most fatal months of the year showed a decrease of 8.3 per cent. The deaths under five years for July and August, which, had they followed the rate of increase established in the first quarter of the year would have numbered 4,930, were only 4,111. Here was an apparent saving of 819 lives in two months, or a decrease of the toll levied by death on the children of New York of sixteen out of every hundred.

The year 1895 was one of relatively high mortality in New York, the death rate being 23.11 per thousand, against 22.76 per thousand in 1894. But it is a striking fact that while the total increase in the number of deaths was 2,245, the increase in the deaths of children under five years of age was only 663. As these latter accounted for 41.9 per cent. of the total number of deaths, and for only 29.5 per cent. of the increase, the evidence seems conclusive that decided progress had been made in the saving of infant lives. In 1896, the death rate was 21.52 per thousand, the number of deaths decreasing over the previous year by 1,798. Of this decrease, 1,414, or over 78 per cent., were due to the reduced number of deaths of children under five years of age. During the three months of June, July and August, there was a decrease of 512 deaths of children under five, as compared with the previous year. Still more striking has been the decrease in the number of children's deaths in 1897. While for the eight months ending in August the deaths under five were 12,734 for 1896, and 13,287 for 1895, they were only 10,962 for the present year. For June, July and August, the deaths under five years of age numbered

5,041 this year, against 5,671 in 1896, a decrease of 630, or about 11 per cent. The comparatively cool summer has had, of course, something to do with this sudden fall in the infant death rate, and the improved sanitary conditions of the city must be accorded their fair share of credit. But, as every physician knows, neither a slight fall in the average summer temperature nor cleaner streets and better regulated tenements will greatly abate the prevalence of infant diarrhoea, if the feeding bottles contain the germs of disease.

In point of fact, the decrease in the mortality of children in New York, which has reached so satisfactory a stage this year, is merely part of a continuous improvement which began in 1893, and which I believe I am right in identifying with the placing of pasteurized milk food within the reach of the children of the poor. The following table, compiled from the vital statistics of the Board of Health, will illustrate the continuous process of improvement during the last four years. The population of children under five years of age is estimated at 11.37 per cent. of the whole population of the city—a proportion which a careful comparison of successive census records fully bears out.

**POPULATION, DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE.**

Year.	Population.	Deaths.	Death Rate Per Thousand Per Annum.
1891	191,805	18,224	99.0
1892	196,485	18,684	95.1
1893	201,164	17,865	88.8
1894	205,843	17,558	85.3
1895	213,664	18,221	85.3
1896	219,905	16,807	76.5

Making the comparison between the first seven months of 1897 and the corresponding seven months of the five previous years brings out the progress of this improvement still more strongly.

**DEATHS AND DEATH RATES OF CHILDREN UNDER FIVE YEARS OF AGE, FROM JANUARY TO JULY, INCLUSIVE, 1892-97.**

Year .....	1892	1893	1894	1895	1896	1897
Deaths .....	12,877	11,290	11,553	11,347	10,902	9,447
Death Rate per thousand per annum..	113.4	96.6	96.0	90.8	84.8	71.4

A similar comparison of the deaths and death rates of children under one year of age, of which the estimated population is equal to 2.8 per cent of the total population of the city, shows with equal clearness the

continuous reduction in the rate of infant mortality, and demonstrates even more convincingly the degree to which it is possible to arrest the culpable and heedless sacrifice of infant life.

DEATHS AND DEATH RATES OF CHILDREN UNDER ONE YEAR OF AGE, FROM JANUARY TO JULY, INCLUSIVE, 1892-97.

Year .....	1892	1893	1894	1895	1896	1897
Deaths .....	7,464	7,003	6,848	6,999	6,661	6,077
Death Rate per thousand per annum .....	266.9	243.3	231.1	227.5	210.4	186.4

Confining the comparison to deaths from diarrhoeal diseases during the two most fatal months of the year, July and August, we find the following state of facts. For the three years 1890-92 the total number of deaths from diarrhoeal diseases during the months of July and August was 6,122; for the three years 1894-96 the total number during the same two months was 5,262, showing a saving of 860 deaths in presence of an increase of average population from 1,700,000 to 1,970,000.

The experience of Brooklyn is, if possible, more significant of the value of the pasteurized milk foods as a preventive of infant disease and death than that of New York. Ten years ago, Brooklyn had a decided advantage over New York in the possession of a much lower rate of infant mortality. This advantage became gradually less till it not only disappeared but left New York apparently a more wholesome abode for children than its twin city across the East River. In 1894 the proportion of deaths of children under the age of five to the whole number of deaths was 42.6 per cent. in New York and 43.6 per cent. in Brooklyn. The disparity was not decreased in 1895, and with the opening of the Summer of last year the Brooklyn Board of Health became still more impressed with the tendency of children's deaths in New York to show a decrease on those of previous years, while with them the tendency appeared to be the other way. In searching around for reasons to explain the lessened infant mortality of New York, they concluded that it was mainly due to the use of pasteurized milk nutriment. They, accordingly, applied to me for help and advice. As the most practical way of answering their appeal, I offered to supply them, free of charge, a thousand bottles a day of pasteurized milk and its modifications, leaving to them to provide the machinery of distribution. In point of fact, in the thirty-eight days from July 29th to September 4th, in which they distributed these milk foods, they received in all 42,739 bottles from my New York laboratory.



The result is indicated in the report of the Board for 1896, as follows: "The milk was distributed in the various stations of the Diet Dispensary, of which there are five in the city, and was supplied gratuitously to the poor on prescription, precedence being accorded to orders emanating from members of the Summer corps, who used a special form. Although this work was not begun until the end of July, and was terminated on the 4th of September, upward of 40,000 bottles of pasteurized milk were dispensed, with the result, as indicated by statistics, of substantially reducing the death rate from infantile diarrhoea." In the same connection, the following sentences from the report on vital statistics of Dr. George E. West, the secretary of the Board, will be found suggestive: "The only notable increase of deaths during the present year, as compared with the previous one, was due to the intense heat of the first half of August, the deaths ascribed directly to this cause having reached the wholly unprecedented number of 333, of which 215 were reported during the single week ending August 15th. In spite of the almost intolerable heat, the deaths from diarrhoeal disease in infants diminished markedly in August, which fact is significant when it is remembered that the gratuitous distribution of sterilized milk was begun at the end of July."

From more detailed statistics furnished by Dr. West it appears that in the four weeks from June 30th to July 28th, the deaths of infants under two years of age from diarrhoeal diseases had been at the average rate of 148 a week, rising in the third week of the month as high as 184 deaths. In spite of the "intolerable heat" of the first half of August, the number of infant deaths fell in the first week of distribution of pasteurized milk to 82, and in the next to 86, and in the five and a half weeks during which the distribution was kept up, the weekly average of infant deaths was reduced to 73, or less than half what it was in the cooler and, for the last year at least, less fatal month of July. The results are no less remarkable when the deaths of children under two from diarrhoeal diseases are compared with the total number of deaths at all ages and from all causes. Beginning with the last week of June, these infant deaths accounted for twenty-two per cent. of the whole mortality of the city. They were twenty-three per cent. in the first week of July, twenty-eight per cent. in the second, twenty-seven per cent. in the third, and twenty-one per cent. in the fourth. The percentage fell to eighteen with the introduction of pasteurized milk in the terrible first two weeks of August, dropped still lower, to thirteen per cent. in the second two weeks of the month, and was eleven and twelve per cent. respectively in the last two weeks in which the milk was distributed.

The following letter sufficiently describes the experience of Brooklyn with the distribution of pasteurized milk food during the present year. The work was done entirely under the supervision of the Board of Health, the money to purchase the raw milk having been furnished by private subscription, and the plant and steam for pasteurization being provided in premises owned by the city.

DEPARTMENT OF HEALTH.  
COMMISSIONER'S OFFICE,

38 and 40 Clinton St.

Z. Taylor Emery, M. D., Commissioner.

Geo. E. West, M. D., Secretary.

R. M. Wyckoff, M. D., Dep'y Com'r.

Albert R. Moore, Counsel.

Brooklyn, N. Y., September 20, 1897.

Hon. Nathan Straus.

Dear Sir:—In reply to your request for statistics demonstrating the utility of pasteurized milk for the purpose of diminishing deaths from diarrhoeal diseases, I take pleasure in supplying you with the following table, which, it seems to me, is quite eloquent:

DEATHS FROM DIARRHOEAL DISEASES, CHILDREN UNDER TWO YEARS OF AGE, FOR 38 WEEKS.

Year.	Population.	Deaths.	Rate Per 100,000.
1890	854,000	1,331	156
1891	890,000	1,320	148
1892	928,000	1,512	163
1893	973,000	1,492	153
1894	1,045,000	1,382	132
1895	1,100,000	1,507	137
1896	1,125,000	1,338	119
1897	1,160,000	1,170	101

As the use of pasteurized milk is confined principally to infants under two years of age, I have used the number of deaths from diarrhoeal diseases of those infants as a basis of comparison. Further, as only thirty-eight weeks of the present year have expired, I have confined myself for purpose of comparison to the first thirty-eight weeks of each of the other years, which period practically covers the season during which diarrhoeal diseases occur in large numbers. The last column of my table is obtained by dividing the number of deaths from diarrhoeal diseases of children under two years, as shown in the third column, by the estimated population of the city for the corresponding year, which I consider the fairest basis of comparison possible.

The experiment of using pasteurized milk was begun in this city about the middle of the summer of 1896, and was followed up during the present summer more vigorously and commenced at an earlier date.

Trusting that you will find the table of service to you, I remain,

Yours respectfully,

GEO. E. WEST, M. D.,

Secretary.

I have always maintained that from the work in which I have been engaged the most satisfactory results at the lowest average cost could be secured in a city of moderate size. This conclusion is amply borne

out by the testimony of Dr. S. E. Getty in regard to the effect on infant mortality of pasteurized milk distribution in Yonkers. This is a city having a population of 38,000, situated just across the northern boundary of New York. It has a large tenement population composed of people of many nationalities—Hungarians, Irish, Russian Jews and Italians—all ignorant of the first rudiments of the proper care and feeding of infants. Here the work of preparing and dispensing pasteurized milk foods was begun, on the lines previously laid down in my New York dispensary, at St. John's Riverside Hospital in July, 1894. The first season's work was mainly experimental, and according to the testimony of Dr. Getty the milk furnished by local dairymen both in 1894 and 1895 left a good deal to be desired. Those in charge of the work realized the necessity of controlling a dairy where every effort would be made to produce pure milk, drawn from healthy and properly fed and groomed cows. So much of the success of the work depending upon a pure milk being obtained at the source of the supply, it was decided before the opening of the season of 1896 to obtain entire control of a dairy. As a sample of the precautions which a medical expert regards as essential to a perfect milk service for children, the following statement of Dr. Getty is worth quoting :

“The cows selected were a cross between Holsteins and natives, and Guernseys and natives, and they were all given the tuberculin test and found to be free from tuberculosis. The stables were critically examined in regard to light, air-space and drainage, and found to be models of their kind, and were kept in a perfectly hygienic manner. The water used by the cows for drinking purposes, also that used for washing the milk pails and cans, was analyzed and proved satisfactory. The pastures were gone over carefully to detect noxious weeds. The greatest care was taken at milking time to keep the milk free from dust and dirt; before each milking the cows were groomed and the udders thoroughly wiped, and after this duty was performed the milkers washed their hands and put on their milking suits. After being drawn, the milk was rapidly cooled, and all care taken to keep it cool and free from contamination until ready for shipment. Only the afternoon's milk was sent to us. The one thing feared was the railroad journey at night of one hour in the refrigerator car, but no ill effects were discovered from it. The train was met on its arrival by the dispensary wagon and, after a short drive, the milk was immediately transferred to a refrigerator. Pasteurization began at 5 A. M. and at that time the milk was thirteen hours old.”

In the four Summer months of 1895, 64,000 six and eight-ounce bottles were dispensed in Yonkers, and in the season of 1896 the number

was increased to 78,300 bottles. Owing to the limited size of the town the effects could be closely observed and the individual cases carefully studied. A study of the vital statistics of the city reveals the fact that the average number of deaths of children under five in the months of June, July, August and September in the years 1892, 1893, 1894 and 1895 was 162. In the same period in 1896 the number was 135, a decrease of 27 deaths, or seventeen per cent. The average number of deaths for the four years from digestive troubles was 91, while in 1896 the number was only 48, a decrease of 43 deaths, or forty-seven per cent. The increase of population in Yonkers from 1880 to 1890 was seventy per cent., and there is every reason to believe that the same ratio has been maintained since 1890. The other causes of death among children show an increase of thirty-seven per cent. and the number of deaths among persons over five years of age shows an increase of twenty-two per cent. These increased percentages would represent about the increase of population in five years, so that not only is there apparently traceable to the use of pasteurized milk foods an arrest of the ordinary increase of mortality among children, but there has been established a positive decrease in face of a rapidly growing population. Confining the comparison to digestive troubles alone, there has manifestly been a saving of forty-three lives in the short space of three months in a town of less than 40,000 people. It is the testimony of Dr. Getty that there has been no material change in either the hygienic condition or the milk supply of Yonkers during the summer of 1896 as compared with that of previous summers.

By way of bringing out more clearly the significance of the reduced death rate in Yonkers, the statistics of the neighboring cities of Hoboken, Long Island City, and Newburgh have been tabulated by Dr. Getty. The following is a summary of the tabulation:

1—Hoboken. The average number of deaths among children under five for the four summer months of the years 1892, 1893, 1894 and 1895, was 289. In the same period in 1896 the number reached 352, an increase of twenty-two per cent. The number of children dying from digestive troubles averaged 104; in 1896 the number was 110, an increase of 5.8 per cent.

2—Long Island City for the same period shows an average of 225 deaths among children under five; in 1896 the number was 257, an increase of 32, or fourteen per cent. The deaths from digestive troubles averaged 90, while in 1896 they reached 115, an increase of 28 per cent.

3—Newburgh for the same period shows an average of 75 deaths among children under five; in 1896 the number was 72, a decrease of four per cent. The deaths from digestive troubles averaged 30; in 1896 they numbered 43, an increase of forty-three per cent. It should be noticed that Newburgh has 12,000 less of population than Yonkers, and that the milk supply is excellent, as it is the largest town in a noted dairy county, and the milk is brought in fresh twice a day in farmers' wagons.

In these three cities the average number of deaths among children was 589 from 1892 to 1895, while in 1896 the number was 681, an increase of 92 deaths, or fifteen per cent. The deaths from digestive troubles averaged 224; in 1896 the number reached was 268, an increase of 44 deaths or twenty per cent. This increase of twenty per cent. is about equivalent to the normal increase due to the growth of the cities; while in Yonkers, with a rapidly expanding population, there is a decrease of seventeen per cent. in deaths among children, and a decrease of forty-seven per cent. from digestive troubles, more than offsetting the increased percentage of other causes of death under five years of age. As Dr. Getty puts it, "there is no need for further argument—these figures speak for themselves."

I think I have fairly demonstrated the proposition that many thousands of infant lives are annually sacrificed by the neglect to supply for the nutriment of children milk which has been subjected to the process of pasteurization. I hold that neglect to be criminal, and I leave it to you to fix the responsibility for it. We punish murder with the penalty of death, and yet we allow murder to be committed by the wholesale in every populous community of this land, with no thought of its punishment, and little thought of its prevention. I have advocated these ideas for years, though I am free to say that I have found nowhere less attention paid to them on the part of public authorities than in the City of New York, where I have done most to prove the sincerity of my belief in them. There is no reform which has not to encounter obstacles, sometimes from the ignorance or indifference of the people for whose benefit it is intended, and sometimes from the narrow selfishness of those who regard it as an interference with their opportunities for making money. But the most exasperating of all forms of opposition to public well-doing is that which comes from those who pervert the trust of public office to the satisfaction of a personal grudge, or the pursuit of a temporary partisan advantage. I have had enough experience of this in New York to force me to the conclusion that the man who sets himself to the task of doing good must be schooled into indifference against the shafts of obloquy and misrepresentation.

The work which I have outlined is legitimately public work, and to do it on a scale fully commensurate with the wants of a community like that of New York transcends the ability of any one individual who has not very great wealth at his disposal. I may add that no organization sustained by combined individual liberality could do it so well as that branch of the municipal government which is charged with the care of the city's health. The fact that some sinister caprice has moved the New York Board of Health to attempt to embarrass and discredit my work does not alter the fact that it is to them that the duty of taking up and carrying out this work belongs. A similar obligation rests on every municipal Board of Health in the country, and I am happy to say that all of them with which I have communicated, outside of New York, frankly recognize this fact. I regard it as more than sufficient reward for all the trouble which this work has brought me that it has not only been instrumental in saving many lives but has directed widespread attention to a necessity which has been too long neglected, and has commanded that most sincere of all forms of praise—imitation.

I appeal to you gentlemen who are charged with the responsibilities attending the government of cities, great or small, to study the conditions under which this work is done, and carefully note the results which attend the doing of it. I appeal to you as if you were standing beside a great river in whose current were constantly swept past hundreds of drowning infants. This stream is a very real thing if people would but recognize its existence, and all its yearly tribute of death is paid because of the public neglect of some of the simplest precautions for the saving of children's lives. You, gentlemen, have the means under your control by which these drowning babies can be saved. I ask you, Will you not apply them? Men are found capable of acts of heroism in presence of danger less threatening and less surely fatal. All that I plead for is the extension of the activity of local boards of health into a sphere which is legitimately theirs, but which they have, so far, lacked the conviction and the courage to occupy. I shall not have spoken in vain if I have succeeded in impressing you with the fact that the dictates of humanity and of public duty combine in demanding that this backwardness should exist no longer.



## WHY THE DISTRIBUTION OF PASTEURIZED (STERILIZED) MILK SHOULD BE A FUNCTION OF EVERY MUNICIPALITY.

**O**UR schools and universities are the finest in the world. We spend millions of dollars annually to prevent intellectual incapacity. Why not treat physical ailments in the same manner?

Prevent them.

Prevent helpless infants developing from a puny, sickly childhood into a diseased, weakened and helpless manhood and womanhood, and save, in so far as possible (and a great deal is possible), the enormous sum paid annually for the maintenance of hospitals and like institutions.

Since it is one of the functions of our government to provide means of curing disease, why is it not within its province to furnish the agents of its prevention?

Milk is the one article of food in which disease and death may lurk without giving any suspicion from its taste, smell or appearance.

If the Pasteurizing of the entire milk supply were made the function of the municipality, it would be an exceedingly clever business investment, for the money expended would be returned a hundred fold. This is looking at it from a practical, commercial standpoint, besides which, from a humanitarian point of view, the amount of suffering and disease which would be prevented is incalculable.

“It is estimated that one-third of the children die before they are three years old, and one of the leading causes of infant mortality is impure milk.”

U. S. DEPARTMENT OF AGRICULTURE.

“Numerous outbreaks of typhoid fever have been reported where there was no doubt about the milk supply being the carrier of the germs. Outbreaks of diphtheria have been traced to milk from farms where diphtheria has been known to exist in the families of the attendants. The same is reported of scarlet fever and cholera. Pasteurization or sterilization of milk is the only safeguard against such dangerous diseases, as this process destroys all the disease germs.”

U. S. DEPARTMENT OF AGRICULTURE.

Thousands of infants' lives are needlessly sacrificed annually by impure milk. No system of milk test or examination now in operation or capable of being generally applied is sufficient to protect the lives of

young children against the noxious germs present in a large portion of the milk delivered in its natural state in cities.

Dr. Shakespeare, of Philadelphia, an eminent authority, states that nearly, if not quite, one-half the deaths in cities in this country are due to that class of diseases which are known to be preventable. Chief among these preventable diseases are the diarrhoeal disturbances of young children, and the prime agent in the production of these is impure milk.

This state of affairs was brought to my attention in 1892. After making a thorough examination of the subject and taking counsel with physicians at home and some who were accepted as authorities in Europe, I began to experiment as to what could be done to bring absolutely pure milk, and milk fitted for infant consumption, within the reach of those who needed it, particularly the poor. I found medical testimony absolutely unanimous as to the requirement of perfect sterilization (Pasteurization) for all milk intended for food in cities. I accordingly established a sterilizing laboratory, and began the dispensing of pure milk, both in its natural and sterilized form, from one booth in one of the most thickly populated districts of this City. The system of sterilization adopted was that of Dr. Rowland G. Freeman, of New York. This system combines the preservation of the nutritive qualities of the milk and the complete destruction of all noxious germs.

This work was begun in 1892, when 34,400 bottles were distributed, and each succeeding year enlarged and widened in scope, until the present year, up to date, 596,677 bottles have been dispensed and 812,921 glasses of milk drunk on the premises. Its results can be more eloquently told by the statistics of the Health Department than by any words in my vocabulary. The following table gives the population, deaths and death rate of children under five years of age, and shows that the death rate per thousand was gradually decreased from 96.5 in 1891 to 62.8 in the year just passed.

#### POPULATION, DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE.

Year.	Population.	Deaths.	Death Rate Per Thousand Per Annum.
1891	188,703	18,224	96.5
1892	194,214	18,684	96.2
1893	199,886	17,865	89.3
1894	205,723	17,558	85.3
1895	212,983	18,221	85.5
1896	216,728	16,807	77.5
1897	220,641	15,395	69.7
1898	224,736	15,591	69.4
1899	229,029	14,391	62.8



Statistics of the deaths and death rate for the three hottest months of the year, June, July and August, when the peril to child life is greatest, and, consequently, the distribution of sterilized milk the largest, demonstrate more convincingly to what degree the culpable sacrifice of infant life may be arrested.

DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE YEARS OF AGE FOR THE MONTHS OF JUNE, JULY AND AUGUST.

Year.	Population.	Deaths.	Death Rate.
1891	188,703	5,945	126.0
1892	194,214	6,612	136.1
1893	199,886	5,892	117.9
1894	205,723	5,788	112.6
1895	212,983	6,183	116.1
1896	216,728	5,671	104.7
1897	220,641	5,401	91.3
1898	224,736	5,047	89.8
1899	229,029	4,689	81.8
1900	233,537	4,562	78.1

The rate of infant mortality is here shown to have continuously decreased since the establishment of the Pasteurized (sterilized) milk booths from 136.1, in 1893, to 78.1, in the present year. These cold figures are fluent and powerful evidence of the beneficence of this work of placing Pasteurized (sterilized) milk within the reach of every poor family in Manhattan, and of its efficacy in routing the forces of disease and death.

Confining the comparison to deaths from diarrhoeal diseases during the two most fatal months of the year, July and August, we find the following state of affairs: For the three years 1890-1892 the total number of deaths from diarrhoeal diseases during the months of July and August was 6,122; for the three years 1894-1896 the total number during the same two months was 5,262, showing a saving of 860 deaths in the presence of an increase of average population from 1,700,000 to 1,970,000; for the three years 1897-1899 the total number during the same two months was 4,050, showing a still further saving of 1,212, with a still greater population.

As a mere hint of what might be accomplished by municipal ownership and municipal operation of plants for the Pasteurization of the milk supply of cities, the results of the establishment of a plant in the Infant Asylum at Randall's Island, New York City, may be quoted:

In 1897 the death rate amongst the waifs picked up in the streets of New York and taken to this hospital was 44.36, a rate so high as to become a matter of grave concern to those in charge. I asked permission

to supply the Asylum with all the Pasteurized milk they required. This offer was declined, and the appalling death rate continued. Finally, in 1898, I secured permission from President John W. Keller, of the Department of Charities, to install in this asylum a complete plant for the Pasteurization of milk foods. The following statistics, furnished by the Department of Charities, show the result of the first attempt at municipal proprietorship and operation of a milk Pasteurizing plant:

1895	Children treated	.....	1216
	Deaths	.....	511
			42.02%
1896	Children treated	.....	1212
	Deaths	.....	474
			39.11%
1897	Children treated	.....	1181
	Deaths	.....	524
			44.36%

The Pasteurizing plant was installed in the early part of 1898, and the death rate immediately dropped as follows:

1898	Children treated	.....	1284
	Deaths	.....	255
			19.80%
1899	Children treated	.....	1097
	Deaths	.....	269
			24.52%

What may we call this heedless, needless, sacrifice of infant life? In the face of these facts, is it too strong to call it MURDER, PERMITTED MURDER? When the news of a railroad wreck and accompanying loss of life is telegraphed across the continent, it is followed by a shudder of horror, and if any life-saving precautions have been lacking there is raised a cry of vengeance against the "soulless" corporation, whose duty it is to provide every safeguard for life. But what of the thousands of infants whose lives pay the penalty of lack of precaution? No shudder of horror passes over the land; no cry for reform is raised, *yet just as surely as the proper precaution would have prevented that railroad catastrophe, just so surely would the lives of the thousands of these helpless infants be saved did our municipal authorities adopt the preventive measures here shown to be effective.*

*Nathan Straus*

## INFANTS' MILK DEPOTS.

PAPER OF NATHAN STRAUS, OF NEW YORK, READ BEFORE THE  
BRITISH MEDICAL ASSOCIATION AT ITS ANNUAL MEETING,  
JULY 24th TO 28th, 1905, AT LEICESTER, ENGLAND.

THE conditions of a wholesome milk supply, though sufficiently simple, are extremely difficult of attainment. These conditions are: healthy cows, clean stables, careful processes of milking, and prompt transfer of the milk in perfectly clean and close vessels from the cows to the consumer. When I first became interested in this subject, thirteen years ago, I found all of these requisites flagrantly violated in the milk supply of the great cities of this country. The inspection of cow stables to detect the presence of disease was neither careful nor constant; milking was done, in most cases, under conditions indescribably filthy, and most of the milk served to families was from 36 to 48 hours old before it reached them. The systems of milk inspection which were then adopted were directed almost solely to the detection of two abuses—skimming and adulteration with water, and to cutting off the supply of one kind of diseased milk, that drawn from tuberculous cows. The latter duty has usually been performed by State officers; the former is an exclusively municipal function. The public inspection of milk in the United States was thus, up to a recent date, directed mainly to the prevention of fraud, and rarely, if ever, to the discovery of pollution. Except as to the stamping out of tuberculosis, considerations affecting the public health received only incidental attention. As Professor Sedgwick said, some twelve years ago, in regard to Boston, “public milk supplies may not legally be watered, but they may be stale, or polluted, or infected.”

It appeared to me, as it had to previous investigators in this field, that the time had come when we should be no longer satisfied with merely preventing the cheating connected with lowering the nutritive quality of milk, and that some systematic effort should be made to restrain its influence in the propagation of disease. It needed no expert knowledge to recognize the fact that polluted or stale milk carried with it the seeds of disease and death. While we have in pure, sound milk nature's most perfectly combined elements of nutrition, I found that there was practically no milk delivered for general consumption in Amer-

ican cities that was fit to be used in its natural state. It needed but little reflection to be impressed with the fact that no plague by which a city was ever ravaged had yielded so plentiful a crop of deaths as that which is reaped every year from the seeds of contagion deposited in the infant system by millions of noxious bacteria developed in milk.

When this subject first engaged my attention, I found as to New York City (forming the present boroughs of Manhattan and the Bronx in the greater city) the following state of facts: The recorded births of the three years 1890-92 were 135,602; allowing for the fact that only five-sixths of the actual number are believed to be reported to the Board of Health, the real total may be placed at 162,721. During the same period, the deaths of children under five years of age were 52,213, or over thirty-two per cent. of the whole number of births. That one child out of every three that were born should die before attaining the age of five seemed to me like part of a system of permitted murder. The further fact that from fifteen to eighteen per cent. of all of these deaths occurred in the five weeks between July 3d and August 6th indicated the true source of the trouble. In 1891, the number of infant deaths in these five weeks was 2,658; in 1892 it was 3,440, an increase of 782. Coming down to the specific causes, it was found that diarrhoeal diseases accounted for about half of all this infant mortality. In the five weeks in question, the deaths of children under five from this group of diseases was 1,209 in 1891, and 1,617 in 1892.

Here was the evidence of a steadily increasing infant mortality in the hottest season of the year, traceable to a cause usually associated with the poisons bred in cow's milk more abundantly at that season than at others. It was not a violent assumption that much of this mortality was preventable, and that the most direct and effectual method of prevention was to place milk suited for infant nutriment within reach of the poorest. After making a thorough examination of the subject, and taking counsel with physicians both at home and abroad, I began to experiment in 1893 with one milk depot. More than a thousand sick babies were fed on the Pasteurized and modified milk preparations, as to whose necessity for infant food I found medical testimony practically unanimous. Most of the children were ill with cholera infantum, and the benefit due to the improvement in their food was immediate and amazing. The system of Pasteurization adopted was that prescribed by Dr. Rowland G. Freeman, of New York, by which the milk was exposed for twenty minutes to a temperature of 167° Fahrenheit. It has been demonstrated that tubercle bacilli die at 158° Fahrenheit, when submitted to that temperature for ten minutes. It is therefore reasonably certain that by this process all noxious germs in the milk are completely de-

stroyed, while the nutritive qualities of the most perfect of nature's foods are not sensibly impaired. I had a special preparation for babies' food made according to a formula supplied by Dr. Freeman. To this I added another from a formula supplied by Dr. A. Jacobi, and both have been sold in my depots ever since, as follows, at a uniform price of five cents:

5—6 oz. bottles	Formula	No. 1, or
5—6 oz.	“	“
8—3 oz.	“	No. 2;
8—3 oz.	“	“
8—3 oz.	“	No. 3, or
8—3 oz.	“	“
2—16 oz. bottles	Pasteurized	Unmodified Milk.

In addition to these modified milk foods, barley flour has been sold. This was intended to meet a want keenly felt by the poor of wholesome nutrition at a price within their means for children beyond the infant state of growth.

The first year's experience showed me that the indirect results of my efforts were quite as valuable as those that could be directly traced to them. The standard of quality of the milk supply of the poor had been raised in the whole area adjoining my milk depot, the people being quick to discern the superiority of an article furnished at a low price over the more or less tainted and also more costly one they had been accustomed to use. The visiting physicians of the Board of Health and all physicians doing charitable work among the poor have been, from the beginning of my work, supplied by me with all the Pasteurized and modified forms of milk which they required, free of expense.

It has been my effort, from the first, to have the milk sold at my depots so drawn, handled and transported as to reduce to a minimum the chances of pollution. The milk is cooled thoroughly before shipment; kept cool in the process of transportation; and, on arrival at New York, is at once taken to the main laboratory and placed on ice, preparatory to being turned into the bottles to go through the process of Pasteurization. Before this, however, it is run through a separator for the purpose of freeing it from all mechanical impurities. It has been a rigidly observed rule that, without respect to demand, no bottle of Pasteurized milk should be sold twenty-four hours after its preparation. Experience has taught my staff not a little as to the details to be observed in the effort to secure the most perfect results, but these are the main lines on which the work has been conducted.

In 1894, preparations were made to supply natural, Pasteurized, and modified milk on such a scale and at so many different depots as might make a perceptible impression on the milk supply of New York, and so reduce the sum of its infant mortality. The character of the Summer was well calculated to put the experiment to a severe test. The average

temperature of the latter part of June, of the whole of July, and of part of August was unusually high, and much higher than that of the preceding year. For the first quarter of the year, the mortality of children under five showed more than the proportional increase which might be expected from the increase of population, the ratio of which was about three per cent. per annum. There were 4,108 children's deaths in the first quarter of 1894, or ten per cent. increase over the same period of 1893. For the second quarter, the deaths in 1893 numbered 4,386, and in 1894, 4,483. As in the second quarter my milk depots were open, I was encouraged to believe that this arrested increase might in part be due to their influence. The mortality statistics for July and August confirmed me in this belief. For July, 1893, the deaths of children under five numbered 2,796, while for the same month of 1894 they were only 2,562. In August, 1893, they numbered 1,686, declining in the same month of 1894 to 1,559. Thus, instead of the increase of ten per cent. in the mortality of children with which the year had started, the two most fatal months of the year showed a decrease of 8.3 per cent. The deaths under five years for July and August, which, had they followed the rate of increase established during the first quarter of the year would have numbered 4,930, were only 4,111. Here was an apparent saving of 819 lives in two months, or a decrease of the toll levied by death on the children of New York of sixteen out of every hundred.

The year 1895 was one of relatively high mortality in New York, the death rate being 23.11 per thousand, against 22.76 per thousand in 1894. But it is a striking fact that while the total increase in the number of deaths was 2,245, the increase in the deaths of children under five years of age was only 663. As these latter accounted for 41.9 per cent. of the total number of deaths, and for only 29.5 per cent. of the increase, the evidence seemed conclusive that decided progress had been made in the saving of infant lives. In 1896, the death rate was 21.52 per thousand, the number of deaths decreasing as compared with the previous year by 1,798. Of this decrease, 1,414, or over 78 per cent., was due to the reduced number of deaths of children under five years of age. During the three months of June, July and August, there was a decrease of 512 deaths of children under five, as compared with the previous year. Still more striking was the decrease in the number of children's deaths in 1897; while for the eight months ending August, the deaths under five were 12,734 for 1896, and 13,287 for 1895, they were only 10,962 for 1897. For June, July and August, the deaths under five years of age numbered 5,041 in 1897, against 5,671 in 1896, a decrease of 630, or about 11 per cent. A comparatively cool summer had something to do with this sudden fall in the infant death rate, and to the improved sanitary conditions

of the city must be accorded their fair share of credit, but, as every physician knows, neither a slight fall in the average summer temperature nor cleaner streets and better regulated tenements will greatly abate the prevalence of infant diarrhoea, if the feeding bottles contain the germs of disease.

The following table shows that even the comparatively low level of infant mortality reached in 1897 has been considerably improved on in more recent years :

POPULATION, DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE.

Year.	Population.	Deaths.	Death Rate per thousand per annum.
1891	188,703	18,224	96.5
1892	194,214	18,684	96.2
1893	199,885	17,865	89.3
1894	205,723	17,558	85.3
1895	212,983	18,221	85.5
1896	218,544	16,907	76.9
1897	222,387	15,395	69.2
1898	226,515	15,591	68.8
1899	230,842	14,391	62.3
1900	235,386	15,648	66.5
1901	240,166	14,809	61.6
1902	245,201	15,019	61.2
1903	250,518	14,402	54.8
1904	256,137	16,137	63.0

Assuming, as I think I have some right to do, that the steady decrease above indicated in the infant mortality of New York during the last eleven years has been closely related to the work of my milk depots, it is instructive to note that, while in 1893, the year before my service was on a sufficiently large scale to be a recognizable element in the milk supply of New York, the death rate of children under five was 89.3 per thousand, it had been reduced by 1897 to 69.2 per thousand. The reduction continued somewhat irregularly since that year and reached its lowest figure in 1903, when the rate fell to 54.8 per thousand. But perhaps the most impressive demonstration of the saving of infant lives which has been effected in New York since the beginning of my work is to be found in the fact that while the average mortality among children under five for the quinquennial period 1891-5 was 90.6 per thousand per annum, the rate for the five years 1900-4 was 61.2 per thousand—a reduction of 32.4 per cent. or, to put the case in another way, the increase in the infant population of the city, on the average of the two periods compared, was 22½ per cent., but while the annual average of

deaths in this population in the five years 1891-5 was 18,110, it was only 15,203 in the five years 1900-4. Obviously had the ratio of deaths to population in the first quinquennial period represented the mortality of the last one, we should have had an average of 22,185 infant deaths per annum, so that the saving of infant lives effected in the ten years during which my infant's milk depots have been fully equipped and organized is not less than 6,982 per annum. By pushing the comparison back to a period antedating any effort to improve the milk supply of New York, a still more striking saving of life could be shown. There has, of course, been a continuous improvement in the sanitary conditions of the city during the period under review, but I think I am right in the assumption that these are insufficient to account for the results I have summarized in the absence of any successful effort to place Pasteurized milk food within reach of the children of the poor.

This assumption becomes invested with a certainty of a demonstration when the following table is examined of the infant deaths and death rate for the three hottest months of the year, June, July and August, when the peril to child life is greatest and the distribution of Pasteurized milk has been on the largest scale.

**DEATHS AND DEATH RATE OF CHILDREN UNDER FIVE YEARS OF AGE.  
FOR THE MONTHS OF JUNE, JULY AND AUGUST.**

Year.	Population.	Deaths.	Death Rate.
1891	188,703	5,945	126.0
1892	194,214	6,612	136.1
1893	199,886	5,892	117.0
1894	205,723	5,788	112.6
1895	212,983	6,183	116.1
1896	218,544	5,671	103.8
1897	222,387	5,401	90.7
1898	226,515	5,047	89.1
1899	230,842	4,689	81.2
1900	235,386	4,562	77.5
1901	240,166	4,642	77.3
1902	245,201	4,389	71.6
1903	250,518	4,037	64.5
1904	256,137	4,805	74.5

It will be perceived that in the year before I began the systematic prosecution of my work, the infant death rate for the summer quarter reached the appalling figure of 136.1 per thousand of the population under five years of age. Last year the ratio was reduced to 74.5 per thousand. In other words, had the infant mortality of the same quarter of 1892 been reproduced, relatively to the population, in 1904, the num-



ber of deaths would have been 8,725, instead of 4,805. I do not think it is a hasty induction from the facts to claim that the most important element in the saving of these 3,920 infant lives has been the improvement of the character of the milk food supplied to the children of the New York poor.

An interesting and very convincing illustration, on a small scale, of the good results attending the Pasteurization of milk food for children is furnished by the history of the establishment of a plant in the Infant Asylum at Randall's Island, New York.

In 1897 the death rate amongst the waifs picked up in the streets of New York and taken to the hospital of this institution was 44.36 per cent., a rate so high as to become a matter of grave concern to those in charge. I asked permission to supply the Asylum with all the Pasteurized milk they required. This offer was declined and the appalling death rate continued. Finally, in 1898, I secured permission from President John W. Keller, of the Department of Charities, to install in this Asylum a complete plant for the Pasteurization of milk foods. For the three years preceding this installation, the ratio of deaths to the number of children under treatment was as follows:

1895	Children treated:	1,216
	Deaths:	511
	42.02 per cent.	
1896	Children treated:	1,212
	Deaths:	474
	39.11 per cent.	
1897	Children treated:	1,181
	Deaths:	524
	44.36 per cent.	

The Pasteurizing plant was installed in the early part of 1898, and the death rate immediately dropped as follows:

1898	Children treated:	1,284
	Deaths:	255
	19.80 per cent.	
1899	Children treated:	1,097
	Deaths:	269
	24.52 per cent.	
1900	Children treated:	1,084
	Deaths:	300
	27.68 per cent.	
1901	Children treated:	1,028
	Deaths:	186
	18.09 per cent.	

1902	Children treated:	820
	Deaths:	181
	22.07 per cent.	
1903	Children treated:	542
	Deaths:	101
	18.63 per cent.	
1904	Children treated:	345
	Deaths:	57
	16.52 per cent.	

In short, had the same ratio of deaths to the number of children treated been maintained in this institution during the last seven years which was established during the preceding three years, the number of deaths would have been 2,604 instead of 1,349. It would be difficult to find a more impressive demonstration of the value of the use of Pasteurized food in the feeding of infants. The demonstration was all the more striking because no other change whatever had been made in respect to either diet or hygiene in the management of the institution.

If it be conceded that the direct and indirect influence of my milk depots has had a perceptible influence in lowering the annual infant mortality of New York, it must follow that the work of these depots so extended as to include practically the whole milk supply of the infant population of the city would make a much more decided impression on the death rate. An organization so comprehensive as this would require belongs to the sphere of municipal rather than of private effort. I am at present engaged in the building and equipment of a new laboratory, with a Pasteurizing plant of much larger capacity than that which I now employ. That the limit of the capacity of my present establishment is being rapidly reached may be inferred from the subjoined figures, showing the increased monthly demand of the present year as compared with the corresponding months of 1904. The figures represent the various sizes of bottles, and are thus merely a general indication of the amount of milk consumed:

#### BOTTLED MILK DISPENSED FROM THE STRAUS DEPOTS.

	1904 BOTTLES	1905 BOTTLES
January .....	162,903	198,928
February .....	153,274	196,579
March .....	178,813	238,313
April .....	171,617	244,665
May .....	172,196	261,387
June to 15th.....	79,219	133,058

As there is a fractional loss on every bottle of milk sold, taking no account of the thousands distributed to families who are unable to pay for them, it is obvious that the work in which I am engaged must, at the present rate of expansion, shortly transcend the bounds of private effort. No better proof of its utility could be given than the remarkable elasticity of the demand now fairly established for my milk foods. The tenement house population of New York have learned their value in the saving of children's lives, and I contemplate with dismay the time when any organization which I am able to provide will be inadequate to supply the demand for them. I can only trust that before that time arrives the city itself may be prepared to accept the obligation, which no other agency can so well discharge, of making the supply of a wholesome milk food for infants a municipal function, and so stamping out the seeds of a plague more destructive than any that is to be dreaded under the conditions of our modern civilization.





# PURE MILK OR POISON?

REMARKS BY MR. NATHAN STRAUS.

Addressed to the Milk Conference held at the New York Academy of Medicine,  
November 20, 1906.

**M**OST of you gentlemen are professional men and your time here is limited, and I am not going to waste it by talking to you about things you know already. I have, however, prepared a little statement which I will hand to you and you can read it at your leisure. What I am anxious to accomplish at this meeting is to get your co-operation in securing legislation that shall deal in a more practical way than we have yet been able to do with this question of pure milk. It must be obvious to you that the resources now at the command of the State Board of Health, or any other Department that may be invested with the required powers, are entirely inadequate to the purpose of stamping out tuberculosis among cows.

It must be equally plain that were these resources amply sufficient for the requirements of our own State, they would have to be provided and applied by the neighboring States which contribute so largely to the milk supply of this city.

Then, as to Federal supervision, milk demands, as an article of interstate commerce, a kind of inspection which even the sweeping requirements of the Pure Food Bill do not provide.

All this will doubtless be accomplished in time, but until that time does arrive, it seems to me that the City or the State should provide pasteurization for the entire milk supply, without any cost to the producer or the consumer. With the co-operation of you gentlemen, this can be done.

I HAVE TRIED PASTEURIZATION, TRIED IT PRACTICALLY, AND UNTIL YOU CAN SHOW ME SOMETHING BETTER I MAY BE PARDONED FOR BELIEVING THAT PASTEURIZATION IS THE THING.

Then let us arrive at some definite conclusion, and let us do it with all the more resolution because whatever we do here in New York will be copied in every City and State of the Union.

I ought to know something about milk. I have been working at the practical end of it for a good many years now. At the outset, I ad-

dressed a public who had hardly begun to realize the waste of human life due to the use of milk carrying with it the germs of disease.

Had I been a man of scientific attainments, so that my statements would carry the weight of scientific authority, I should probably have accomplished more than I have done. But I have at least had the satisfaction of contributing to a great awakening of public interest in this vitally important question.

*Partly, at least, because of my own efforts, I have seen State and Municipal Boards of Health address themselves seriously to the primary requirements of a pure milk supply. I have even had the satisfaction of seeing hasty scientific conclusions in regard to the harmlessness of the bovine tubercle bacillus in the human system proved inaccurate. Finally, I have had the satisfaction of seeing the death rate among the children of the City of New York under five years of age reduced from 96.5 per 1,000 to 63 per 1,000 per annum.*

I need not enlarge on the harm wrought by some of the mistaken conclusions reached by men of science among people who are only too prone to be lulled into a false security. But I am sure that I address to-day a body of men as fully impressed as I am with the importance of this question, and I am encouraged to believe that this meeting will reach a conclusion calculated to advance the problem a long step nearer to solution.

## STATEMENT.

The greatest task confronting humanity to-day is the conquering of disease.

We have met to discuss what we can do in our feeble way in the direction of solving a question of vital importance, and I say to you that the phase of the problem which we are to consider has not received the attention its surpassing needs deserve.

I have been criticised for preaching the danger of our milk supply, for saying that the most destructive of all agents of disease and death is the common, ordinary milk offered for consumption in our cities. I welcome this criticism, because it is only through discussion and agitation that the public is aroused.

I think it requires no argument to prove that our milk supply, even with all the precautions thrown around it, needs further and radical reform, but I do not believe that it is generally understood to what degree it is responsible for suffering and death, particularly among young children.

You know that in this country one child out of every three that are born dies before the age of five is reached, and I claim that the majority of these deaths *are preventable*.

I can conceive of no work that should appeal more strongly to a people or to a government than the saving of infant lives.

Scientists are devoting their best efforts throughout the world to finding remedies for the prevention and cure of the world's greatest scourge, the most dreaded and deadly of diseases—Consumption, well named the "White Plague."

Last year in the International Tuberculosis Congress held in Paris, Professor von Behring expressed the opinion that one of the most useful results of the Congress was the acceptance of the fact by all the delegates that bovine tuberculosis is transmissible to human beings, the bovine bacilli being more dangerous even than are the human bacilli.

Fourteen years ago I lived in the Adirondacks, and to be sure of having pure milk for my family, we kept our own cow. One day the cow fell sick and died suddenly. We thought she had been poisoned and called in a veterinary surgeon. He found the cause of her death easily enough—her lungs had been eaten away with consumption.

So you see that when we thought we were drinking pure, wholesome milk, we were taking into our systems the germs of disease. From that time, no more raw milk was used in our family.

That was fourteen years ago. Now I will tell you of a recent experience to prove to you the correctness of my convictions. I met one of our prominent butchers a short time ago, and we talked about pure food. I asked him to tell me something about the condition of the cows slaughtered for this market. He told me that out of a herd of one hundred and eleven that he recently bought, twenty-seven were found to have diseased lungs—were far gone in consumption. He also said that about ten per cent. of all cows bought for slaughter in this market were afflicted with the same disease.

I asked his permission to use this information, and though for obvious reasons he did not wish me to use his name, he sent me a letter, which I have as proof of the statement.

Another fact which has come to my knowledge is that in one of the greatest dairy farms of this State, stocked with high-bred, registered cows, last year over one hundred had to be killed because they had developed consumption. This occurred on a farm where to my personal knowledge the most scrupulous cleanliness prevails, and where every-

thing is conducted on the most thorough scientific principles of sanitation. If I had been asked, "Is there any milk brought to this market fit for use in its raw state?" I should have unhesitatingly recommended the milk from this farm as the best.

Not long ago I had a letter from a very wealthy resident of this city, a man whose name you all know. He wrote me that to prevent any possibility of the milk provided for his little son being impure, he had built a new cow barn at his country place, and at great trouble and expense selected eight of the finest and best bred young cows, registered Alderneys, for his private use. One of the cows took sick shortly after, and he had her killed. A post-mortem developed that the cow had tuberculosis. He then had the remaining cows tested by a representative of the State Agricultural Department, and he pronounced *five of the remaining seven cows tubercular*.

And he cried out to me: "Where and how can I get milk fit to give my child?"

Thirteen years ago I was asked by the Editor of the *Forum* to write an article for his publication on the necessity for pure milk.

I did so, and my article was returned to me with the request that I eliminate a certain paragraph—he said it was too radical, too daring. The paragraph was as follows, which was finally printed as a foot note:

"Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it a special susceptibility to tuberculosis."

Thirteen years ago I believed that the pasteurization of milk was the only remedy. To-day I KNOW IT.

In June, 1895, Dr. Jacobi, in endorsing the use of pasteurized milk, wrote me: "There is nothing so instructive as a success, and a single practical proof speaks louder than any number of volumes." Therefore, I will cite the case of a public institution where the death rate of the children was so high that it became a public scandal. This was on Randall's Island. Though the city had their own herd of cows, which were kept on the Island, carefully tended and apparently in perfect health, they did not succeed in reducing the death rate below forty-four per cent. At that time I was President of the Health Board, and the institution came under my direct charge. I had a chance to study the appalling conditions that still prevailed there. After I had resigned



from this office, encouraged by the results I had already obtained in the city, I installed on the Island a complete plant for the pasteurization of milk. In the very first year of its operation, the death rate of the children made the astonishing drop of from 44 per cent. to 20 per cent. Remember, there was no other change made either in diet, hygiene or management of the institution. The rate was later reduced to the still lower figure of 16.5 per cent.

Just think of the enormous saving of lives if pasteurization were generally adopted.

I have done as much as one man could to establish and promote the use of pasteurized milk everywhere, but all that has been accomplished is merely a fraction of the good that could be done were the supply of pure milk made a municipal function as much as the supply of pure water. There can be no question but that the supply of milk everywhere should be pasteurized, not only that intended for infants, since the use of raw milk for adults is almost equally fraught with danger.

It has been said that the pasteurization of milk will not destroy the tubercle bacillus, but this assertion must have been made by some one not familiar with the process of pasteurization, or not familiar with the proofs on the subject.

Scientists agree that a temperature of 165 deg. for twenty minutes will destroy the tubercle bacillus. Dr. Smith, of Boston; Pearson of the University of Pennsylvania; Bang, of Copenhagen; Russell of the University of Wisconsin; Moore of the New York State Agricultural Department and Ravenel, of Philadelphia, all eminent scientists, are a unit in agreeing upon this. And as in the process of pasteurization the milk is heated to a temperature of 165 deg., and kept there for twenty minutes, it follows that the tubercle bacillus must be destroyed.

If it were possible to secure pure, fresh milk direct from absolutely healthy cows in any large city, there would be no necessity for pasteurization.

If it were possible to establish a system of public inspection and examination of milk which would prevent the supply of polluted milk, there would be no cause for pasteurization.

If it were possible by legislation to obtain a milk supply from clean stables, after a careful process of milking, to have transportation to the city in perfectly clean and close vessels, then pasteurization would be unnecessary.

But I am compelled to conclude, after years of study that these conditions are *absolutely impossible* of attainment.

Corrective laws have been passed, medical societies have directed their energies to a betterment of conditions, but I do not think it will be denied that a very large proportion of the milk now sold in New York City is unfit for consumption.

No agitation for a better milk supply, by whatever methods attempted, can be without good result, but I have preferred to direct my work to the attainment of positive results, and these I know can be attained by pasteurization only.

While efforts directed toward the prevention of contamination at the source of supply are attended by many difficulties, and the net results, therefore, are extremely small, such efforts should not be abandoned. On the contrary, even though milk be pasteurized, and I believe the time will come when the entire milk supply of all large cities will be pasteurized, there should be no relaxation of vigilance to prevent initial contamination.

In the course of years human ingenuity may have found a means of entirely eliminating disease; it is for us to do our share with the light that is given us.

Scientists play their part in adding to the sum total of human happiness, but the layman has no unimportant role. I believe the solution of the question before us is not scientific but practical. *It is not cure—it is prevention.*

Public opinion is the greatest force in human achievement to-day, and when the public have been sufficiently aroused to the fact that the prevention of disease is quite as essential as the erection and maintenance of hospitals for the cure of disease, we shall have the first requisite for intelligent legislation on this subject. Since the fact can easily be demonstrated that the conditions surrounding the milk supply of our city entail an appalling penalty of suffering, disease and death, surely prejudice, ignorance and criminal neglect of obvious precautions must have had their day.



# THE AMERICAN SOLUTION OF THE MILK PROBLEM.

PAPER BY MR. NATHAN STRAUS.

SECOND INTERNATIONAL CONGRÈS DES GOUTTES DE LAIT,  
BRUSSELS, SEPTEMBER 12, 1907.

**A**T the last Congrès International des Gouttes de Lait I was a solitary voice from America declaring that child life should be protected from infected milk by pasteurization.

To-day I come with the same message indorsed by the most distinguished scientists of my country and formally and officially promulgated by the Government of the United States of America.

Two years ago, at the Congress at Paris, I argued and pleaded for a policy that would save lives by the hundred thousand; to-day I have the honor and satisfaction to report most substantial progress toward the acceptance by my country of the milk programme then outlined.

For fifteen years I have sounded in America the warning that *raw milk kills*. In an article contributed to *The Forum*, of November, 1894, I made the following emphatic declaration:

"Here let me say that the penalty of disease and death, paid for the neglect of simple precautions in the use of milk, is by no means paid exclusively by the poor. Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it a special susceptibility to tuberculosis. In milk intended for infant nutriment perfect sterilization is an absolutely essential precaution; but, simple as the process is, it is not always certain, even in the homes of the rich, that it will be properly done. I hold that in the near future it will be regarded as a piece of criminal neglect to feed young children on milk which has not been sterilized."

These statements whose justice will be recognized by you, fellow members of this Congress, were received with incredulity in the United States. I was called an alarmist. The dangers to which I pointed were minimized by medical men of standing. For years Prof. George M. Kober, of Georgetown University, stood almost alone in declaring and proving the dissemination of scarlet fever, typhoid, and diphtheria by means of infected milk. No longer ago than May of this year, a medical commission characterized the danger of tubercular infection through milk as "Slight," but this was the dying gasp of the opposition to the pasteurization of the milk supply, which has crumbled away as ignorance has given place to knowledge.

While I persisted in warning against the use of raw milk, I provided pasteurized milk for the babies of New York City. This was regarded

as an amiable benevolence. The virtue of the enterprise, in the eyes of most people, was that it provided food for the poor at less than cost, or for nothing.

However, as the infantile death rate of New York City went steadily down, *from 96.2 per 1,000 in 1892 to 55 per 1,000 in 1906*, coincident with the increased use of pasteurized milk, the significance of my work became apparent, and the conviction spread that the virtue of the Straus milk was not its low cost, but the fact that the milk was pasteurized.

While this demonstration was going on in New York City, epidemics of infectious diseases in various parts of the country, especially in Boston and Chicago, were directly and indisputably traced to the use of raw infected milk, emphasizing the urgent need for action. Scientific men, studying the milk problem, were forced to decide that public safety demanded pasteurization, and in a notable statement of the problem as affecting New York City, Dr. Ernst J. Lederle, former Commissioner of Health, declared that pasteurization should be insisted upon in all cases in which there was no proof that the dairy herds were free from tuberculosis.

Investigations by Government experts, to which I shall make further reference, made clear the fact that the peril of tuberculosis in milk was *far greater and far more frequent* than had been generally understood. The studies of Prof. M. J. Rosenau, of the Public Health Service, proved that the advantages of pasteurization far outweighed the disadvantages, if there are any.

Finally, early this summer, the President of the United States became so convinced of the dangers of raw milk that he ordered a thorough official investigation of the whole problem, with a view to legislation by the Federal Congress.

These steps toward the protection of the people, and especially of the children, were the consequence of an awakening of the public intelligence and a stirring of the popular conscience. The people stood aghast at the revelation of millions of babies left daily at the mercy of disease germs hidden in the ordinary market milk.

#### INFANT MILK STATIONS.

In five American cities infant milk stations are now maintained and are achieving remarkable results in reducing infantile mortality.

In New York City, my own work has extended from one central station to seventeen depots and the output of pasteurized milk has in-

creased from 34,000 bottles in 1893 to 3,140,252 bottles and 1,078,405 glasses in 1906. A total of at least 3,500,000 bottles and 1,500,000 glasses is already indicated for this year. In addition, more or less efficient pasteurization is being done by dealers to the extent of about 300,000 quarts a day.

Early this summer the municipal government of New York adopted a forward policy in setting apart public funds for the building of model milk stations in the public parks in the congested tenement districts, but the city will depend upon private philanthropy to provide the supplies of milk to be dispensed at these stations. Several years ago, I gave the first impetus to the work in Chicago by the donation of a pasteurizing plant, and now the Milk Commission of the Children's Hospital Society, a private charity, maintains ten infant milk depots, from which 400,000 bottles of pasteurized milk were dispensed in 1906. But the good effect of this work, so far as it could be shown in the vital statistics of the city, was obscured by the ravages of epidemics of scarlet fever and diphtheria, caused by the infection of a large part of the city's daily supply of raw milk in two big dairy centers and by the neglect of the Health Authorities either to exclude this milk or to require that it be pasteurized.

In Philadelphia I was able to supply the means to make a practical demonstration of the value of pasteurization in preserving infant lives and have had the satisfaction of seeing that nine infant milk depots, maintained by the Modified Milk Society, in 1906 distributed 991,166 bottles of pasteurized milk, and that the percentage of mortality of children under five years has been reduced from 62 per cent. in 1901 to 47 per cent. in 1906. In like manner, as a direct result of my donation of a pasteurizing plant to St. Louis, the Pure Milk Commission of that city now maintains 15 depots and distributed 600,000 bottles of pasteurized milk in 1906.

Jersey City has adopted the infant milk depot plan as a municipal enterprise. Mayor Mark M. Fagan, recognizing the duty of the city to protect the lives of the children, has established a pasteurization plant and has opened four infant milk depots, all maintained at the public expense.

In Paris, in 1905, I said to the Congrès International des Gouttes de Lait:

"It is milk—*raw milk, diseased milk*—which is responsible for the largest percentage of sickness in the world. Milk is the one article of food in which disease and death may lurk without giving any suspicion from its taste, smell, or appearance.

"Why, then, use it in its raw form? Why ever trust it without due precaution?"

"I hold that the only safe rule is—Pasteurize the entire milk supply and make it a function of the municipality."

This statement, I believe, received the cordial assent of the scientific men of the Congress. I had been saying the same thing in America for thirteen years in the face of interested and persistent opposition, in the face of indifference and seemingly hopeless ignorance.

But I kept on saying this, with renewed courage, after the Paris Congress, and I now have the gratification of reporting to you that there is substantial agreement in America to-day, among all informed scientific men and public health officials, as to the perils of raw milk and the necessity for pasteurization.

One phase of the raw milk danger—and the most serious phase of all—the fact that raw milk is the common cause of tuberculosis—has been especially illuminated by the work of American scientific men.

Professor von Behring was a prophet when, in 1903, he said: "The milk fed to infants is the chief cause of consumption." Four years ago this statement savored of hypothesis: now it is proved scientific fact.

The announcement by Koch, that tuberculosis was not communicable to man from bovine sources, was followed by renewed investigations in various countries. Eminent investigators reviewed previous experimental work, repeated and extended researches upon this important point, with the unanimous conclusion that tuberculosis is communicable from animals to man, and from man to animals. Clinical operation affords abundant proof to confirm these results of experimental research.

I will not weary you with a recitation of the well-known conclusions of the British Royal Commission on Tuberculosis, which demonstrated the transmission of tuberculosis from the cow to the human being through milk, nor will I cite to you the similar findings of the German Imperial Health Office.

But I will briefly call your attention to the investigations of the Bureau of Animal Industry of the United States Government into the modes of tubercular infection. Thorough practical experiments and exhaustive tests made by Drs. E. C. Schroeder and W. E. Cotton, at the Experiment Station at Bethesda, Md., have proved that the presence of tubercle bacilli in milk is far more frequent than has been supposed to be the case. These experts have absolutely disproved the idea that the udder of the cow must be diseased in order to infect the milk, and they have demonstrated that the presence of a single tuberculous animal in the herd is sufficient to cause the infection of all the milk of that dairy.

The tremendous significance of this demonstration is apparent when we consider the estimate that from thirty to forty per cent. of the dairy cattle are tuberculous and recognize as probable that no untested herd is free from tuberculosis.

It is necessary at this point to quote only two paragraphs from Dr. Schroeder's work. He says:

"The presence of a single tuberculous cow in a dairy stable may be responsible for the introduction of infectious material into the milk of healthy cattle."

"Observations definitely show that the frequency with which milk contains tubercle bacilli is greatly underestimated, especially when it is milked in the customary way from tuberculous cows with healthy udders, or from entirely healthy cows in a tuberculous environment."

Dr. A. D. Melvin, Chief of the Bureau of Animal Industry, indorses the conclusions of Drs. Schroeder and Cotton in these words:

"The work as a whole shows that the general condition or appearance of a tuberculous animal gives no indication as to the time when it will begin to distribute tubercle bacilli and become dangerous; that the milk from all tuberculous cattle, irrespective of the condition of their udders, should be regarded as dangerous, and that even the milk of healthy cows, if it is drawn in the environment of tuberculous cattle, may contain tubercle bacilli."

This work of Dr. Schroeder was made public at about the time when the United States was startled by the disclosure by the Census Bureau of the fact that tuberculosis caused more deaths than any other disease, and Dr. Schroeder joined with Schloszmann and von Behring in the belief that tuberculosis, at whatever age it makes its appearance, may be due to tubercle bacilli introduced into the body through the intestines during the milk-drinking period of life.

It is the testimony of eminent surgeons of wide experience that abdominal tuberculosis (involving peritoneum, mesenteric glands and intestines) is more common among people living in the rural districts where *raw milk* is a universal article of daily food than among the inhabitants of cities, where raw milk is more costly and less easily procured.

Coincident with this advancing appreciation of the perils of tuberculous milk, the National Capital had an outbreak of typhoid fever that was traced to the milk supply and the U. S. Military Academy at West Point had eradicated typhoid from among the cadets by pasteurizing all the milk used at the cadets' mess. These circumstances led to the appointment of a joint committee, composed of experts of the Public Health Service and of the Department of Agriculture, to make a thorough inquiry into the sanitary relations of the milk supply of the District of Columbia.

The result of this inquiry was thus flatly stated in the committee's report:

*"The committee, in the interest of public health, strongly advocates clarification and pasteurization of all milk."*

The establishment of pasteurization plants by the District Government, or by private enterprise under the direction of the public health authorities, was urgently recommended, and the committee, "being so strongly impressed with the manifold dangers connected with the milk supply," recommended, for the meantime, until milk should be pasteurized at central stations, that housekeepers subject all milk used to home pasteurization by simply bringing it to the boiling point.

This report, adopted by the Secretary of Agriculture and indorsed by the Chief of the Bureau of Animal Industry, embodies the official policy of the United States Government in dealing with the milk problem.

For the purpose of putting this policy into force, the District of Columbia, the seat of the National Government, has adopted a classification of milk as follows:

Class I. Certified Milk, produced under ideal conditions from herds proved free from tuberculosis by the tuberculin test, handled by persons free from infection, put into sterilized bottles, delivered within twelve hours from the time of milking, and not to contain more than 5,000 bacteria to the cubic centimeter.

Class II. Inspected Milk, produced from cows proved free from tuberculosis, but under less perfect conditions than Class I, and not to contain more than 100,000 bacteria to the cubic centimeter.

Class III. Pasteurized Milk. All milk of unknown origin or which does not come up to the requirements of Classes I or II to be pasteurized by heating to 150° Fahrenheit (65° c.) for twenty minutes, or 160° Fahrenheit (70° c.) for ten minutes.

Thus a practical milk reform programme has been adopted for the District of Columbia, the seat of the National Government, and an example has been set for the other cities of the country.

Time will be required to extend this policy to the other centers of population, but the work inaugurated by the Federal authorities is being pushed by competent experts under the direction of Surgeon-General Walter Wyman, of the Public Health Service, and Assistant Surgeon-General Kerr, and I am warranted in believing that the pasteurization of milk, especially in the cities, will soon be required by Federal statute.



That this will mean a steady reduction in the infantile death rate, I can assert from experience; that it will mean an enormous decrease in the number of new cases of tuberculosis annually reported, I can assert on the authority of such names as von Behring, Schloszmann and Schroeder, and I think that none will venture to contradict me when they consider that pasteurization means the eviction of the tubercle bacilli from the milk bottles.

While the agitation for milk reform has to be kept up, we are no longer talking into deaf ears; mountains of prejudice have been removed. The light of knowledge has been shed upon the subject, and the people are concerned about the necessity of securing safe milk for their babies and themselves.

In America, though the Federal Government has indorsed our campaign for pasteurized milk supplies in an authoritative utterance, we have still to make this policy effective by securing mandatory legislation and by bringing health officers to the point of requiring the pasteurization of all doubtful milk.

The prevalence of misinformation respecting pasteurization, and the efforts of interested parties to confuse the public mind by disseminating misleading assertions, induced me this summer to open a bureau of information in the City of New York. Here I have gathered such statistics bearing upon the milk question as were readily accessible, and to these I hope to add reports of all new developments. I have begun correspondence with the various health departments of the civilized world and, also, with leading medical and scientific authorities, and have arranged for an exchange of information which should prove mutually profitable. The records gathered in this manner, and by the personal investigations of competent agents, will be at the service of members of this Congress, as well as other interested persons, and prompt and careful attention will be given to any communications from responsible sources. The official address of this bureau is, "Nathan Straus Depots For Pasteurized Milk, New York City."

I come from America to this Congress for the sole purpose of helping along a work in which I am deeply interested. As an evidence of that fact, I stand ready to supply pasteurizing plants, up to the number of twelve, for service in any place or places where the need of one is pressing and the means are lacking to provide it.





# STRIKING AT THE CAUSE OF TUBERCULOSIS.

BY NATHAN STRAUS.

**W**HEN American cities take the proper steps to compel the pasteurization of all milk used within their confines, the greatest victory in the battle against "The White Plague" will have been won. It is a dictum of medical and chemical science that while the properties of milk are of such a character as to endow it, on one hand, with almost ideally perfect qualities for the preservation of health and for nutriment, it may, on the other hand, become a terrific energy for the propagation of disease.

Milk is one of the most perfect "culture fluids," and the bacteria which get into it from external sources, after it is drawn, increase with almost miraculous rapidity. But it is not only from external sources that milk may be polluted. It may be drawn from cows already infected with the germs of tuberculosis, or whose organs show the ravages of the disease. Calves may be born tubercular because they are the progeny of tuberculous mothers and should they attain years of maturity, their milk must be highly impregnated with the tubercle bacillus.

Since no thoroughly efficient means of discovering the existence of this disease in milch cows has yet been provided by law, and since the thorough inspection of all the cows which contribute to the milk supply of a great city is next to impossible, the only path of safety in the use of natural milk is to see that the noxious microbes which it contains are killed. The process known as commercial pasteurization does not accomplish this, and the only way to have it satisfactorily performed is to expose the milk for twenty minutes to a temperature of 167° Fahrenheit.

This is not literally a precept of boiling. But *it is better to boil the milk than to take it in its natural state.*

The duty of pasteurizing or boiling all milk for consumption is an imperative one, and one that has been too long shirked.

We spend millions of dollars for our hospitals to cure disease, and we spend millions of dollars for our schools to educate the people. Why not devote a few millions to eliminating conditions which help so largely to fill our hospitals, and which, in so many cases, bring to an untimely end the lives of the graduates of our schools before they can take advantage of the benefits which they have received?

It is against the law in New York, and in most cities, to sell milk adulterated with water, even though the water may be pure. But while public milk supplies may not legally be watered, they may be stale or polluted or infected. That is to say, milk may be sold without detection bearing innumerable microbes fitted to breed tuberculosis, typhoid and scarlet fever. Whether through inefficiency, or lack of power, the health authorities of New York City do but little to furnish an effective check to the greatest known cause of infant mortality. This, too, in spite of the fact that the conditions are well known to them through reports and other information which I know have been brought to their attention.

The State law for the discovery and extirpation of cattle infected with tuberculosis is lamentably deficient. There is really nothing to check unscrupulous farmers from continuing the lives of diseased animals or from selling the milk which they yield in the regular market. Yet no less an authority than Professor von Behring, of the University of Marburg, and the discoverer of antitoxin, in his work on "The Suppression of Tuberculosis," says: "*The milk fed to infants is the chief cause of consumption.*"

Sir Frederick Treves, of the National Health Society of London (England), affirms in a recent lecture that "the absolutely reckless use of raw, unpasteurized milk is little short of a national crime, for which we are paying very heavily in ill health, disease and death."

Dr. Bryan Bramwell, of Edinburgh, asserts that "infection of milk is the *most important source of tuberculous disease.*"

In his latest book, "The New Hygiene," Elie Metchnikoff, the successor of Pasteur, emphatically confirms the above statements.

In our own country and State we have Professor Abraham Jacobi, who after studying the question for more than fifty years, entirely agrees with the findings of these foreign scientists. In a recent course of lectures before the students of Johns Hopkins University he lends his authoritative voice to the absolute necessity of pasteurization. When I began my work in New York, fifteen years ago, it was to Professor Jacobi that I went for advice, and he has lent me his professional and moral support ever since. I owe to him one of the formulas for the preparation of the modified milk which I am still using with the best results.

If it be true that "an ounce of prevention is worth a pound of cure," our cities would pursue a policy of enlightened economy by compelling milk pasteurization, for they would be making possible great reductions in their appropriations for the support of hospitals, to say nothing of raising the general standard of public health.

No one questions the duty of the commonwealth to spend millions of dollars to counteract the evils of popular ignorance, but is it not equally a public duty to prevent helpless infants from developing from puny, sickly childhood into diseased, weakened and helpless manhood and womanhood?

Milk is the one article of food in which disease and death may lurk without giving any suspicion of the fact in its taste, smell, or appearance. As a competent authority said years ago: "If milk gave the same outward appearance of decomposition or fermentation as is shown by vegetables, fish or meat, more than three-quarters of all the milk consumed in the metropolitan district would be condemned as unfit for human food; if its pollution could be perceived, it would be loathed; and if the disease germs could be as plainly seen as a pesthouse, the death-dealing milk would be as soon dreaded and shunned."

Why, then, use milk in its raw form? Why ever trust it without due precaution?

If you have no facilities for pasteurizing milk, boil it.

The only safe rule is to pasteurize the entire milk supply and make it a function of the municipality.

Do not run away with the idea that milk is necessarily good in proportion to the price paid for it or free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it a special susceptibility to tuberculosis.

In milk intended for infants, perfect sterilization is an absolutely essential precaution, but, simple as the process is, it is not always certain that it will be done properly, even in the homes of the rich. There will be a time in the near future when it will be regarded as a piece of criminal neglect to feed young children on milk that has not been pasteurized.

It is the testimony of medical science that nearly, if not quite, one-half the deaths in the cities of this country are due to the class of diseases which are known to be preventable. Chief among these preventable diseases are the diarrhoeal disturbances of young children, and the prime agent in the production of these is impure milk.

One-third of all the children born die before they are three years old, and the excessive rate of mortality expressed by this statement is traceable to the imperfections of the milk supply.

It is unquestionably true that no plague by which any community was ever ravaged has yielded so plentiful a crop of deaths as that which is reaped from the seeds of contagion deposited in the infant system every summer by millions of noxious bacteria developed in milk.

The United States Department of Agriculture has added its testimony to that of many physicians that pasteurizing or sterilizing of milk is *the only safeguard against the diseases of which milk is the most common vehicle.*

It is the testimony of medical experts that at least fifty per cent. of all the children who die have been infected with tuberculosis through their infant nutriment, and that one-seventh of all deaths, infant and adult combined, are due to tuberculosis.

If, then, pasteurization of milk is conceded to be effective in exterminating the germs of the fatal disease of which milk is the chief carrier, and if by this process the fifty per cent. of dead children, or any considerable fraction of it, could have been saved from the bane of tuberculosis, no further argument should be required to demonstrate its imperative necessity. If thousands of lives, both of children and adults, can be saved, and if an untold aggregate of suffering and sorrow can be averted by the simple process of pasteurization, there ought surely to be no question about its general adoption.

Here in New York I have been conducting pasteurized milk depots for fourteen years. I began the experiment with one depot in 1893, and the result was so satisfactory that I was encouraged to enlarge the scope and area of the work. While my practical demonstration of the benefits of pasteurization has been confined to New York, the educational value, I may be permitted to say, has been widespread. Now we have many depots in operation not only in New York, but in Philadelphia, St. Louis and Chicago, although they are *not pushing the work as energetically as I would wish.*

The milk is exposed for twenty minutes to a temperature of 167° Fahrenheit, and as it has been demonstrated that tubercle bacilli die at 158° Fahrenheit, when submitted to that temperature for ten minutes, it is reasonably certain that by the process of pasteurization all noxious germs in the milk are completely destroyed. At the same time, the nutritive qualities of this most perfect of nature's foods have not been at all impaired.

All milk at my depots is so drawn, handled and transported as to reduce the chances of pollution to a minimum. The milk is cooled before shipment; is kept cool in the process of transportation; and on arrival in New York is at once taken to the main laboratory, where it is placed on ice before being treated and turned into the bottles. All the milk used in the laboratory is known as "certified," having been certified, according to the requirements prescribed by the County Medical Society, as to its purity and cleanliness. Before granting the certificate, the in-

spectors must be satisfied that the milk is drawn from healthy cows, stabled according to the most advanced sanitary requirements and milked under proper conditions of cleanliness.

The result of the work done here is shown in the steady drop in the number of deaths of infants reported to the Board of Health. In 1892, the death rate of children, under five years of age, in Manhattan and the Bronx, was 96.2 per thousand of the population. Since that time it has been gradually scaled down until low-water mark was reached in 1903 with a percentage of 53.3 per thousand. In 1905, the rate was 55.8 per thousand. Even more eloquent are the returns of the death rate of children under five years of age during the months of June, July and August. For the two metropolitan boroughs above named the rate was 136.1 per thousand in 1892, and it was only 62.7 per thousand in 1906.

My milk depots were established in the thickly congested sections of the then City of New York, but the standard of quality of the milk supply of the poor was raised throughout the entire area. The people were quick to discern the superiority of an article furnished at a low price over the more or less tainted, and also the more costly, article they had been accustomed to use.

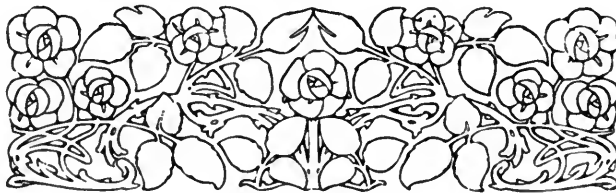
In addition to selling the milk below cost to the poor, the visiting physicians of the Board of Health and all physicians doing charity work among the poor, have from the beginning of my enterprise been freely supplied with all pasteurized and modified forms of milk which they required in their practice. It has also been a rigid rule with me that no pasteurized milk should be sold later than twenty-four hours after its pasteurization. The milk is distributed in round bottles so that they cannot be left uncorked and the milk exposed to contamination.

In the first year of my depots, 1893, a total of 34,400 bottles of pasteurized milk was dispensed. In 1906, a total of 3,140,252 bottles was dispensed and 1,078,405 glasses of pasteurized milk were drunk on the premises.

If it be conceded that the direct or indirect influence of my depots has had a perceptible influence in lowering the annual infant mortality of New York, it must follow that the work of these depots, if extended so as to include practically the whole milk supply of the infant population of the State, would make an even more decided impression on the death rate. The limit of the capacity of my present establishment is being rapidly reached, and, to be at all adequate to the demands made upon it, must very shortly reach a point where it belongs to the sphere of municipal rather than private effort.

Then, too, there is a loss on every bottle of milk sold, taking no account of thousands of bottles distributed to families unable to pay for them. In the budget of a government this cost would be but a small item, but when it is merely a question of individual effort and private means, it may readily be conceived that the cumulative increase of such a business may create a burden too heavy to be borne.

As I have already intimated, the value of my work has been very largely educational. The area of my efforts has been necessarily a restricted one, and their indirect results must be held to be of more value than the results directly traceable to them. It is something to have been largely instrumental in awakening public intelligence throughout the country to the dangers latent in an unregulated milk supply. It is something to have been able to concentrate public attention in this city and State on the necessity for pasteurizing the entire milk supply. The fight is not yet won, by any means, and it has been a fairly arduous one from the start. The fact that I have lived to see a total change in the point of view, alike of men of science and the public generally, in regard to this whole question, encourages me to believe that the final steps of legal precaution will be neither halting nor long-deferred.





# Milk-Pasteurization an Economic and Social Duty

Address by

*Nathan Straus*

to the Students of Political  
Economy in the University  
:: of Heidelberg ::

At the Invitation of Professor Ebehard Gothein



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## BIBLIOGRAPHICAL NOTE.

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- von Behring, E. 1. Tuberkulosebekämpfung. (Vortrag gehalten auf der 75. Versammlung von Naturforschern und Aerzten am 25. Sept. 1903 in Kassel.) Marburg, 1903.
2. Tuberkulose tilgung, Milchkonservierung und Kälberaufzucht. (Veröffentlichungen der Landwirtschaftskammer für die Rheinprovinz, No. 3) Bonn, 1904.
3. Tuberkuloseentstehung, Tuberkulosebekämpfung und Säuglingsernährung. (Beiträge zur experimentellen Therapie, Heft 8.) Berlin, 1904.
4. Bekämpfung der Tuberkulose beim Rindvieh und hygienische Milcherzeugung. Von Professor Dr. von Behring und Professor Dr. Dammann. Sonderabdruck aus dem „Archiv des Deutschen Landwirtschaftsrats.“) Berlin, 1906.
- Dammann, See von Behring (4).
- Kindermann. K. Die Versorgung Heidelbergs mit Milch und speziell mit Säuglingsmilch. (Heidelberger Tageblatt, 27 September 1906.)
- [Milk Bulletin.] Milk and its Relation to Public Health. By various Authors. (Hygienic Laboratory: Bulletin No. 41.) Washington, 1908.
- Spargo, J. The Common Sense of the Milk Question. New York, 1908. [A popular but reliable work, containing precise references and statistics. For the sake of convenience I have often quoted from it.]
- Straus, N. Amerika's jüngster Beitrag zur Milchfrage. [Heidelberg, privately printed, 1908.]

## ADDRESS.

DELIVERED AT THE UNIVERSITY OF HEIDELBERG, JULY 24, 1908.

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**I**T is not so very long ago since, in some countries at least, Political Economy was supposed to require little more of the student than the possession of a certain amount of common sense. This naive misconception of a most difficult science has, I am sure, been effectually banished from *your* minds—if it ever was there—or you would not be making a visit to an experimental laboratory for the pasteurization of milk. Such a visit betokens that the days of the old, abstract, arm-chair Political Economy are ended. The fact that the establishment you are to visit is not a commercial undertaking, but an effort of private enterprise to awaken the public conscience, is again evidence of the change that has come over the rigid, almost inhuman methods of the oldest school of economists. At the present day the study of economics imposes a heavy burden upon its followers; they must possess much positive knowledge, and are often called upon to make temporary excursions into remote fields; and the common sense once thought to be the one thing needful must never desert them. I rejoice that the subject to which I am about to invite attention is eminently one to be judged by common sense. It is true that it is a subject fraught with immensely complicated side-issues, but the main argument is, I venture to think, as simple as could well be desired.

## I.

### VALUE OF INFANT LIFE.

Every modern economist, I believe, no matter what view he might take of the population question, would admit the obligation of society to preserve the lives of all its members. The obligation is recognized as especially binding in the case of infants. Once born into the world in a civilized state, the morsel of humanity has established its right to existence.

### DECLINING BIRTH RATE.

Not to mention any higher motives, the mere desire to prevent economic waste suggests that not a life should be needlessly lost. The suggestion comes with special force at the present time. From all parts of the world, though most strikingly from Australia, we have the same remarkable evidence of a special decline that is going on in the birth rate. In ten years, from 1891 to 1900, the birth rate fell in England and Wales from 31.4 to 28.7 per 1,000; in the German Empire from 37.0 to 35.6; in France from 22.6 to 21.9 [Spargo, p. 8]. These figures to some extent at least indicate a physiological deterioration of the race. They show how the value of the human baby, always of late years highest in France, is steadily going up in other countries as well.

### THE WASTE OF LIVES.

Upon every consideration, public and private, ethical as well as economic, the death of a little baby is a calamity to be avoided at all costs. And yet, as you are aware, the annual loss of infant lives is enormous. In the German Empire, for instance, something like 2,000,000 children are born every year, and of these about 400,000 die within the first year of their lives [Dammann, p. 23]. That is at the rate of about 200 deaths to 1,000 births, and there are few countries in Europe, except Russia, that have to deplore so high an infantile death rate as this. Here are the statistics of some of the great towns:

	Births July 1, 1905 to June 30, 1906	Deaths under 1 year of age	Death rate per 1000 Births	Diar- hoeal death rate	Percentage of deaths due to diarrhoea
Barmen	4597	605	132	47.64	36.20
Berlin	49708	9933	200	87.99	44.03
Chemnitz	8314	2253	271	135.67	50.07
Cologne	15373	3266	212	93.60	44.06
Frankfurt a. M.	9335	1446	155	53.13	34.30
Hamburg	20471	3538	173	70.98	41.07
Karlsruhe	3052	565	185	86.17	46.55
Leipzig	14734	3273	222	121.49	54.69
Mannheim	5170	1053	204	86.46	42.45
Munich	15787	3432	217	95.33	44.14

## MILK THE SOURCE OF THE EVIL.

Those figures, which I take from the United States Government "Milk Bulletin" (p. 635), show the extent of the evil and also one of the principal causes. Between Barmen with its 132 per thousand and Chemnitz with its 271 there is a great difference, but even at Barmen 36.20 per cent. of these early deaths are due to gastro-intestinal disease. In some of these towns one out of every two of the poor babies falls a victim to this complaint. The rate of such deaths is heaviest during the summer months, and the reason of this is that the milk on which the children are fed favors the growth of noxious bacteria more readily at summer temperatures. The heat itself lowers the vitality and resisting powers of the infants to begin with, and then comes the milk with its increased bacterial content. I need hardly remind you that milk is an almost ideal medium for the growth of micro-organisms at any time, but especially in summer. In a town like Berlin more than two-thirds of the babies have to be bottle-fed (v. Behring, *Bekaempfung der Tuberkulose beim Rindvieh*, etc., Berlin, 1906, p. 3), and these are just the ones to perish of intestinal troubles. It was actually found in France that of 20,000 infants who died from this cause four-fifths were bottle-fed [Spargo, p. 38]. Again, there are official German statistics to show that the mortality in the first year among artificially fed infants may be 51 per cent. as against only 8 per cent. of those nursed exclusively at the breast [Spargo, p. 39]. But the milk of mothers who themselves are underfed and who perform severe physical labor all day can hardly be a suitable diet for a baby. Sooner with the poor, later with the rich, there comes a time when the mother cannot supply the needful quantity or the desired quality of milk. It is here that pasteurized, modified cow's milk steps in. Pasteurization minimizes the dangers of a second summer. (See Professor Jacobi's letter at end of this pamphlet.)

## II.

### THE SCOURGE OF TUBERCULOSIS.

I wish now to direct your attention to another great scourge of mankind, namely, Tuberculosis, a disease which in its advanced stages, when the lungs are affected, is but too familiar under the name of Consumption or Phthisis. I am unable to give you German statistics on the subject, but in 1905, 12 per cent. of the total deaths registered in the United States were due to tuberculosis [Milk Bulletin, p. 239]. It is estimated that 150,000 or 160,000 deaths occur every year in the United States from this cause alone [ibid.; Spargo, p. 122].<sup>5</sup>

## HUMAN AND BOVINE TUBERCULOSIS IDENTICAL.

The disease is not confined to mankind. Cattle are peculiarly liable to be attacked by it, and it is a constant menace to the breeder and dairy-farmer. There is no longer any doubt that the disease is essentially the same both in man and in animals, and may be communicated from one to the other. The specific bacillus was discovered by Robert Koch in 1882. Moreover, the uncertainty caused for a time by the great bacteriologist's assertion in 1901 that bovine and human tuberculosis were distinct has now been removed. The vigilance of meat-inspectors is now clearly recognized to be by no means unnecessary, since the meat of tuberculous animals, if not thoroughly cooked, would expose the consumer to the risk of infection.

### TUBERCULOUS MILK.

Not only the meat but also the milk of tuberculous animals contains tubercle bacilli. This discovery, made by the Danish Prof. Gustav Bang in 1890, is of the very greatest importance. There are perhaps comparatively few cows suffering from acute tuberculosis, recognizable by the ordinary methods of physical examination, and yet furnishing milk for human food. But the meat-inspectors at the slaughter-houses can find internal traces of the disease which would give rise to no anxiety while the animal was alive. Here I may mention, by way of illustration, some results of the meat-inspection here and at Mannheim. The percentage of cows slaughtered at Heidelberg found to be tuberculous was 38, 44, 32 and 42 in the years 1903-6 respectively [Heidelberger Tageblatt 20. Januar 1908]. At Mannheim the percentages for 1904-6 were 25, 30 and 33 [Heidelberger Tageblatt 24. Januar 1908]. These cows were milked, probably, down to the very day of their death, and their milk, being mixed with that of healthy animals, might convey the germs of tuberculosis into numerous families.

### THE TUBERCULIN TEST.

If we wish to know whether a given milk cow is tuberculous or not it is fortunately not necessary to slaughter her. Koch's tuberculin, a glycerin-extract of tubercle bacilli grown in the laboratory, is injected hypodermically and produces in tuberculous animals (or men) a rise of temperature sufficiently well marked to constitute an almost infallible test for even very slight degrees of infection. Only animals which fail to react to this test can be looked upon as capable of supplying milk that is above all suspicion of tuberculous taint. The application of the test by the veterinary surgeon leads to some surprises. It often

reveals the startling fact that the sleekest cow in the herd, and the best milk-producer, is nevertheless tuberculous. Seven or eight years ago in Hessen-Nassau it was found that where more than 40 or 50 head of cattle were kept, nearly all of them were infected, whereas in studs consisting of not more than four head the number of tuberculous animals was as low as 3 or 4 per cent. [v. Behring, *Tuberkulose-tilgung*, etc., Bonn, 1904, p. 7]. In Saxony it seems that 30 per cent. of all cattle are infected [Spargo, p. 136]; 25 per cent. was the estimate made last year (1907) for all the cows supplying the city of Washington with milk [Milk Bulletin, p. 493].

#### HUMAN TUBERCULOSIS: MILK THE MAIN SOURCE OF EVIL.

As regards the origin of tuberculosis in man I may confess at once that I am a believer in the doctrine of Prof. E. von Behring of Marburg. According to this eminent authority tuberculosis is contracted not so much through the nose and lungs as through the mouth and the alimentary canal, not so much by breathing bacilli emanating from tuberculous persons as by drinking the milk of tuberculous cows. It is part of his theory that the primary infection takes place in the first year of infancy, before the mucous membrane of the intestinal tract has become fully capable of resisting the passage of bacteria. This predisposes the individual to develop the disease to the full extent if at some future time he is exposed to constant infection with tubercle bacilli, say through membership in a consumptive family, or residence in apartments inhabited by consumptives. Consumption thus caught, say, by a child from its parents, is not truly hereditary, because not contracted until after birth. In the majority of cases the disease must be regarded as lying latent between infancy and the time when it calls for medical treatment. Post-mortem examinations and tuberculin tests on living persons alike confirm this. Von Behring sums up his doctrine on the practical side by saying: "*The milk fed to infants is the chief source of consumption.*" (*Tuberkulosebekaempfung*, p. 25.)

### III.

We have thus traced to the use of cow's milk the two principal losses in our vital statistics, first, the excessive mortality of infants in their first year, and second, the annual tribute of lives claimed by consumption. It being altogether impossible to give up the use of cow's milk in the nursery, and most undesirable to banish such a food from the adult diet, it becomes imperative to seek for means to render the milk harmless. Let us first glance at the actual conditions at present obtaining in the milk industry.

## THE COWS.

A large proportion of the cows, as we have seen, are tuberculous. They are often kept in stalls that give every encouragement to the disease. They are there in company with other tuberculous animals, and the amount of light and air available is often very deficient. Rough walls, damp floors, thatched roofs and unnecessary lumber, all furnish lurking-places for bacteria. In this part of Germany the cows rarely have any opportunity to pasture in the open fields. The unenlightened peasant is usually extraordinarily careless in such matters as storage of fodder and general attention to cleanliness. There should be no possibility of animals infecting their own food. The excreta should be easily removable and frequently removed.

## MILKING.

How rarely does it happen that the milking is satisfactorily conducted! The person of the milker often leaves much to be desired. He comes to his work regardless of the state of his health or the state of his hands, in the very clothes in which he has, perhaps, just been shoveling manure. If he washes his hands on what does he dry them? If he washes his pails in what sort of water does he do it? Does he trouble to cleanse the udder before beginning to milk? Under ordinary conditions there is so much dirt flying about the air of the stall, so much filth adhering to the animal's skin and liable to be knocked off by the milker's hands or clothing, that it would be a miracle if none of it found its way into the broad-mouthed pails commonly used. As a matter of fact Renk in 1891 found from a series of thirty tests that a liter of market-milk at Halle contained on an average 15 milligrams of cow's excrement; Leipzig, 3.8 milligrams; Berlin, 10.3 milligrams, and Munich 9 [Milk Bulletin, p. 441-2]. "According to some authorities," we are told, "the citizens of Berlin consume 300 pounds of cow-dung in their milk daily" [id., p. 395].

## TRANSPORTATION.

After the milk is drawn the chief thing is to protect it from dust and keep it at a low temperature, so that the inevitable bacteria may increase as slowly as possible. The more shaking the milk receives the more the clusters of bacteria will be broken up, and the more rapidly will they multiply. All the mixing and pouring from one receptacle to another that goes on, sometimes in most incredible situations, before the milk reaches the consumer, is injurious. Small dealers are unable to take the necessary measures, by the provision of ice and special cooling-rooms, to keep their milk at a proper temperature. Even big dealers



are singularly lax, from an American point of view, in this matter. I see even superior bottled milk being hauled through the streets with nothing better than a thin cloth to protect it from the glaring sun. I greatly fear that in this country less attention is bestowed on the milk than on the *beer*. You keep *that* cool while it is traveling and after reaching the place of consumption, and leave the milk too often to take care of itself. Truly there is something to be learned from the brewers and landlords.

#### BACTERIA IN MILK.

In the absence of proper precautions, milk that on leaving the cow contained relatively few bacteria may on reaching its destination some hours later be literally swarming with them. Bacteriologists are able, by a somewhat troublesome process, to estimate the actual number of these minute organisms present in a sample of milk. The numbers per cubic centimeter not uncommonly run to millions. Twenty years ago the "bacterial content" of the milk sold at Wuerzburg ranged between 222,000 and 2,300,000 per cubic centimeter in winter, and between 1,900,000 and 7,200,000 in summer. Munich milk, six hours old, has been found to contain from 200,000 to 6,000,000; Halle milk varied from 6,000,000 to 30,700,000; and a very high figure was reached at Giessen in May, 1892, namely, 169,600,000, though that is far from constituting a record [Milk Bulletin, pp. 13, 441-2]. These numbers of bacteria were estimated in one cubic centimeter, a quantity equivalent to about fifteen drops, or a quarter of a teaspoonful. *There are often more bacteria in a drop of milk than in a drop of sewage* [Bulletin, p. 421].

#### DISEASE GERMS IN MILK.

The bacteria present in milk may be of a perfectly innocuous kind, but it is obvious that if the milk ever comes in contact with the germs of disease these, too, will be taken up and handed on to the unfortunate consumers of the milk. Under present conditions there are plenty of chances for good milk to become infected. The cow may have waded in water containing typhoid germs; dust may have borne the germs of typhoid or scarlet fever; an infectious case may have been nursed in the family of the milker or dealer; perhaps one of these men may have been suffering himself from, say, diphtheritic sore-throat. Hence it comes that quite a number of epidemics are traceable to the milk-supply. The recently published American "Milk Bulletin" contains particulars of over twenty typhoid epidemics in Germany between 1875 and 1899 that had this origin. At Rostock, for instance, in August, 1893, several cases of typhoid occurred, and all were traced to milk from a suburban dairy which was found in a most unsanitary condition. A highly polluted

well was used for washing the utensils, and very likely also for adulteration [Bulletin, p. 131]. At Rostock again, in May and June, 1885, there were eight cases of scarlet fever. All the patients were consumers of milk which was directly traced to a farm where scarlet fever prevailed and convalescents assisted in milking [Bulletin, p. 137].

The tubercle bacilli that occur in milk do not attract attention by causing a sudden outbreak of disease. Their action is rather of the nature of slow poisoning. But their frequency in milk has often been the subject of inquiry. At Berlin, for instance, Petri found 17 per cent. of the samples he examined virulent to guinea pigs. By the same method Rabinowitsch in 1897 showed that 28 per cent. of the samples of Berlin milk he examined were tuberculous. A research by Proskauer and others (1907) revealed tubercle bacilli in 55 per cent. of the samples [Bulletin, pp. 170, 172, 173].

#### IV.

Such being the actual state of affairs, what are the proposals for reform? We will begin with the most ideal, and come down to the most practical.

##### ENCOURAGE BREAST-FEEDING.

In the first place it is obviously wise to encourage mothers to nurse their own babies wherever it is physically possible. Hence we hear of premiums being paid by business firms and municipalities for every child raised entirely without the use of the bottle. The town of Cologne, for instance, subsidizes breast-feeding, at least on a small scale.

##### IMPROVE THE BREED OF COWS.

Heroic measures have also been proposed, and partly begun, with regard to the cows. A small country like Denmark has already succeeded in practically stamping out bovine tuberculosis on the plan recommended by Professor Bang. With the tuberculin test as guide the only real obstacle is the expense and the danger of depleting the national stock of cattle by too sudden procedure. Another method deserving of mention is Professor von Behring's, which has now been some years on trial, for "bovo-vaccination," or inoculation of cattle with the object of rendering them immune against tuberculosis. This is a preventive, not a curative, measure, and has already been applied with Government sanction in the Grand Duchy of Hessen. Von Behring's plan is gradually to eradicate tuberculosis among cattle, and thus to cut off the main source of the tubercular infection of man. It is a grand, masterly idea, but even on the most sanguine assumptions years must elapse before

the goal is attained and tuberculous milk has become an impossibility. And it is easy to see that this great reform, so profoundly affecting the agricultural and economic interests of the nation, can only be carried out with State help. There must be State inspection and State compensation for the farmers.

#### MUNICIPAL DAIRYING.

But now and always there would be room for the municipalities to take their part by establishing model dairy-farms, where the very best milk should be obtained under ideal conditions of cleanliness for use in municipal hospitals and other institutions, and for distribution at a low price to the infant children of the poorer classes. This is already being done at some places in England (St. Helens, Liverpool, Nottingham, Reading, Birmingham), and I cannot forbear to remind you of a suggestion made less than two years ago by a University teacher of Political Economy who is still gratefully remembered here, Prof. Karl Kindermann. He suggested that the town of Heidelberg should establish its own dairy farm on the airy heights of the Kohlhof and assume the responsibility for the important work carried out with the aid of private charity in the Milk Department of the Luisenheilanstalt [Heidelberger Tageblatt, 27 Sept. 1906].

I for my part look forward to a time when the whole of the milk supply will be pasteurized free of charge by the town, just as at present the town undertakes the supply of gas, water, electricity and street tramways.

#### THE TECHNIQUE OF PURE MILK.

In order to get milk with a bacterial content of less than 1,000 per cubic centimeter, such as von Behring regards as a not unattainable ideal, or even of less than 10,000, which is the standard for "certified milk" at Rochester, N. Y., you must be prepared to devote money and careful attention to the problem. The animals must be kept scrupulously clean. Complete asepsis must be aimed at in milking. The cows' tails for instance must be cleansed with an antiseptic wash. Before milking begins it ought to be possible to pass a white kid glove over the cow's udder without staining it. The milker's hands should be washed with special precautions before milking each cow, and special milking suits should be worn. A special cooling-room must be available, and the milk should be filled into bottles and sealed for delivery as soon as possible. Always it must be kept cool. The bottles employed must be thoroughly cleaned and sterilized before the milk comes into them. To say nothing of the machinery required, it is obvious that all this needs conscientious work-people.

## V.

### THE PRICE OF PURE MILK PROHIBITIVE.

If all these reforms were universally carried out then we should indeed have an ideal milk-supply. On an experimental scale, we may say, they have been carried out already, so that of the *possibility* of the reforms there can be no doubt. But the price of such milk is prohibitive for all but the rich: 40 to 60 pf. per liter (say 10 to 15 cents per quart) would be cheap for such milk under present conditions. By municipal enterprise and wholesale operations the price could no doubt be somewhat reduced, but it is pretty clear that it would always remain much higher than the present price of ordinary milk. The reform can only come gradually; there must be improvement before there can be perfection. That being so, there is nothing for it but, for the present at least, to adopt a temporary policy of compromise—which even an extreme idealist like von Behring is forced reluctantly to approve. This policy, in a word, is *Pasteurization*.

### DEFINITION OF PASTEURIZATION.

Pasteurization, so named after the founder of bacteriology, Louis Pasteur, consists in maintaining the milk at a temperature of 60°-75° centigrade [140°-167° Fahrenheit] for 20 minutes in a closed vessel, and then cooling it rapidly. I myself prefer the higher temperature 70° c. or 158° F. I have always pasteurized at this temperature and the results have been so satisfactory that I am loath to change it. The lower temperature is advocated as less likely to destroy the chemical ferments in the milk, which are supposed, in the absence of definite information, to be of great value in making the milk digestible. You observe that the milk is *not boiled*, and *not sterilized*. The flavor is not impaired, the food value remains the same, and yet the amount of heating is sufficient to kill the disease germs whose presence is most to be feared in milk—the germs of tuberculosis, typhoid, scarlet fever, diphtheria, dysentery, cholera, etc. As to the alleged disadvantages of pasteurization, I will only say that the findings of the experts in the recent American Government "Milk Bulletin" disprove them all. When rachitis and scurvy occur, they are the results *not of pasteurization* but of some other cause, such as abnormal composition of the milk or improper hygiene. Far from being rendered indigestible by heating, the pasteurized milk is now claimed to be even more easily digested than raw milk [Bulletin, pp. 610, 626, 668-9].

## PASTEURIZATION IN PRACTICE.

All this theoretical discussion about the advantages and disadvantages of pasteurization interests me, as a practical man, very little. You must remember that I have been pasteurizing milk now for sixteen years, and the system has proved *distinctly successful*, so that in my mind there is no room for doubt that the advantages far outweigh the possible disadvantages.

I first opened my milk-depots in 1893 for the distribution of good milk in New York. To quote the words of a writer last year in the "Archiv fuer Kinderheilkunde," edited by Professors Baginsky, Monti and Schlossmann: "In New York there died in the months of July and August in the years 1890, 1891 and 1892 13,201 children under 5 years of age, 6,122 of them succumbing to infant cholera. In the year 1893 Straus's Milk Charity was opened and the mortality sank as if by magic." The improvement was as a matter of fact remarkable and it amounts to this: that at the rate of mortality which prevailed in 1892 the number of deaths in June, July and August, 1906, would have been 9,743, instead of 4,426 as it actually was. This saving of more than 50 per cent. of the young lives formerly sacrificed in those three hot months has of course not been effected solely by the distribution of pasteurized milk. Other hygienic improvements have co-operated, but there can be no doubt that the milk was the prime factor.

A still more unequivocal example is the case of Randall's Island, a foundling asylum at New York, where the death rate of the children was 44.36 per cent. in 1897. Early in 1898 I introduced the pasteurization system there, and the death rate for that year, although no other change whatever was made in the diet or hygiene, fell to 19.80 per cent. There could not be more striking proof than this of the value of pasteurization.

Similar results have followed in other places where my example has been followed. At Philadelphia, where, as at St. Louis and Chicago, I installed the necessary plant, the mortality of children under 5 years was reduced 24 per cent. between 1901 and 1906.

When I came here last winter, anxious to make a practical demonstration of the efficacy of pasteurized milk, my attention was drawn to Sandhausen near Heidelberg. In this village the death rate of children under one year was 46%. It had been even higher before, and an improvement had already been gained through a Crèche, which the Burgomaster of the village erected. Still 46% seemed a high figure, and enough to warrant my belief that Sandhausen was a proper field for demonstration.

Encouraged by my experience at Randall's Island and elsewhere, I knew and I prophesied that I could reduce the death rate considerably.

Accordingly I began on February 1 to supply the village with pasteurized milk from my Heidelberg laboratory. Since March 1 the milk has been prepared in a Milk Kitchen, which I installed for this purpose in the village. The first few months realized my most sanguine expectations, as the death rate by June 1 had fallen to *half* what the average had been for the same months of the five preceding years.

Insinuations were thrown out at this time—doubts were uttered, and it was hinted very strongly that the summer months alone could show whether there was any merit in pasteurization. But I knew, and again prophesied that in spite of summer and heat a still lower death rate could be attained.

I was working against great disadvantages. Sandhausen is a poor village, the population consisting almost entirely of factory workers—men and women alike. The single doctor on whom the people are dependent has to work for a total population of about 4,000. The advice and guidance of young mothers was out of the question; quick medical action in case of need was an impossibility.

There is no running water in the village, and accordingly sanitary arrangements of any kind are entirely wanting. So I erected a bathing establishment in connection with the Crèche, and thereby added another factor for the saving of infant life to the foremost one of proper feeding. I had been made timid by unkindly expressed doubts, much as I relied on pasteurization alone.

We have now the record for June—the first month of the harvesters of infant lives—and so far my prophecy has come true. In the five months ending June 30 only seven children under two years died, as against twenty-four, the average for the same five months of the preceding five years.

Sandhausen is no exceptional case. The same excellent results could be achieved anywhere else, provided that the local authorities would take the matter up energetically.

Why do I devote so much energy to demonstrating publicly the need of milk-reform and the immediate benefits of pasteurization? Into the personal and private reasons that first induced me to engage in this work I need not enter here. It is enough to say that it was my own sad experience which made me so determined to save the lives of other people's babies.

But I have always only considered how best and quickest to enlighten the world in a practical manner. To attain this I sought the help of the press, and it is due to its ever ready co-operation that my work and its results have been made known broadcast. Only through publicity can the advantages of the pasteurization of milk be everywhere realized.

I am not a professional man, and I am therefore not bound by professional etiquette to keep secret what I know to be for the public good. The unnecessary slaughter of the innocents has appealed to me, and I have sought and found the remedy to stem the evil, which I am giving to the world in spite of selfish opposition, in spite of intrigue and all manner of provocation. My impatience as a reformer is, I think, justified by the crying nature of the evil and the apathy I encounter. At last in America, after sixteen years of agitation, the time seems to have come when Congress will take up the question of the milk-supply from a national point of view. That has been my constant aim, and it is because I am bound to Germany by old and dear ties that I wish to see the same public spirit developed here, and in all the countries of the civilized world.

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(REUTER'S AGENCY.)

Ottawa, Wednesday, June 10, 1908.

Addressing the Canadian Medical Association here, Dr. Hastings, of Toronto, made the following remarkable statement:

“If the truth were known, 15,000 children of the 30,000 who die in Canada annually might justly have the epitaph, ‘Poisoned by impure milk,’ placed on their gravestones.”





*Nathan Straus*

## PASTEURIZED MILK LABORATORIES

FOUNDED 1892

348-350 EAST 32nd STREET, NEW YORK CITY

### THE DIFFERENCE BETWEEN REAL PASTEURIZATION AND COMMERCIAL PASTEURIZATION.

Real Pasteurization means that the milk is exposed to 157 degrees Fahrenheit for twenty-five minutes (five minutes for reaching the temperature and twenty minutes at that temperature) and then rapidly cooled to 40 degrees, according to the system of Prof. R. G. Freeman and other men eminent in the medical world. This process kills all noxious germs and preserves the nutritious quality.

Many mothers are cheated into the belief that they are getting a safe milk when they buy what is described as "commercially pasteurized" milk. Such milk should be labeled "NOT Pasteurized." It is a humbug and a fraud, for it has not been pasteurized at all, but has been treated by a process that merely preserves the milk and keeps it from souring; it does not kill the disease germs. It does more harm than good, for it enables dealers to keep bad milk and to market it when it is old and stale. It deceives mothers who know that pasteurized milk is good for their babies, and who do not know that "Commercially Pasteurized" milk is preserved milk.

Commercially pasteurized milk is milk exposed to heat for forty seconds, which does not destroy the pathogenic (disease) germs, but tends to give them a better chance to propagate. Unfortunately the so-called "Pasteurized Milk" which is now being sold in this city is mostly "Commercially Pasteurized." The using of the term "Pasteurized" in connection with such milk should be prohibited by law.

New York, Nov. 28, 1908.

*Nathan Straus*



America's  
Latest Contribution  
to the  
Milk Question

A REVIEW

BY

*Nathan Straus*

OF THE  
U. S. Government Report  
"Milk and Its Relation to Public Health"

(Published in Washington, D. C., 1908)



## VIEW OF EMINENT MEDICAL AUTHORITY.

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The most that can be hoped for from the most thorough inspection possible is that the milk supplied to the city shall be microscopically clean—free, that is, from admixture of manure and other gross impurities—and containing only a few thousands of ubiquitous bacteria to the cubic centimeter.

Even then there could be no certainty that the milk would be always absolutely sterile as regards the bacilli of tuberculosis, typhoid fever and diphtheria, to say nothing of occasional accidental contamination with other pathogenic germs.

With the best inspection possible under existing or any practically conceivable conditions, the great bulk of milk delivered in New York every morning will only be fit for pasteurization—and even that is as yet far from realization.

Nevertheless, our present milk supply can be rendered reasonably safe by pasteurization, which kills the existing germs even if it does not destroy the toxins already formed or prevent subsequent growth when not kept cool and in sealed receptacles.

The only safety for the consumers of milk in this and other cities throughout the country lies in municipal pasteurization, conducted under constant supervision of the Health Department, of all except an insignificant fraction of the milk supply.

Even that fraction would be made safer by heating for twenty minutes to 155° Fahrenheit and subsequent cooling of the sealed bottles containing it to 40°.

*In pasteurization only, supplemented by conscientious and thorough inspection, will be found a solution of the problem of a pure milk supply.—New York Medical Record.*

The following are the names of the gentlemen whose arduous labors are represented, in part at least, by their contributions to "Milk and Its Relation to Public Health." They have earned the gratitude of all who are interested in the milk question: that is, or should be, the public at large.

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PUBLIC HEALTH AND MARINE HOSPITAL SERVICE.

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DR. WALTER WYMAN, Surgeon General  
DR. MILTON J. ROSENAU, Director Hygienic Laboratory  
DR. JOHN F. ANDERSON, Assistant Director  
DRS. J. M. EAGER and J. W. KERR, Asst. Surgeons Gen'l  
DR. JOSEPH H. KASTLE, Chief Division of Chemistry  
DR. LESLIE L. LUMSDEN DR. GEORGE W. McCOY  
DR. J. W. SCHERESCHEWSKY DR. JOHN W. TRASK  
DR. NORMAN ROBERTS DR. WM. WHITFIELD MILLER

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DEPARTMENT OF AGRICULTURE.

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DR. HARVEY W. WILEY, Chief Bureau of Chemistry  
DR. A. D. MELVIN, Chief Bureau of Animal Industry  
MR. E. H. WEBSTER, Chief of Dairy Division  
DR. B. MEADE BOLTON, Biochemic Division  
DR. JOHN R. MOHLER, Chief of Pathological Division

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HEALTH DEPARTMENT DISTRICT OF COLUMBIA.

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DR. WM. CREIGHTON WOODWARD, Health Officer

## WARNING FROM AN INVESTIGATOR.

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Dr. E. C. Schroeder, Superintendent of the Experiment Station of the Department of Agriculture at Bethesda, Md., thus sums up his investigations:

“Man is constantly exposed to fresh tuberculous material in a helpless way through his use of dairy products from tuberculous cows and cows associated with tuberculous cattle.

“It seems from this array of facts, every one of which is based on positive experimental evidence, that we should feel no doubt regarding our plain duty, which is, no matter what other measures we adopt in our fight against tuberculosis, not to neglect one of the chief, if not the most important, source of infection—the tuberculous dairy cow.”—*Bureau of Animal Industry Bulletin No. 93*. See also *Bulletin No. 99*, by the same author.

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## DEATHS FROM TUBERCULOSIS.

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The Census Bureau, in a report issued Sept. 15, 1908, shows that in the registration area, namely, the two-fifths of the country from which fairly complete vital statistics are obtained, 76,650 persons died from tuberculosis in 1907. This was 11.2 per cent. of all the deaths. These figures bear out President Roosevelt's statement that there are 200,000 deaths from tuberculosis in the United States every year.

## AMERICA'S LATEST CONTRIBUTION TO THE MILK QUESTION.

**A**T a time when the question of a pure milk supply is engaging public attention everywhere, it is of interest to note what fruit a similar agitation has borne in the United States. I have the satisfaction of knowing that it was owing in a great measure to my efforts that the interest of our government was aroused in a *pure milk supply*. Sixteen years ago I started my work in New York City and extended it gradually to other places. The results which followed wherever I introduced pasteurized milk were brought to the notice of the Public Health Department of the United States; and the very extensive report recently published, "Milk and Its Relation to Public Health," is the outcome of my agitation.

In the meanwhile I had sent to Mayors of cities and Presidents of Health Boards letters, urging them to take up this question, which my experience had taught me to be such a vital one. I demonstrated practically by the distribution of pasteurized milk the great need and the great results that can be attained. Coincident with this distribution the infantile death rate of New York City steadily decreased from 96.2 per 1,000 in 1892 to 51 per 1,000 in 1907. Similar good results followed wherever pasteurized milk was introduced.

### THE NEW BULLETIN AND WHAT LED TO IT.

About the same time that my first milk depot was opened in New York (1893) Dr. Henry L. Coit organized the first "medical milk commission" in the United States, that is to say, an association of medical practitioners on the one hand, and a dairyman on the other, for the production of milk of especially high quality, known as "certified milk," primarily for medical purposes. The spread of these associations and the opening of infants' milk depots in various cities served to awaken public interest, until at length in 1904 there began a regular battle for pure milk in New York, which led to the holding of an important Milk Conference there in November, 1906.

In the Summer of 1906 there were typhoid outbreaks in the District of Columbia, which, thanks to an efficient inspection service, were traced to the milk supply. The District of Columbia is only sixty square miles in extent, but it includes Washington, the seat of the national government, and the Hygienic Laboratory of the Public Health Department of the United States is situated there.

In June, 1907, President Roosevelt ordered a thorough investigation of the milk problem to be made by the officials of the Public Health

Service with the assistance of the Department of Agriculture. With extraordinary dispatch the results of this inquiry are now laid before us in a volume of about 750 pages, entitled "Milk and Its Relation to Public Health" (Bulletin No. 41 of the Hygienic Laboratory, Washington). The book is full of facts bearing on the milk problem as it exists in America, in England, or indeed in any other country.

The Bulletin is not the report of a commission. It consists of twenty-one essays or monographs by the departmental specialists on various aspects of the milk question, with an introduction in which Surgeon-General Wyman briefly alludes to the most striking results of each of the papers. Without specifying the titles of all the contributions it is enough to say that a number of authors write on the connection between milk and disease; others deal with the chemistry and bacteriology of milk; others show the requirements that must be met in practical dairy-farming; there is one masterly treatise on the feeding of infants; and other papers criticise preventive methods, legal standards and technical processes at present in use to protect the milk-consumer.

It is unnecessary for me to attempt a summary of the whole book. I propose to leave for the present the purely scientific sections and those relating to milk-inspection and dairy-hygiene, while I refer more in detail to the teachings of the book on the two matters most nearly connected with my own propaganda, viz., disease in milk, and pasteurization as the remedy.

#### GOOD MILK INFECTED SPREADS DISEASE.

I suppose it is well known by this time that the germs of disease can be carried in milk, and that epidemic outbreaks are often traceable to that source. Typhoid, scarlet fever, and diphtheria are the diseases most frequently spread in this way, but we learn from the Bulletin that Asiatic cholera (p. 241), dysentery (p. 603), and Malta fever are also communicable through milk. One special subject for inquiry by the American investigators was the frequency of these "milk epidemics," as they are called. An enormous amount of statistical material relating to the last fifty years has accordingly been collected and sifted. Here you will find summarized the essential details of 317 outbreaks of typhoid, 125 of scarlet fever, and 51 of diphtheria, *all owing their origin to infected milk*, though it is admitted that not *all* the statistics available from foreign sources have been included.

These figures appeal directly to British readers, for most of the statistics come from the United Kingdom. Thus while the United States furnishes 132 instances of typhoid, 27 of scarlet fever, and 18 of diphtheria, the United Kingdom can "boast" of 138, 96, and 32 cases re-

spectively, the sum-total of all three diseases from other countries being only 50. This of course does not mean that the sanitary conditions are worse in the United Kingdom than elsewhere. It is a proof of the excellent work of your English medical statisticians, but it is also a terrible warning of the dangers lurking in milk.

#### TYPICAL INSTANCES OF MILK EPIDEMICS.

Look for instance at the Dublin typhoid epidemic of August, 1899. No fewer than 66 persons were smitten with the disease, and all of them were supplied with milk from the same dairy. Now there were cases of typhoid being nursed at that dairy, and it was probably the handling of the milk by one of the persons acting as nurse that caused the milk to become infected.

The very same thing happened on a smaller scale three years previously in Dublin. In May, 1896, the two children of a small milk dealer were down with typhoid, and again it was probably the children's sick-nurse who infected the milk in the shop. The business being a very small one, only 14 cases resulted.

Take another typhoid case—from Liverpool. In October, 1897, twenty-seven children were suddenly seized with typhoid after eating ice-cream at a stall kept by an Italian whose wife at home was lying sick of the disease.

Liverpool illustrates also the connection between milk and scarlet fever. In February, 1904, fifty-nine cases of scarlet fever occurred among the persons using the milk from a dairy where there was a child recovering from this complaint.

As for diphtheria, take the example of Edinburgh, where in May, 1900, something like fifty persons contracted the disease because they were consumers of milk from a dairy farm where milkers and others were found to be suffering from sore-throat which on bacteriological examination proved to be true diphtheria.

#### UNHEALTHY COWS—UNHEALTHY MILK.

So far we have been dealing with cases where milk had become infected on its way from the cow to the consumer. There is of course another class of cases, in which the milk is already infected when it leaves the cow. The contempt of precaution is more culpable, perhaps, when human diseases are allowed to infect the milk, but it is only another degree of neglect which tolerates the sale of milk from diseased cattle.

## TUBERCULOSIS.

That negligence must now be branded as criminal which allows animals suffering from tuberculosis to contribute to the supply of milk destined for human food. It is ridiculous at this late hour to quibble over any possible difference there may be between bovine and human tuberculosis.

Koch, the discoverer (1890) of the specific germ of the disease, had at first no doubts whatever as to its identity in man and in animals. Ten years passed before he asserted the contrary (1901), and the assertion has now been disproved by means of extensive experiments undertaken at the instance of various governments.

Englishmen will probably be content with the verdict of the British Royal Commission on Tuberculosis as to this matter, but the doubters in America and even the Germans themselves have been forced to the same conclusion, viz., that tuberculosis, whether in animal or man, is essentially the same disease, and is *communicable from animal to man in milk*.

This I hold to be a reason of paramount importance for insisting on public control of the milk supply, or at least on precautionary measures *for securing non-tuberculous milk for the innocent children who must have milk and who cannot protect themselves.*

### THE TUBERCULIN TEST.

One of our greatest debts to Koch is the invention of the tuberculin test for ascertaining, in cases where merely physical examination fails, whether or not an animal is tuberculous. Tuberculin, itself a product of the growth of tubercle bacilli in the laboratory, is injected hypodermically and produces in tuberculous individuals a marked rise of temperature, and this, under proper precautions, becomes an almost infallible index of the unhealthy condition which it is desired to recognize and eliminate. The veterinary surgeon can thus say precisely which of the cows in a herd are to be considered tuberculous, and ninety-seven times out of a hundred he is right.

Now look at the results of the tuberculin test as applied in America. More than 1,500 of the cows supplying milk to the City of Washington were officially tested last year, and nearly 17 per cent. had to be pronounced tuberculous. This inspection was neither universal nor compulsory, so it is fair to assume that only owners who were confident of the healthy state of their herds submitted them to the test. Had all the cows in all the herds been examined, no doubt the percentage would have been much higher, say 25 per cent. (p. 493). The figures are first-hand, and speak for themselves.



## THE DANGER FROM DIRT.

The Bulletin mentions incidentally (p. 240) an estimate made in 1906 that at least 8 per cent. of the milk sold in London is the product of tuberculous cows. The American evidence, however, justifies us, I think, in assuming that one cow out of every four is, slightly at least, tuberculous. It is possible, perhaps, for some of these cows to give perfectly healthy milk. This point is not yet definitely settled, but it is perfectly certain that the dung of such cows may contain the bacilli (pp. 163, 493), and this is a point of great importance. People do not realize the quantity of solid dirt that gets into the milk-pail in the course of milking.

It is not only that dust flies about in the air of the stall but the milker's hands or clothing may easily detach portions of dirt from the skin of the animal, unless those ideal regulations are observed which at present are only enforced at a few dairies of the very highest class, and which add so considerably to the cost of the milk as to make it a luxury except for the rich.

"According to some authorities," says the Bulletin (p. 395), "the citizens of Berlin consume 300 pounds of cow-dung in their milk daily." One hardly likes to think what the estimate would be for London! The worst of it is that merely mechanical means, such as filtration and centrifuging, while removing the foreign bodies, actually promote the growth of any bacteria present by breaking up the groups in which these minute organisms live.

## TUBERCLE BACILLI IN MILK.

Let us see next what the bacteriologists find who examine samples of milk as sold in the great towns. In Liverpool, for instance, in 1898-9 six per cent. of the samples from town dairies, and 17 per cent. from country dairies, contained tubercle bacilli (p. 173). About the same time 9 out of 16 dairies supplying the colleges at Cambridge were found to be selling them milk that was tuberculous (p. 171). I do not know whether the undergraduates are still taking their chances with such milk—things may have improved since then—but if such was the state of the milk provided for the privileged sons of the well-to-do classes, what was likely to be the quality of the milk drunk by the poor babies of the London slums?

The latest research on milk-tubercle is Dr. John F. Anderson's examination of the Washington milk, full details of which are given in the Bulletin. The results are summed up in the statement that approximately 11 per cent. of the dairies whose milk was examined contained tubercle bacilli virulent for guinea pigs. The test, I ought to say, consists in inoculating guinea pigs with specimens of the milk; and as some

guinea pigs, like some human beings, have better constitutions than others, and are able to resist the effects of a comparatively weak dose, it may be said that all the percentages obtained in this way are, if anything, under the mark as an index of the frequency of tubercle bacilli in the milk.

#### THE REMEDY.

It is easy to see the magnitude of the evil, but what is to be the remedy? Obviously the thing to be aimed at is compulsory examination of all cows by the tuberculin test and weeding-out of those found to be tuberculous. This is distinctly recommended in the Bulletin (p. 192), and it is very wisely suggested that the objectionable cows should be purchased out of a Government compensation fund, as in fact is already done in Pennsylvania (p. 499).

This is assuredly a most important, if not the first, requirement—to raise the veterinary standard of the cattle throughout the country to the highest possible pitch. It is, however, still more imperative to urge the necessity of improvement in dairy procedure from first to last, so as to minimize the risk of infecting healthy milk on its way to the consumer. Much of this improvement could be effected without any great outlay, but, as already hinted, the maximum of scrupulosity entails an increase in the price of the product which places it beyond the reach of ordinary purchasers.

There remains, therefore, *for the present at least, but one way of dealing with all milk whatever, except in a few special cases where it is procured under exceptionally favorable conditions—and that is, in my opinion, pasteurization.*

#### RECOMMENDATIONS OF THE EXPERTS.

The writers in the Bulletin fully agree with me on this point. I am entitled to congratulate myself a little on the change that has come over professional opinion, for when I began to interest myself publicly in the milk question I was almost alone in my demand for universal pasteurization—and it could always be said of me that I was but a layman.

It is now more than thirteen years since I wrote in "The Forum" (November, 1894): "I hold that in the near future it will be regarded as a piece of criminal neglect to feed young children on milk which has not been sterilized"; and now compare those words with the recommendations of the specialists in the Milk Bulletin.

Dr. Leslie L. Lumsden writes (p. 159) that "to prevent the spread of typhoid infection in the milk supply of cities \* \* \* pasteurization of the milk \* \* \* is the best measure."

Dr. John R. Mohler recommends, as a veterinary authority (p. 506): "That all milk \* \* \* shall come from \* \* \* tuberculin-tested cattle, which shall be re-tested at least once a year or be subjected to pasteurization under the supervision of the Health Department in case the herd is not tuberculin-tested."

Dr. Joseph W. Schereschewsky, writing on "Infant Feeding" (p. 668), says: "During the summer it is better to pasteurize or to sterilize all milk used in infant feeding."

#### DR. ROSENAU'S OPINION.

The author of the paper specially devoted to "Pasteurization," Dr. Milton J. Rosenau, Director of the Hygienic Laboratory, maintains throughout the judicial attitude of the man of science, but it is not difficult to see the side toward which the practical man in him inclines.

"We must protect ourselves," he says (p. 606). "We prefer pure milk, but so long as we cannot obtain it we must purify what we get" (p. 625). "Special cases may require raw milk, but the general public should be protected" (p. 627). And after giving us all the arguments for and against, he concludes with these words:

"Theoretically, pasteurization should not be necessary; practically, we find it forced upon us. The heating of milk has certain disadvantages which must be given consideration, but it effectually prevents much disease and death, especially in infants during the summer months" (p. 628).

#### PASTEURIZATION—ITS ADVANTAGES.

The great value of Dr. Rosenau's paper, to my mind, is its unprejudiced discussion of the alleged disadvantages of pasteurization. The advantages are of course thoroughly emphasized also, and they admit of very simple statement.

The effective pasteurization of milk, or heating of milk as Dr. Rosenau prefers to call it, consists in maintaining the milk at a temperature of 140° Fahrenheit for 20 minutes in a closed vessel, and then cooling it rapidly. Exposure to that temperature for that amount of time is fatal to the germs of tuberculosis, typhoid, diphtheria, dysentery, cholera, etc. (p. 598), but does not destroy the chemical ferments present in milk, which are supposed, in the absence of definite information, to be of great value in making the milk digestible.

Now it is pretty generally admitted that milk heated in the way Dr. Rosenau describes is a great safeguard against the diseases mentioned, and that it has a beneficial effect in reducing the risk of infantile diar-

rhoea, but there still are doctors who believe that its disadvantages outweigh its merits as a food for infants.

The objections are carefully gone into one after another by Dr. Rosenau, but he and Dr. Schereschewsky between them are able to reply very satisfactorily to them all.

#### ALLEGED DISADVANTAGES.

For instance, it has been asserted that scurvy may result from feeding children with heated milk, but our two doctors show that in the rare instances when it occurs it is very likely due to over-feeding with a milk that is excessively fat and deficient in potassium salts. In all cases the scurvy readily yields to simple treatment.

Rickets is another disease that has been attributed to the use of pasteurized milk, but the general opinion of physicians regards it as due to other causes—defective alimentation and improper hygiene (pp. 597, 626).

So far from pasteurized milk being more difficult of digestion than raw milk, as is sometimes asserted, the heated milk is found to be more completely absorbed than the raw (pp. 610, 626, 669); the curd is softer and will therefore behave in the stomach more like the fine curd of human milk (p. 669); large fat-containing curds are less likely to be formed in the stomach (p. 668). "The evidence seems clear that the pasteurization of milk at 60°c. [60°centigrade = 140° Fahrenheit] for twenty minutes does not appreciably deteriorate its quality or lessen its food value" (p. 625).\*

#### THE SAVING OF INFANT LIVES.

The alleged disadvantages may therefore be dismissed and we come back to the manifest benefits of pasteurization. It clearly makes milk a safer article of diet for all who use it. Above all, it saves the lives of infants. No better illustration of this fact is known to the writers in the Milk Bulletin (pp. 237, 612) than the oft-quoted figures relating to the infants' hospital at Randall's Island, New York, "where the mortality in 1897, with raw milk, was 44.36 per cent., while in 1898, with pasteurization of the milk" undertaken at my suggestion in an apparatus that I presented to the institution, "it was 19.80 per cent."

Speaking generally, the rate of infantile mortality is still everywhere too high. While modern sanitation has been steadily reducing the general death rate of the whole population of civilized countries, the

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\*I have always pasteurized at 157° F. for 20 minutes, and this heat has not been found to destroy the chemical ferments. Experience is better than theory, and my experience has so demonstrated the success of 157° that I am loath to change my method.

mortality of infants under one year of age has failed to fall in the same proportion (p. 230). The average death rate of such infants for the whole of England and Wales (1895-1904) is 150 for every 1,000 births. Out of every 1,000 children born in the country 150 are destined to die before they are twelve months old, and locally the proportion must be much higher—in Manchester and Salford, for instance, not far short of 200 (p. 231). Of course one way to save some of these lives is to revive the practice of breast-feeding, but much can be done by giving up the *laissez faire* policy with regard to the milk supply.

### CONCLUSIONS.

The chief reason for the acute state of the milk question at the present moment, as pointed out by Surgeon-General Wyman (p. 11), is the high rate of infant mortality, coupled with a declining birth rate. The milk can no longer be allowed to take care of itself: it calls aloud for appropriate treatment. Whether that treatment is to be administered by some public body, beginning with inspection of the dairy farm, or whether it is to be left to private management and restricted to the domestic kitchen, is a question of national temperament and public finance.

In America, I feel sure, this important Milk Bulletin will before long be followed by Federal legislation.

England, I am happy to see, has also recognized the importance of the question, and I cannot believe that she will hesitate to make the responsibility for a pure milk supply a public charge.

How can nations grudge the money for this great service when taxes for enormous military and naval expenditure are cheerfully borne? There is a nobler warfare to which we are called: war against dirt, disease and death; war in defence of our most precious possessions—the infant inheritors of the destiny of the world.

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Heidelberg, July, 1908.

My experience during a seven months' residence in this city has only confirmed my previous views. *After all it is impossible by inspection and control to insure a pure milk supply.*

Official statistics show that 42.42 per cent. of the cows slaughtered here in 1906 were tuberculous. This figure is probably not higher than elsewhere, and only testifies to the careful work done by the slaughter-house authorities.

Despite all the precautions which I know are being taken here, such cows are milked to the last day; their milk is mixed with that of healthy animals, and the entire supply thereby infected.

In Sandhausen, near Heidelberg, the death rate of children under two years of age was 46 per cent. Encouraged by my experience on Randall's Island, I began on the 1st of February, 1908, to supply this village with pasteurized milk. During the first month I sent the milk from my Heidelberg Laboratory. Since the 1st of March the villagers have prepared the milk themselves with an apparatus supplied by me and installed in the village by the kind co-operation of Buergermeister Hambrecht. And I am happy to be able to announce that in spite of the unfavorable weather of this spring and a few deaths caused by inflammation of the lungs the death rate, according to the official statistics, amounts to only one-third of the average death rate of the last five years.

Before sailing for America on August 27 I received this telegram:

Nathan Straus, Passenger Cedric, Queenstown:

Since February 1, 1908, there died in Sandhausen eleven children under two years of age, against twenty-five for the corresponding months in 1907, and against thirty-two average for the five preceding years. We use same milk as before, only pasteurized.

(Signed) FRANZ HAMBRECHT,  
Bürgermeister.



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### CHICAGO SAYS MILK MUST BE PASTEURIZED.

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Chicago, Aug. 8.—This city, under the leadership of Dr. W. A. Evans, Commissioner of Health, has taken the lead in adopting practical measures for the prevention of tuberculosis, being the first city in the world to take definite steps to stop the sale of milk containing the germs of consumption.

The City Councils have passed an ordinance requiring that after January 1, 1909, all milk offered for sale in the city shall be pasteurized, unless it comes from cows that have been tested with tuberculin within a year and that have been proved to be free from tuberculosis.

Similar ordinances have been passed requiring that no butter or cheese shall be sold in the city unless made from the milk of tuberculin-tested cows or from pasteurized milk.

Dr. Evans, in his long fight for the adoption of these measures to prevent the spread of tuberculosis, cited the demonstrations made in New York City by Nathan Straus and the proofs given in European cities by the American philanthropist.

He pointed out that an American layman had taught the whole world how to successfully combat the great white plague, and that the most American of cities ought to take the lead in adopting and enforcing Mr. Straus's practical and efficient scheme for the saving of human life and the curbing of the most dreaded of all diseases.

—New York Evening Mail.

## MOTTO

For all who would aid in the fight against the  
Great White Plague:

MEDICINES AND HOSPITALS ARE  
POSSIBLE CURES  
WHILE  
PASTEURIZATION IS POSITIVE  
PREVENTION.



Ottawa, Wednesday, June 10, 1908.

Addressing the Canadian Medical Association here, Dr. Hastings, of Toronto, made the following remarkable statement:

“If the truth were known, 15,000 of the 30,000 children who die in Canada annually might justly have the epitaph, ‘Poisoned by impure milk,’ placed on their gravestones.”





# NECESSITY FOR PASTEURIZATION OF MILK AND BENEFITS ATTAINED THEREBY.

PAPER PRESENTED TO THE INTERNATIONAL CONGRESS OF APPLIED  
CHEMISTRY AT LONDON, MAY, 1909.

BY NATHAN STRAUS.

**A**N epoch in life-saving is marked by the assembling in London of the 7th International Congress of Applied Chemistry, for the workers in that branch of chemistry which has to do with the purity of foods have won the right to celebrate the triumphs of their science over commercial greed. Even though benzoate of soda seems to be entrenched in the United States behind a referee board, it is Dr. Wiley who has won the real victory, for the American public is with him, and will have none of the preserved foods.

But my interest in the science of applied chemistry is due to the aid given me by your profession in my life-work of saving the lives of babies.

For eighteen years I have done what one man could do to stop the slaughter of children. In 1892 I was convinced that infected milk was responsible for the excessive infantile death rates and for the persistence of tuberculosis among human beings.

Forthwith I proceeded to put pasteurized milk within reach of the children of New York City. Instant was the response in decreased mortality, and conclusive was the demonstration obtained by feeding the city's waifs on Randall's Island with pasteurized milk, resulting in the reduction of the death rate from 44% to 19.8%.

Therefore I proceeded to urge both in America and in Europe the adoption of pasteurization as a practical means of killing pathogenic germs in milk and thereby saving children from disease and death, doing what I could to facilitate the putting of such milk at the disposal of mothers.

Instantly my work was bitterly opposed. In those days I could only point to the babies fed upon pasteurized milk to prove that I was right. Objections to pasteurization multiplied, based entirely upon ignorance or hostility at the idea of a mere layman teaching how to save lives. To all attacks I replied by quoting the advice of that true medical sage, Prof. Abraham Jacobi, for half a century the leading expert on children's diseases, who had guided me in all my work, and by calling upon

Dr. Arthur Randolph Green, the medical director of my infant milk stations, to tell exactly how the babies fared who were fed upon pasteurized milk.

However, throughout all these years, with no purpose but to save lives, I was compelled to meet attacks, and the extension of the benefits of pasteurization was hindered everywhere by the noisy clamor of those who did not know and who would not believe. One New York physician went so far as to declare that his clinic was thronged daily with babies who had contracted scurvy or rickets from being fed upon pasteurized milk. He was challenged to produce one such case. Dr. Green went to his clinic to see the anomaly. I need hardly tell you that this belligerent doctor failed to show a single such case, nor need I add that he has not yet been silenced by this conviction of lack of veracity.

Such was the condition when applied chemistry stepped in to determine scientifically the value of pasteurization and the true weight of the objections shouted from the house tops by its foes.

I submitted, with perfect frankness, to the Public Health Service of the United States, in 1907, every objection that I had ever heard raised against pasteurization, every alleged disadvantage, every criticism, and I asked nothing but that each of these objections should be carefully considered, and that a true scientific verdict should be rendered.

The result was given to the world last year in the famous Hygienic Laboratory Bulletin No. 41, "Milk and Its Relation to Public Health," which was a complete and thorough vindication of pasteurization, both as showing its necessity and as proving scientifically that the heat necessary to kill the germs of disease does not impair the ferments that assist digestion, does not deteriorate the quality of the milk, does not lessen its food value, does not alter its chemical or physical qualities—but does prevent much sickness and save many lives.

In short, Dr. Rosenau, Dr. Kastle, and the other experts working with the Surgeon General, Dr. Walter Wyman, in the investigation of the milk problem, experimentally demonstrated the scientific correctness of pasteurization as the practical method of making milk safe food, confirming my practical experience of eighteen years in two hemispheres.

I, therefore, take this opportunity to express my sense of the obligation that humanity thus owes to applied chemistry for sweeping away the crude errors that have so long protected the pathogenic germs in milk and thus enabled them to spread disease and death broadcast.

The importance of this addition to the sum of human knowledge can be appreciated only by one who has tried to stand between disease and the babies and to shield them from untimely death.

When the results of this American investigation are properly grasped by the medical profession and by the officers charged with the protection of the public health, and when the fact of the scientific correctness of pasteurization is considered with reference to the relations of bovine and human tuberculosis, as proved by the independent investigations of the British Royal Commission on Tuberculosis and Drs. Schroeder and Mohler, of the American Department of Agriculture—when these facts are impressed upon the public conscience, it will be held to be a crime to sell milk unless it has been produced under sanitary conditions from tuberculin-tested herds and delivered uncontaminated in sterilized containers, or unless it has been properly pasteurized.

Hundreds of thousands of lives will be saved if this Congress will make a clear and emphatic declaration for pasteurization as the scientifically correct and practically efficient method of saving human beings from tuberculosis and other milk-borne infections. I sincerely hope that the great influence of the International Congress of Applied Chemistry will be exerted in the cause of health and life and against disease and death.





## THE WHITE PERIL: HOW IT MAY BE AVOIDED.

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Paper Presented to the International Dairy Congress, Budapest,  
June, 1909.

Budapest, June 7.—That time and persistence in present methods will certainly assure the extinction of the dairy industry and of the human race, was the alarming statement made to-day by Mr. Nathan Straus, the New York philanthropist, who has been fighting tuberculosis for eighteen years. Mr. Straus had a paper before the International Dairy Congress, in session to-day at the Vigado.

Stating that the great white plague of tuberculosis persists and spreads among cattle and among people largely because of the white peril of tuberculous milk, Mr. Straus said:

Tuberculous cows bear healthy calves and straightway infect them with this disease through the milk that they give to their young, and when the calves are weaned these diseased cows supply the germs of the white plague to the human beings who use their milk. Thus we are inviting the extermination of the dairy industry and of the human race, for this plague is increasing both among cattle and among men, and it will increase like the spreading of a fire so long as the milk swarming with tubercle bacilli is used as food for calves or babies. There is a mathematical certainty as to this fact.

### CHICAGO ONLY CITY PROTECTING BABIES.

But we need not sit down in stupid helplessness and give tuberculosis undisputed sway on the dairy farm and in the home. We have the tuberculin test to detect the infected animals, and the Bang method of segregating the diseased cows and using those that are only slightly affected to bear calves, which can be brought up without contracting the disease by taking them from the cows and feeding them on pasteurized milk. This will save the dairy herds. And we have the perfectly feasible method of saving the babies by pasteurizing all the milk that does not come from tuberculin-tested herds.

Eighteen years ago I declared that it would soon be regarded as a crime to feed a young child upon milk that had not been pasteurized.

I was optimistic. Intelligent farmers now regard it as folly to feed a calf or a pig with unpasteurized milk unless they know by the tuberculin test that the cow is free from tuberculosis, but Chicago is the only city in the world that takes such precautions to save its people from tuberculosis.

To show that he was not exaggerating, Mr. Straus quoted the report of Dr. A. D. Melvin, chief of the American Bureau of Animal Industry, in which he shows that more than 10 per cent. of the dairy cattle are tuberculous and that "this disease is undoubtedly on the increase." Mr. Straus also said that Dr. V. A. Moore had found tuberculosis in 302 herds out of 421 examined, about one-third of the animals being affected. Mr. Straus added:

#### TUBERCULIN TEST RELIABLE.

Yet for the past nineteen years we have had a practically infallible method of singling out the tuberculous cattle. Dr. John R. Mohler, of the American Department of Agriculture, has compiled the records of 24,784 applications of the tuberculin test, and has found that in all but 397 of these cases post-mortem examination showed tuberculosis indisputably.

As for the consequences of dairymen selling tuberculous milk, Mr. Straus pointed out that there had been in New York City in two years an increase of 33 per cent. in the number of new cases of tuberculosis, a fact which the Health Department of the city tried to explain, but did not deny. At this rate, he said, within a generation the great wealth of the American metropolis would be insufficient to provide hospitals for the tuberculous patients.

Mr. Straus said that bovine tuberculosis now costs the American farmer \$14,000,000 a year, and the immediate killing of all the tuberculous dairy cows, if it could be effected, would cost a billion, but that pasteurization would infallibly kill the germs of tuberculosis and all other disease germs that might be in the milk.



New York, May 12, 1909.

National Association for the Study and Prevention of Tuberculosis,  
Washington, D. C.:

Dear Sirs—Warmest greetings and enthusiastic praise are due the National association upon the occasion of its fifth annual meeting, because of the incalculable service rendered in bringing the International Congress on Tuberculosis to this country, and because of the multiplication of sanitarium in the United States to more than 200, largely through the influence of the campaign so vigorously conducted by this association.

Yet this meeting would be barren and unprofitable if the National association rested in contemplation of work well done, and failed to recognize that the methods of prevention urged in its literature do not strike at one of the greatest causes of the multiplication of tuberculosis victims.

Increase of population may explain 10,157 deaths from tuberculosis in New York City in 1908, as compared with 8,883 in 1902, but it does not justify 23,325 new cases in 1908, where there were only 12,914 in 1902, almost doubling the year's record in six years.

The last two years have seen diligent and thorough application of the methods of prevention embraced within the scope of the work of this association, yet the number of new cases of tuberculosis reported in New York was 19,725 in 1907, 23,325 in 1908, an increase of 18 per cent., and in the first four months of the present year 8,755 new cases have been reported, indicating a total of 26,265 for 1909, or 33 per cent. more than in 1907.

These figures are tragic for the city cited as "leading the whole world in the warfare against tuberculosis," and their significance must be duly considered by this association.

Dr. Trudeau, the real pioneer in systematic combat against the white plague, at the New York exhibition, said: "Prevention offers the most promising field for effective work."

And we must have prevention that prevents, if we are to cut down this rapidly increasing roll of tuberculous patients.

Prevention that deals only with infection that may come from the tuberculous patient, and ignores the mischief wrought by the tuberculous dairy cow, is the sort that we have had, and it has failed to prevent a 33 per cent. increase in the number of victims of the disease.

This association would be untrue to the International congress, for which it was responsible, if it were to rest content with this sort of

prevention, for that congress unanimously decreed that "measures are to be continued against bovine tuberculosis and that its transmission to man is to be recognized."

That resolution of the delegates from thirty-three nations was a call to the foes of the great white plague to move forward their battle lines and to enter upon a yet more fruitful campaign against the most deadly foe of mankind.

The situation is far too serious for any further pothering over quibbles about a microscopic difference in the appearance of the tubercle bacilli found in man and those found in cows. Dr. Mohler, of the Department of Agriculture, among others, has shown that the two forms of the bacillus are due to the media in which they live, and that each type changes to the other when transplanted.

Dr. Schroeder, of the agricultural experiment station, points out that "if the two types really differ in an important way, it is only that the type commoner in cattle is of much higher pathogenic virulence than that commoner in man."

Dr. Ravenel, of Wisconsin, and Dr. Theobald Smith, of Harvard, have isolated the germs of bovine type in the tissues of children who have been killed by tuberculosis, and I have before me the records of 63 cases of children in which the bacilli were undoubtedly bovine. If in some cases of children and in many cases of adults the germs are found to be of the so-called human type, the variation is probably only the morphological change that Dr. Mohler has shown to result when the bovine bacillus dwells long enough in human tissues.

These are now scientific facts, corroborated by a host of scientific men.

The Bureau of Animal Industry and Prof. Moore, of Cornell, have shown the extent of tuberculosis among dairy herds, their investigations indicating that one-third of the cows are affected and two-thirds of the herds.

Investigations in Washington showed one out of every eighteen samples of milk taken to be tuberculous, and that one out of every ten dairies supplied tuberculous milk. Dr. Schroeder has shown that milk is infected not only when the cow's udder is diseased, but that one tuberculous cow may infect the milk of the entire dairy.

"Milk is frequently infected with living, virulent tubercle bacilli," he writes. "There is nothing hypothetical, circumstantial or inferential about this. It is a fact, a plain, experimentally demonstrated fact." And he adds, after showing how the inhalation theory of human infection has been overestimated: "We must not forget the significant fact that tubercle bacilli in milk are not on floors or on pavements or on places



where they may or may not enter our bodies; they are located in articles of food, to be eaten, in most instances, in a raw state, and therefore are inevitably consumed in large quantities."

Every one of these facts has been corroborated by the British commission.

"Every tuberculous cow," says Dr. Woodhead, of that body, "is either an actual or potential center of infection. We cannot get rid of the great white plague until we take bacilli of bovine origin into consideration."

Dr. Latham, the famous London physician, on April 22 wrote me:

"I agree with you that preventive measures are all important with reference to tuberculosis, and have watched your work in connection with the pasteurization of milk with great interest. Unfortunately we at present devote our attention chiefly to an endeavor to deal with those who are already afflicted with tuberculosis, but there are signs that the public is at last waking up to the fact that the only real way of dealing with the question is a wider one, and that it entails prevention of infection in milk."

In 1895, almost in the beginning of my eighteen years' warfare against tuberculosis, I wrote: "In the near future it will be regarded as a piece of criminal neglect to feed young children upon milk that has not been sterilized." I have demonstrated again and again that pasteurization reduces excessive infantile death rates at least one-half and that it kills the germs of tuberculosis.

Science has amply verified my experience. The public health service thoroughly investigated the whole milk problem and Dr. Wyman and Dr. Rosenau, with their corps of twenty experts, proved beyond dispute that pasteurization does kill the germs of tuberculosis and the other milk-borne infections, without in any way impairing the milk. Dr. Rosenau fixes 20 minutes at 140 degrees Fahrenheit as the minimum for efficient pasteurization.

In the light of these facts I feel that I am amply warranted in urging this association to take the important and necessary step forward and to attack tuberculosis in its citadel—the dairy farm.

The progress hitherto made has been almost entirely in taking better care of the tuberculous patient. Praiseworthy as this is, it is not stamping out tuberculosis. The abolition of this unnecessary disease will begin when it is made a crime to sell milk unless it comes from tuberculin tested cows, or has been properly pasteurized.

*Nathan Straus*

To Dr. Vincent Y. Bowditch, President.



# REPORT MADE TO THE INTERNATIONAL CONFERENCE AT STOCKHOLM ON THE INFECTION OF CHILDREN BY MILK FROM TUBERCULOUS COWS.

Stockholm, July 8, 1909.

**A**MERICAN investigations of the responsibility of bovine tuberculosis for the persistent spread of the disease among human beings, particularly children, were officially reported to-day to the eighth International Tuberculosis conference, in session here, by Mr. Nathan Straus.

The paper by the New York philanthropist was presented by Dr. Arthur Randolph Green, medical director of the Straus pasteurized milk work, and one of the American delegates. It disclosed for the first time the overwhelming evidence gathered by the American investigators to show the responsibility of milk from tuberculous cows for the infection of human beings with tuberculosis.

## MR. STRAUS'S PAPER.

Mr. Straus's report was as follows:

The topic assigned for discussion, the protection of healthy children from tuberculosis, suggests two important and imperative lines of action:

1. That their association, in families or otherwise, with tuberculous patients be safeguarded by sanitary measures.
2. That their infection with bovine tuberculosis be prevented by forbidding the sale or use of milk unless it comes from tuberculin-tested cows, or unless it has been properly pasteurized.

Overwhelming proof of the necessity of stopping the use of tuberculous milk has been supplied, particularly within the past year, by the definite tracing of a large number of cases of human tuberculosis to its bovine origin.

The "Journal of the American Medical Association," in a leading editorial on May 22, pointed out that in over 300 cases investigated bacilli of the bovine type had been found in more than sixty cases, a little more than 20 per cent., and this highest authority among the medical publications of America declared: "Bovine tuberculosis is a source of danger to man sufficiently great to demand rigorous precautionary measures against it."

## DR. PARK'S INVESTIGATIONS.

Quickly following this unanswerable summing up of the situation came the disclosure in the same month of the investigations conducted by Dr. William H. Park, director of the research laboratory of the New York City Health department. Dr. Park reported to the Association of American Physicians that of seventeen fatal cases of generalized tuberculosis in infants, five were found to be due to bacilli of bovine type. Two cases of abdominal tuberculosis were examined and both were due to the bovine bacillus. In five cases of tuberculosis of the bones and joints and four cases of pulmonary tuberculosis among babies, the bacilli were of the human type. Of twenty-nine cases of tuberculosis of the lymph glands of the neck nine disclosed bacilli of the bovine type. Dr. Park observed: "Bovine infection is certainly a considerable factor in the tuberculosis of children."

Dr. M. P. Ravenel, of the University of Wisconsin, as early as 1902 refuted the Koch error of 1901 by isolating the bacilli of bovine type in the tissues of a child who died from tuberculosis. Dr. Theobald Smith, of Harvard, found the bovine germ in four cases. Febiger and Jensen, of Copenhagen, proved that seven of twelve children who died from tuberculosis had been infected by milk, tracing the disease back to tuberculous cows.

The German imperial commission, appointed to vindicate Koch, investigated eighty-four cases of tuberculosis in children and found twenty-one, or 25 per cent., of bovine origin. The British Royal Commission established that fourteen out of sixty cases, or 23 per cent., were due to the bovine bacillus.

## PROOF OF BOVINE INFECTION.

Thus we have cumulative proof of the responsibility of milk and milk products for the persistent spread of tuberculosis among human beings, and the recent investigations of the American Department of Agriculture have created a strong presumption that the infection has been of bovine origin in many cases other than those in which post-mortem examination discloses bacilli of undoubted bovine type. For Dr. John R. Mohler has proved that the bacillus of bovine type changes to the human type when transplanted into clots of human blood, indicating that the form of the tubercle bacillus is due to the media in which it lives. And Dr. Schroeder says: "If the two types really differ in an important way it is only that the type commoner in cattle is of much higher pathogenic virulence than that commoner in man."

Dr. Mohler's remarkable experiments open an absolutely new line of investigation and suggest as highly probable the hypothesis that the tubercle bacilli of the so-called human type are in many cases really of

bovine origin and differ in appearance from the bovine bacilli only because of long residence in the human tissues. This hypothesis should receive the studious attention of investigators.

#### EXTENT OF DISEASE IN DAIRY HERDS.

Besides the indisputable evidence that bovine tuberculosis is transmitted to human beings, particularly to children, we have to recognize the fact of the extent of tuberculosis among the dairy herds. Dr. A. D. Melvin, chief of the American Bureau of Animal Industry, in his last annual report showed that more than 10 per cent. of the dairy cattle were tuberculous. "This disease is undoubtedly on the increase," he said. Dr. Moore, of Cornell University, found tuberculosis in 302 out of 421 herds examined in New York State, about one-third of the animals being diseased.

It is to be remembered in this connection that Dr. E. C. Schroeder has proved that tuberculous cows, even though but slightly affected, give off tubercle bacilli in their feces, and that the mere presence of a tuberculous cow in a dairy herd may result in the infection of the entire milk supply of that dairy. Dr. Schroeder's conclusions were amply verified and confirmed by the British Royal Commission.

#### TUBERCLE BACILLI IN MILK.

Then we have evidence of the undoubted presence of tubercle bacilli in milk offered for sale in our cities. Wherever examinations have been made living, virulent germs of tuberculosis have been found in a considerable number of the samples taken from the milk dealers.

The most important and thorough investigation of this sort was that made by Dr. John F. Anderson, assistant director of the United States Hygienic Laboratory. After years of work on the part of the agricultural department had vastly improved the conditions as to health of the dairy herds supplying the city of Washington, Dr. Anderson gathered 272 samples of milk from 104 dairies, the largest number ever examined in one investigation. He obtained indisputable results from 223 of these samples, finding 15, or 6.72 per cent., to contain virulent tubercle bacilli, and that this tuberculous milk came from eleven different dairies.

And of the tubercle bacilli in milk, it must be remembered, as Dr. Schroeder points out, that their lodgment in human bodies is not left to chance, as in the case of germs in dust or sputum, but that they are inevitably consumed in large quantities and enter human bodies alive and virulent. Wherefore, Dr. G. Sims Woodhead, of the British Royal Commission, says: "Every tuberculous cow is either an actual or potential center of infection."

## MUST ELIMINATE GERMS FROM MILK.

Obviously, therefore, the efficient protection of human beings, and particularly children, from tuberculosis requires that a summary stop be put to the almost universal practice of using milk of doubtful origin in the raw state. This was the position I took in 1895, almost at the beginning of my work, and this was the conclusion reached in 1908 by the United States Public Health service, after the most thorough investigation of the milk problem ever made.

By means of the tuberculin test the diseased cows can be weeded out, but this will be a work of years. Through the activity of medical milk commissions in America a supply of milk from tuberculin tested cows has been secured, but this milk is costly and the total output is only about 40,000 quarts a day, or one-tenth of one per cent. of the quantity daily used in the United States.

For the other 99.9 per cent. we need measures that will eliminate the tubercle bacilli and other germs and prevent the milk setting up infections in the human body. The measures that are recommended by the United States Bureau of Animal Industry are the tuberculin test and pasteurization, the recommendation being that pasteurization be required in the case of all milk not produced from tuberculin tested herds.

## GOVERNMENT FOR PASTEURIZATION.

Summing up the results of the milk investigation, Surgeon-General Walter Wyman writes: "The important subject of pasteurization has been carefully studied by Dr. Rosenau, who points out its advantages and discusses its inconveniences. He recommends 60 degrees Centigrade (140 degrees Fahrenheit) as the best temperature to use in pasteurizing milk, as this degree of heat is sufficient to destroy the pathogenic microorganisms without devitalizing the milk itself. Pasteurization is forced upon us by present conditions. It prevents much sickness and saves many lives."

And Dr. Schroeder writes: "It is a simple matter to destroy tubercle bacilli in milk and cream by pasteurization. It is necessary to educate men to a realization that tuberculosis is so common among dairy cows that many years must pass before we can reasonably hope to eradicate it, and that in the meantime pasteurization is absolutely necessary for the protection of public health."

Dr. Rosenau, director of the United States Hygienic Laboratory, after a thorough study of the amount of heat necessary to kill the tubercle bacilli, decided that the milk should be heated to at least 60 degrees Centigrade and kept at that temperature for twenty minutes.

## VINDICATION OF THE METHOD.

The proof of the correctness of pasteurization of milk as a life-saving measure has been rounded out by Dr. Joseph H. Kastle, chief of the division of chemistry of the hygienic laboratory, who has shown that the process, as recommended by the United States Public Health Service, does not impair the ferments or enzymes contained in fresh milk, does not alter the chemical composition of milk, does not lessen its food value, either as to nutrition or digestibility, and does not alter its taste or physical qualities.

This method of destroying the tubercle bacilli in milk, so thoroughly proved and justified by science, has been practically vindicated by my eighteen years' experience in supplying pasteurized milk for the babies in New York and other cities in America and abroad. The result has been that wherever pasteurization has been introduced in cities having excessive infantile death rates, the mortality among the babies has been reduced one-half.

In view of all these facts that I have briefly summarized, the tuberculosis problem resolves itself largely into a milk problem, and the milk problem is not what to do, but how to get it done.

The prevention of the infection of healthy children by tuberculous patients is largely the work of the doctors, and they are quite able to cope with this duty.

## ACTIVE CO-OPERATION NEEDED.

The prevention of the infection of healthy children by tuberculous milk requires the active and willing co-operation of the dairyman, the milk dealer, the legislator, the health officer and the doctor. That these men of diverse interests may work together to enforce the pasteurization of milk that is not from tuberculin tested herds requires the earnest endeavors of the organizations that have been formed to fight tuberculosis and the assistance of the pulpit and the press to create such well-informed public sentiment that it will be regarded as a crime to feed a child upon milk of doubtful origin unless it has been properly pasteurized.

The progress hitherto made in the fight against tuberculosis has been chiefly in the treatment of the disease, the easing of the sufferings of the hopelessly tuberculous and the curing of incipient cases.

There are indications now that the anti-tuberculosis movement will soon make headway against the plague along the lines of rational and effective prevention. Within the past month the American Association of Physicians and the National Association for the Study and Prevention of Tuberculosis both issued warnings against infected milk as a cause of tuberculosis, the former declaring the sale of such milk criminal, the latter body earnestly commending all efforts to secure, especially for the children, a pure milk supply.





# PREVENTION OF INFECTIOUS DISEASES CAUSED BY MILK.

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SUBMITTED TO THE  
INTERNATIONAL MEDICAL CONGRESS  
AT BUDAPEST, AUGUST 31, 1909  
BY NATHAN STRAUS OF NEW YORK.

**H**APPILY the representative medical associations are on record as frankly recognizing the perils of raw milk and officially recommending the well-proved remedy, namely, the destruction by heat of the disease germs that may be in milk. And science has made rapid progress in verifying the correctness of this wise advice and in adding urgency to the warning that milk should be boiled or pasteurized.

Investigations in all the civilized countries have heaped up irrefutable evidence that infected milk is a frequent cause of infectious diseases, and that pasteurization at not less than 140 degrees, for not less than twenty minutes, thoroughly kills the pathogenic organisms, without in the least impairing the physical qualities of the milk.

Health officers, having become keener in tracing epidemics to their source, have proven that numerous outbreaks of infectious diseases among children have been due to the use of infected milk in the raw state.

Dr. John W. Trask, of the United States Public Health Service, has tabulated the convincing records of 500 such epidemics that have been definitely traced to the milk supply. This list includes 317 milk-caused epidemics of typhoid fever, 125 of scarlet fever, 51 of diphtheria and 7 of epidemic sore throat.

Dr. M. J. Rosenau, director of the Hygienic Laboratory at Washington, who has just been designated the first Professor of Preventive Medicine and Hygiene at Harvard University, made two thorough investigations, case by case, of typhoid fever in the American capital. Rejecting all the instances in which the evidence fell short of actual proof, out of 866 cases in 1906, he found that 85, or nearly 10 per cent., were due to infected milk; while out of 523 cases in 1907, 48, or more than 9 per cent., were definitely traced to infected milk.

Marking all cases, irrespective of their proved origin, on a map of Washington, and tracing thereon the routes of the milk dealers, Dr.

Rosenau obtained a remarkably illuminative result. In 1906 there were only 3 cases, and in 1907 only 8 cases on the routes of one of the biggest dealers in the city. Dr. Rosenau gives this explanation:

“This dealer is the only one in Washington who both sterilizes the bottles and pasteurizes the milk. The low typhoid fever rate among his customers is significant and perhaps is a fair index of the result which would be accomplished by the pasteurization of the milk supply.”

The pasteurization in this case is not the fraudulent half-minute process called “commercial pasteurization,” but consists in heating the milk to 156 degrees Fahrenheit (69 degrees Centigrade) and holding it at that temperature for half an hour.

While practical experience was furnishing this concrete demonstration of the efficacy of pasteurization, Dr. Joseph H. Kastle, the chief chemist of the Hygienic Laboratory, made a most searching investigation of the effects of heat upon milk. He found that the heat necessary to kill the germs of disease does not impair the ferments that assist digestion, does not deteriorate the physical qualities of the milk, does not lessen its food value, does not alter its chemical constituents.

Wherefore, Surgeon-General Walter Wyman, summing up these and other inquiries, says: “Pasteurization prevents much sickness and saves many lives.”

In the face of these practical demonstrations, which coincide exactly with my own experience of eighteen years in supplying pasteurized milk for the babies of New York and other cities, it certainly seems that it should be impossible for crude errors and prejudices to persist and to protect the pathogenic organisms that so often are found in milk, and thus enable them to spread disease and death broadcast.

But there is a reason for pasteurization that is more imperative than the presence in milk of the germs of typhoid or scarlet fevers or diphtheria.

The specific germ that causes tuberculosis is found in much of the milk that is used for human food. In America, only one-tenth of one per cent. of the milk daily sold is certified as free from tubercle bacilli. Conditions are much the same in every country, for bovine tuberculosis exists everywhere except on the Channel Islands, and the susceptibility of cows to this plague increases with the development of their milk-producing capacity.

Dr. John F. Anderson, of the Hygienic Laboratory, found virulent tubercle bacilli in 6.72 per cent. of 223 samples of Washington milk, after the Department of Agriculture had for years been diligently weed-

ing out the tuberculous cows from the dairies supplying the national capital.

Dr. Alfred H. Hess found tubercle bacilli in 16 per cent. of 107 samples of New York milk.

The London County Council last month received a report of the investigation of the milk supply of the British capital, which showed that 12.9 per cent. of 1,217 samples were undoubtedly tuberculous.

These facts would be alarming were they not illuminative. They would inspire terror, did they not point the way to the means of saving the human race from this widespread and ever present peril.

Among scientific men, save the few who in 1901 committed themselves to a hasty assumption, no one now in 1909 doubts the transmission of bovine tuberculosis through the raw products of diseased animals to human beings. Nor does any one, unless similarly committed to some pet error, dispute the certain efficacy of pasteurization as killing the infection, rendering the milk safe, while in no way impairing its food qualities.

It is, in fact, proved, with mathematical certainty, that progress in fighting the Great White Plague depends upon the adoption of methods of evicting the tubercle bacilli from the milk supplies. The elimination of the diseased animals from the herds, it is admitted, will be the work of years, involving the expenditure of many millions. The destruction of the tubercle bacilli in milk is the work of half an hour, the cost trifling.

I will yield to no one in enthusiastic appreciation of the services that medical science is rendering to humanity in improving the treatment of tuberculosis and in reducing the death rate from this disease. In New York City the death rate from this cause fell from 2.42 per 1,000 of population in 1902 to 2.39 in 1907 and 2.29 in 1908, but the number of deaths from tuberculosis in proportion to the total number from all causes remained fairly constant. In 1902, 13.04 per cent. of all the deaths were caused by tuberculosis; the percentage fell to 12.54 in 1904; rose to 13.10 and 13.37 in the next two years; fell to 12.95 in 1907, and rose to 13.90 in 1908.

These figures reflect upon the medical profession greater credit than appears upon the surface. This holding in check of the death rate from tuberculosis has been in spite of a very great and alarming increase in the number of new cases of the disease.

The population of New York has increased 26 per cent. since 1902, while the number of new cases of tuberculosis reported in a year has increased 100 per cent. Growth of the city has added 932,291 to the population, while the spread of tuberculosis has added 144,172 to the

army of consumptives, until the vast resources of the great metropolis are taxed to the utmost to care for these victims of the Great White Plague.

Here are the figures of the new cases of tuberculosis, year by year:

	New Cases.	Per 1,000 of Population.
1902	12,914	3.55
1903	15,219	4.07
1904	18,723	4.88
1905	20,831	5.18
1906	20,085	4.83
1907	19,725	4.60
1908	23,325	5.27
1909 (half year)	13,350	5.85 (for year)

The cases reported up to July 1, 1909, indicate a total of 26,700 for the year.

These are the official figures of the Health Department and they cannot be successfully disputed. The explanation has been advanced that the doctors have been remiss in past years in reporting cases, and have suddenly begun to do their duty. This I reject as a mean and unmerited attack upon the integrity of the physicians of New York City.

There is no way in which these figures can be shorn of their alarming significance, namely, that the number of new cases of tuberculosis is increasing, in spite of better housing and working conditions. And these figures are paralleled in every other city in which similar data is available.

The logical and inevitable conclusion is that we must go back to the proven source of much human tuberculosis if we are to check the ravages of this plague. We must not stop at protecting the healthy from human infection, but we must save the well from the infection that may lurk unsuspected in raw milk.

If 16 per cent., or even 10 per cent., of the milk sold in New York is tuberculous, can we wonder at 13,350 new cases in the first six months of this year, and can we hope to stop this rapid infection of the population while we are feeding the people upon live, virulent tubercle bacilli? And are we not, as I said in 1894, guilty of criminal negligence in feeding young children upon milk which has not been sterilized or pasteurized?

One of the foremost authorities in England, Sir James Crichton-Browne, president of the Sanitary Inspectors' Association, has well said:

"The primary and paramount food question is the protection of the milk supply. Suicide, as well as assassination, has to be prevented by the strictest surveillance. The first and fundamental necessity in the protection of life is the application of efficient modern methods of purification to the disease infested milk supply."

It stirs the heart to think of how much sickness and suffering could be prevented by stripping the milk supplies of their power to cause disease and making this universal food of humanity a means of sustenance and health instead of an instrument of disease and death.

If I feel deeply and speak warmly, it is because I have seen results from my work. I have seen the infantile death rate in New York cut down from 96.5 to 49.6 per 1,000 since 1891, coincidentally with the increased use of pasteurized milk in the tenement districts. I have seen the mortality in the infants' asylum at Randall's Island, New York, reduced from 44.36 to 19.80 per cent., with no other change in care or diet than the substitution of pasteurized for raw milk. I have seen the death rate of Sandhausen, Germany, cut to less than half of the average for the preceding five years by no other means than by pasteurizing the milk for the children. I have seen similar saving of life at Eberswalde, near Berlin, with the remarkable record of not a single death of a child fed on pasteurized milk from October, 1908, to July, 1909. Thus I might multiply the evidence by citing the experience of twenty other cities.

This International Medical Congress meets at a time when the nations are competing feverishly in building equipment for making war, spending millions upon engines for the destruction of human life.

Your Congress, representing the men throughout the world who are striving to save lives, has the right to urge upon the governments of the world that the true way to make the nations great is to save the resources given them in their children, by protecting them from tuberculosis and the infectious diseases of childhood, by insisting that no milk should be used unless pasteurized or produced from tuberculin-tested herds under sanitary conditions.

Your labors against disease qualify you to insist that every expenditure upon the means to destroy lives in war should be duplicated by the setting apart of like sums for the saving of lives by the prevention of disease.

The advocates of expensive armament justify their programmes by saying that they seek to prevent war. No excuse is necessary for the proposal that like millions at least be spent to prevent sickness and death.

With national resources to support the higher warfare against death, we would soon see real headway in the fight against the great white plague in such a considerable reduction in the number of new cases that humanity would take heart, and thousands would call the International Medical Congress blessed for instituting such an enlightened policy of practical life saving.

*Nathan Straus*



## SAVING CHILDREN FROM MILK-BORNE DISEASES.\*

BY NATHAN STRAUS

**T**HE old city of New York (now the Borough of Manhattan), has established a new record in the saving of the lives of babies. Notwithstanding unusually severe periods of intensely hot weather the past summer, there have been fewer deaths of children under five years than in any preceding summer, and for the first time in the history of the city the summer mortality has fallen to a rate less than fifty per thousand per annum.

When I first undertook to protect the babies of New York from milk-borne diseases by supplying pasteurized modified milk in 1892, the summer saw the dying of 6,612 children under five years, making the rate per thousand per annum 136.1. With the steadily increasing use of pasteurized milk there has been a steady decline in infant mortality, until the summer just ended showed only 3,900 deaths in a population of children larger by 125,000 than that of 1892.

In other words, in 1892, 964 children out of every 1,000 survived the summer, while in 1910 there were 988 who escaped death out of each thousand.

That the pasteurization of milk fed to children has been a considerable factor in this achievement none may deny, for the prevention of sickness and death proceeds inevitably from the destruction of the germs that cause illness and that slay the little ones.

These facts are too elementary to be recited before the American Public Health Association. They are set forth fully in the thorough exposition of the milk problem by the Federal Public Health Service in the Bulletin, "Milk and Its Relation to Public Health," which Surgeon-General Wyman summarized in the words, "Pasteurization prevents much sickness and saves many lives."

This epitome of the results of the Federal Milk Investigation ought to be the battle cry of the forces united in the warfare against preventable diseases. Of all preventable diseases the most prevalent are tuberculosis, typhoid and scarlet fevers, diphtheria and the intestinal disorders of infancy; the specific germs of each may be and often are transmitted to the human system in raw milk, and these germs are rendered harmless by proper pasteurization.

\*Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

We ought to recognize that the disease now attracting so much attention—infantile paralysis—has all the appearance of a germ disease, occurs among infants whose only food is milk, and is probably prevented by pasteurization. I venture this presumption because of the fact that this disease has never occurred among the babies fed upon the milk pasteurized at my laboratories. I submit this fact in the hope that this practical experience may be used to the protection of child life while scientists are engaged in the tedious effort to isolate the germ.

If resort to pasteurization precedes scientific justification in the case of infantile paralysis, this method, as applied to the diseases known to be milk-borne, follows and confirms the discoveries of science.

My recent experience at Sandhausen, Germany, may be cited. The death rate among babies under two years of age had averaged 46 per cent. for five years. I pasteurized the milk for most of the babies, and the death rate fell to less than 20 per cent. I pasteurized the milk for all the babies of the village, and last July there were no deaths at all.

Again at Karlsruhe, instead of 26 per cent. of the babies dying in a year, the rate was reduced to 16 per cent. by pasteurization of the milk fed to about one-fifth of the whole baby population. These children were of the poorer classes, among whom the death rate had been higher than the average for the city. After these babies had been fed upon pasteurized milk the death rate among them fell to less than seven per cent.

All of which confirms and emphasizes the warning uttered by the eminent Prof. Jacobi at a meeting of child-saving agencies at the New York Health Department last spring. He had listened to the broaching of various ideas that had been put forth for approval of the conference. The most important thing, said the greatest authority on the care of infants, is this: "Use no raw milk."

There is no division of science upon this point. No competent authority has ever disputed the fact that pasteurization kills the germs of disease, while it in no way impairs the nutritive value or the digestibility of the milk.

My practical experience in saving children from milk-borne diseases warrants the assertion that the pasteurization of the milk supplies of our big cities, under careful Health Department supervision, would infallibly reduce the number of cases of infectious diseases and save lives of babies.

In no way could the American Public Health Association save so many mothers from bitter grief and loss of their little ones as by hastening the time when efficient pasteurization will be the rule and when the milk-borne diseases will be as rare as the plagues that medical science has practically abolished.



REPORT BY

*Nathan Straus*

OFFICIAL DELEGATE ON THE PART OF THE  
UNITED STATES

ON

**The Progress Made in America  
in The Protection of  
Child Life**

SUBMITTED TO THE

**THIRD INTERNATIONAL CONGRESS  
FOR THE PROTECTION OF INFANTS**

(GOUTTES DE LAIT)

BERLIN, SEPTEMBER 11-15, 1911



## REPORT BY NATHAN STRAUS.

OFFICIAL DELEGATE ON THE  
PART OF THE UNITED STATES ON THE

# PROGRESS MADE IN AMERICA IN THE PROTECTION OF CHILD LIFE.

PRESENTED TO THE  
THIRD INTERNATIONAL CONGRESS  
FOR THE PROTECTION OF INFANTS.

HELD AT  
BERLIN, SEPTEMBER 11-15, 1911.

Mr. President and Members of the Congress:

**A**T THE command of His Excellency, The President of the United States, I am here to present to this International Congress a report of the progress made in America in the protection of the lives of infants and to commend to your attention and approval the methods approved by our scientists and justified by our practical experience.

We have been happy in America in having at the head of our national government and of the bureaus that deal with the public health men who have been impressed with the social and economic importance of the baby, and who have been diligent to exert the powers of government for the protection of infants. Much has been accomplished; more is to be done.

President Taft is determined that the Federal Government shall do its utmost, both to show the local health officers and philanthropic agencies the best ways of protecting the lives of babies, and to carry on active work on their behalf in the protection of the milk supplies and in the promotion of better standards of living.

TO SAVE 125,000 BABIES A YEAR.

The Government has examined with expert ability and care the work in this field of individuals and philanthropic agencies, has made investigations and conducted experiments, and has reached conclusions which are being applied in the confident expectation of saving 125,000 babies' lives annually.

Of 1,324,660 deaths in the United States in 1909, 280,000 were of babies under one year, and 113,000 of these deaths were from intestinal disorders, due to improper feeding, and from infectious diseases, due often to disease germs conveyed to the babies in the milk.

It has been completely demonstrated in the United States that such deaths can be prevented, and that children, by proper nourishment, can be made to withstand other sicknesses of infancy that are not directly due to impure milk or improper feeding, and this is the basis of the expectation that 125,000 babies can be saved annually.

At the opening of the present century 180 out of every 1,000 babies born in the United States died in their first year; such progress has been made that the average for the decade has been 165 deaths out of every 1,000 births. We expect to reduce the rate to 100 or less.

### SYSTEMATIC PROTECTION OF BABIES.

The systematic protection of babies' lives had its beginning in America twenty years ago in the supplying of properly modified and pasteurized milk for infant feeding. It was then that I opened my first infant milk depot in New York City, with the advice and expert cooperation of Dr. Rowland G. Freeman. In 1892 the death rate among children under five years was 96.5 per 1,000; in 1910, in the same area, the rate was 45.8 per 1,000.

This reduction in infantile mortality was coincident with the increase in the number of stations and the output. This year I have eighteen stations, and the municipality and other agencies have increased the total number to eighty-seven. The statistics to date indicate a death rate much lower than any ever recorded in New York.

The credit for the success of this pioneer work is due to the wise guidance and unfailing helpfulness of that prince of savants, Prof. Dr. Abraham Jacobi, whose authority as the greatest of experts on infant feeding is recognized in Europe as well as in America, and who has just been made president of the American Medical Association.

### DEMONSTRATION ANSWERED OPPOSITION.

But even though my work had the approval of so eminent a specialist, it encountered bitter opposition at the very start. In an article published in "The Forum" in November, 1894, I stated:

I hold in the near future it will be regarded as a piece of criminal neglect to feed young children upon milk that has not been sterilized (pasteurized). Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it special susceptibility to tuberculosis.

At first the editors refused to print this statement as being too radical, but as a compromise put it in a footnote. Now this has become the battle cry of this whole campaign.

It was necessary, therefore, to make a demonstration such as could not be had by feeding babies in their homes. New York City at that time cared for its waifs on Randall's Island. In the three years, 1895, 1896 and 1897, out of 3,609 children, 1,509, or 41.81 per cent. died. Without any other change in their diet or regimen, the children in this institution were supplied with pasteurized milk from the same cows instead of the raw milk. The result was that in the next seven years out of 6,200 children only 1,349, or 21.75 per cent., died.

Thus the certainty of this method being efficacious was established. I might recite with cumulative force other facts from my twenty years' experience in this work, but I shall reserve this data for a brief paper that I will submit at another session of this Congress.

#### WORK OF AMERICAN GOVERNMENT.

Up to 1907, when this Congress met at Brussels, progress had been slow. But the foundation for effective work throughout the United States had been laid by the Public Health Service and the Department of Agriculture.

The former body, in 1907, under the direction of Dr. Walter Wyman, Surgeon-General, made an exhaustive investigation of the milk problem at the direction of President Roosevelt, proved that raw milk was often the cause of tuberculosis, typhoid fever, diphtheria, scarlet fever and intestinal disorders of babies; demonstrated that pasteurization does not impair the nutritive or digestive qualities of milk, and summed up the inquiry with the statement that "Pasteurization prevents much sickness and saves many lives."

Officials of the Agricultural Department, under the leadership of Dr. A. D. Melvin, chief of the Bureau of Animal Industry, formed the Washington Milk Conference, in 1907, and declared that the only milk reasonably safe in its raw state was that from tuberculin-tested cows, produced under sanitary conditions and known as "certified milk," and that all other milk should be pasteurized.

#### STAND TAKEN BY THIS CONGRESS.

At this juncture this Congress, in session at Brussels, issued the warning:

*Milk for children should be boiled, sterilized, or pasteurized—not used in its raw state.*

A year later (1908) the Sixth International Congress Against Tuberculosis was in session at Washington, and by reason of the weight of the arguments advanced by the American authorities, Ravenel, Schroeder and Mohler, and by Woodhead, of England, declared:

That measures be continued against bovine tuberculosis, and that its transmission to man be recognized.

At this time there were infant milk depots in 21 cities in the United States; now there are such institutions in over 40 cities, and in some of the cities the number of depots and the output of milk have been more than doubled in the three years. The work of these institutions includes instruction in the feeding and care of babies.

#### TWO GREAT CITIES REQUIRE PASTEURIZATION.

The City of Chicago, with Dr. W. A. Evans as Commissioner of Health, set the example in adopting measures for dealing with the milk supply as a whole by requiring in 1909 the pasteurization of all milk not from tuberculin-tested herds. The death rate for the preceding ten years had averaged 316 to the thousand; in 1909 it fell to 287. As compared with 1908 the lives of 521 babies under one year were saved.

On January 1, 1912, practically the same regulations will be enforced by Health Commissioner Lederle in New York City. Thus the two greatest cities in America will bar from use raw milk except such as has been produced from healthy cattle under exceptionally good conditions.

This stand has been taken by these two cities after years of diligent effort to regulate the milk supplies by inspection alone have proved that the most careful guarding of the sources of supply is not sufficient to surely exclude the germs of disease from milk.

#### MUNICIPAL MILK DEPOTS.

Another step in advance has been made by the City of New York in undertaking the establishment and maintenance of municipal milk depots for supplying milk for infant feeding. Fifteen such depots have been established in New York and are now in their first year. This clear recognition of the responsibility of the municipality for the proper feeding of babies is an important gain, and the example set by New York is likely to be followed in many other cities.

Notwithstanding the thorough demonstration of the efficacy of pasteurization, it has been only after much controversy and keen argument

that the decision has been reached that safety for the babies can be had only by the application to the milk of sufficient heat to surely kill the disease germs.

In 1904 the New York Milk Conference was formed with a strong disposition among its influential members to fight to the end for that elusive ideal, "clean raw milk." This Conference in 1910 decided officially that two kinds of milk, and only two, were safe for human consumption, namely:

(1) Milk in a raw state produced under sanitary conditions from tuberculin-tested cattle.

(2) All other milk to be thoroughly pasteurized.

The former milk is known as "certified;" it forms one-tenth of one per cent. of the city's daily supply, and its cost is prohibitive except to the wealthy.

#### DR. ROSENAU ON PASTEURIZATION.

The consensus of American opinion on this point is stated by one of the country's highest authorities on hygiene, Dr. Rosenau, Professor of Hygiene and Preventive Medicine at Harvard University, who as director of the Hygienic Laboratory personally conducted the Federal milk investigation. He says:

Pasteurization is rapidly gaining ground. Raw milk is apt to be dangerous milk. The milk that is not certified or guaranteed as fresh, pure and clean should be heated to at least 140 degrees Fahrenheit for twenty minutes. This in essence constitutes pasteurization, and is the inevitable outcome of the future.

The dangers from raw milk are constantly brought to our notice through epidemics of typhoid fever, scarlet fever, diphtheria and the summer complaints of children. All these and many more infections are carried in milk.

The safeguard is to destroy the infection by the simple process of heating the milk. Pasteurization does not injure the quality of the milk in any way, does not diminish its nutritive value. It saves lives and prevents sickness.

Dr. Lederle, Health Commissioner of New York City, says:

No inspection can make milk entirely safe for infants. Compulsory pasteurization and the classification of all milk will enable us really to safeguard the milk supply.

The Commission on Milk Standards, consisting of eighteen prominent American experts, under the chairmanship of Dr. Evans, with Dr. Charles E. North as secretary, on May 22, 1911, resolved:

That in the case of inspected milk, or milk produced under careful conditions so far as cleanliness or infectious diseases is concerned, and from tuberculin-tested cattle, pasteurization is optional, otherwise compulsory.

That in the case of all milk not either certified or inspected, as required in these standards, pasteurization is compulsory.

We have been letting babies tumble over the cliff quite long enough. We have fed them with infected milk and have maintained great hospitals to win them back from death's grasp. Now in America we are putting the fence around the top of the cliff. We are beginning to shut off the supplies of raw milk, with their possibilities of disease, and to provide properly pasteurized milk that the babies may live, that their childish prattle may gladden the hearts of mothers that would be bowed with grief but for this precaution.

Prevention is the word that I bring to you from America, and Prevention means Pasteurization. Upon this the health agencies of the United States Government are agreed. I am here to commend to you the results of patient scientific investigation and of years of practical experience, and my message is confirmed by the dean of the American medical profession, Dr. Jacobi, in the words, "Use no raw milk."

*Nathan Straus*





TWENTY YEARS'  
PRACTICAL EXPERIENCE

IN

Modifying and Pasteurizing  
Milk for Infant Feeding

BY

*Nathan Straus*

FOUNDER OF INFANT MILK DEPOTS

PRESENTED AT THE

**Third International Congress for the  
Protection of Infants**

!(GOUTTES DE LAIT)

BERLIN, SEPTEMBER 11-15, 1911



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BERLIN, SEPTEMBER 11-15, 1911.

Mr. President and Members of the Congress:

**I**T has been my privilege as official delegate to this congress from the Government of the United States to bring to your attention the method that America has found successful in saving the lives of babies. This method has been the modification and pasteurization of milk for infant feeding, the maintenance of infant milk depots, and the instruction of mothers in the feeding and care of their babies.

It was twenty years ago that the appalling waste of child life and the recognition of the perils of raw milk for infant feeding led me to start the first depots in New York City. In my official report to this congress I gave the statistics showing the reduction of the death rate among children from 96.5 per 1,000 in 1892 to 45.8 in 1910. This reduction was steady, the rate going down lower each year, as the number of milk depots and their output increased.

WORK OF VAST POSSIBILITIES.

Almost at the start I recognized the vast possibilities of the work and the fact that it was beyond the power and the means of any one man to fill this field. I sought, therefore, to interest others in the protection of the infants and to arouse the municipalities to their duty to the babies.

Plants that I installed in Philadelphia, St. Louis and Chicago formed in each city the nucleus of work similar to mine in New York, with like results. Beginnings were made in other cities, and finally, in the present year, New York opened the era of municipal milk depots for the babies, in response to popular demand that was incited by the results achieved by my work in that city.

## PROPER WORK FOR MUNICIPALITIES.

I need not weary you with the statistics of my American work. The best proof of its success is the recognition, after twenty years, by America's greatest municipality, of the fact that the maintenance of such pasteurized milk depots is a proper and necessary municipal function. Enlightened public policy has dictated that the babies should be saved from needless sickness and death.

It has been recognized also in New York that this is a proper work of humanity for a church to undertake, the Morningside Presbyterian Church having set the example by establishing an infant milk depot which takes care of 125 babies a day.

In 1908 the Countess of Aberdeen, wife of the Viceroy of Ireland, accepted from me a pasteurization plant which has since been operated by the Women's National Health Association in Dublin, with the result that the death rate among the babies supplied with this milk has been only 55 per thousand, while the mortality among the rest of the babies of Dublin has been three times as great.

## BABIES' LIVES SAVED IN BADEN.

The Women's Society for the Care of Infants, of the Grand Duchy of Baden, accepted a similar plant, and it has been operated under the patronage of her Royal Highness the Dowager Grand Duchess Luise. The official report of this work for 1909 shows that the death rate among the babies in the entire city of Karlsruhe was 17 per cent., while among the babies supplied with pasteurized milk the mortality rate was only 6.3 per cent. The report says:

This very remarkable success of feeding with pasteurized milk is to be appreciated more because these children were mostly sick or had become reduced by long sickness before they were brought to us.

In Sandhausen (district of Heidelberg) the demonstration was complete. I began supplying the babies with pasteurized milk in February, 1908. Immediately there was a reduction in the death rate. The average infant mortality for the preceding five years was 46 per cent. With no other change except the substitution of pasteurized milk for raw milk, the death rate fell to less than 20 per cent.

Extending the work so as to supply milk for all the babies in Sandhausen under two years, the record of two months last year, in which there were no deaths at all among the babies, was highly gratifying.

## WORK OF TWO NOBLE WOMEN.

Thus with the enthusiastic encouragement of two noble women, the Dowager Grand Duchess of Baden and the Countess of Aberdeen, I have

been enabled to make conclusive demonstrations in Germany and in Ireland. The practical experience with pasteurization in the cases I have just cited confirms the conclusions resulting from the work in America, and warrants me in urging upon this congress the duty of encouraging the establishment of pasteurized milk depots.

With the great increase in population and in industry in Germany and other progressive countries conditions have changed so as to make this necessity urgent. Instead of the cows having the benefits of life in the open fields, they are more and more shut up in stables, which increases their susceptibility to tuberculosis. No longer does any doubt exist as to the dangers of raw milk from tuberculous cows; neither can there be any reason to hesitate over adopting that means of safety that is afforded by pasteurization. Moreover, there are the other diseases that may be transmitted in milk—typhoid fever, diphtheria, scarlet fever and intestinal disorders, and the last is more fatal than any other ailment in babies, causing 37 per cent. of all deaths under one year.

#### DEMONSTRATION IN WASHINGTON.

My most recent demonstration of the value of pasteurization has been in Washington, where I established a laboratory in 1910, with six sub-stations. The medical director, Dr. Louise Taylor-Jones, kept careful records of the work of the first six months. I quote these significant figures:

Of the 506 babies that were supplied with the milk 57 per cent., or 289, were ill when they were brought to the stations.

Out of the total 51, or 10 per cent., died.

Of the 318 babies that were fed upon the milk for a month or more, long enough for a fair trial, only 20 died. This was 6.2 per cent.

Of the 192 still on the milk at the end of six months all were thriving.

None of the babies who were lost died from intestinal disorders or from infectious diseases.

The period of these observations included the intensely hot summer months, which are particularly severe in Washington.

#### INFANT DEATH RATES CUT IN HALF.

Summing up my twenty years' practical experience most conservatively, I can state with certainty that excessive infantile mortality has been immediately checked wherever I have supplied pasteurized modified milk, and the rate has been cut down at least to half the average for the preceding five years.

The prevention of sickness among babies is a public duty. This is demanded by humanity and by public policy. Sickness and death are among the chief burdens of the poor and the cause of much poverty. The systematic prevention of the diseases that are caused by impure raw milk will do more than anything else to lift these burdens.

Who can estimate the happiness that can be brought into the world by these means? Who can realize what it will mean to mothers to prevent milk being, as it is now, the means of spreading tuberculosis and other infectious diseases? Blessed is the home in which the prattle of babies is heard. Blessed will this congress be if it promotes measures to prevent the stilling of the voices of the babies in death.



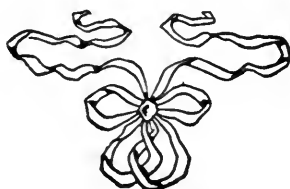
# OFFICIAL REPORT

*of the* THIRD INTER-  
NATIONAL CONGRESS  
*for the* PROTECTION *of*  
INFANTS *held at* BERLIN

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SEPTEMBER ELEVENTH TO  
FIFTEENTH, NINETEEN  
HUNDRED AND ELEVEN

---



AS SUBMITTED TO  
PRESIDENT TAFT







*Nathan Straus*

PASTEURIZED MILK LABORATORIES  
FOUNDED 1882  
348 EAST THIRTY-SECOND STREET, NEW YORK CITY

27 West 72d Street  
New York, Dec. 20, 1911

The President,

Washington, D. C.

My dear Mr. Taft:

Pursuant to your instructions I attended the Third International Congress for the Protection of Infants, held at Berlin September 11-15, 1911, as official delegate on the part of the United States. As the representative of America I was accorded marked consideration by Her Imperial Highness, the Empress of Germany, under whose patronage the Congress was held, and she expressed the keenest interest in the efforts that are being made in our country to protect the lives of the infants, and in the efficient work that is being done by your administration to promote the public health.

I had the honor to present to the Congress a report on "The Progress made in America in the Protection of Child Life," and in my individual capacity as a member of the Congress I submitted a brief paper on "Twenty Years' Practical Experience in Modifying and Pasteurizing Milk for Infant Feeding." A copy of each paper is attached to this report.

Particular interest was aroused by my report of the activity of the American Government in investigating the causes of excessive infant mortality and in finding practical methods of preventing unnecessary sickness and death among the babies. The French delegates, coming from a nation that appreciates more keenly than any other the value of an infant life, were particularly ready to commend the able pioneer work of the United States Public Health Service and of the Department of Agriculture. Those of the members of the Congress who were connected with public health agencies in their several countries were familiar with much of the work done by the American Public Health Service.

Some of them took pains to tell me that no reports on public health questions rank higher among experts abroad than the volumes embodying the results of the Milk and Typhoid Fever investigations by the Public Health Service and the monographs by Drs. Schroeder and Mohler on their investigations into the transmission of tuberculosis from cow to man. I found that these two names, with those of Drs. Wyman and Rosenau, were regarded abroad as typical of authority and progress, and as putting America in the very front rank among the nations that are seriously grappling with the problems of the prevention of disease.

So cordial were the expressions of appreciation that I feel warranted in believing that the news of the death of the Surgeon General of the Public Health Service was received with genuine grief in the foreign health offices and that the passing of Dr. Wyman from his sphere of beneficent activity was regarded as a calamity to the world at large.

I attended all the sessions of the Congress and followed the papers and discussions with care, in the hope that I would be able to bring back some practical ideas on the prevention of sickness among infants, for incorporation in the report that you desired me to submit.

But for the most part the papers presented had little to do with the prevention of sickness. Methods of treating the diseases of children were discussed at length, but it would be foreign to your purpose for me to attempt to synopsise the array of cures brought before the Congress.

Neither would it be to your purpose for me to recite the ideas on institutional management put forth at the Congress, or to tell of the papers that dealt with such elementary principles of hygiene as personal cleanliness, or that discussed what nurses ought and ought not do in the care of babies.

Upon one subject much stress was laid, namely, upon the necessity for accurate and uniform vital statistics. I gathered from the discussions that America is quite abreast of the other nations in the registration of births, deaths and epidemic diseases, and that no government issues better statistical reports than those that are put forth by the U. S. Census Bureau. The extension of the registration area to cover the entire country is greatly to be desired.

That which most impressed me at the Berlin Congress is the vital importance of directing the attention of the world at large and of the health officers of cities and nations to the duty of preventing disease. It seemed significant that delegates from two score nations, representing practically all the civilized world, could meet to discuss "the protection of infants" and devote the bulk of their time to debating what kind of pills to give the babies. The treatment of sick babies can be trusted to the doctors. What is needed is the prevention of sickness.

Infantile death rates the world over are needlessly high, not because of lack of skill on the part of the physicians, but for the simple reason that the babies are recklessly infected with diseases. Efforts to prevent these sicknesses, beyond the elementary expedient of quarantine, are made in only a few cities, and no nation except the United States has, as a nation, attacked the sources of the sicknesses that slay the little ones.

The searching investigations by the Public Health Service and the Agricultural Department have proven that typhoid and scarlet fevers, diphtheria, tuberculosis, sore throat and summer complaint are often caused by raw milk, and that the transmission of these diseases through this common food of babies may be prevented by efficient pasteurization of the milk. I mention this because it illustrates the advanced position of this Government in seeking to prevent disease. The only parallel to these investigations is that conducted by the British Government into the relation of bovine and human tuberculosis, an inquiry that was anticipated at every step by the American Government in the

work of Drs. Schroeder and Mohler, and by the independent investigator, Dr. Ravenel, and their findings were verified in every particular by the British Royal Commission on Tuberculosis.

In one other respect America is happily in advance of the times. In having at Harvard University the only scholastic department in the world devoted to the prevention of disease, the chair being occupied by Dr. Rosenau, trained in the Government service and now the foremost exponent of scientific measures to attack sickness at its sources

I mention these considerations as vindicating the propriety of America taking the lead in the world-wide movement to strike at the roots of disease. To launch such a movement, I respectfully suggest to you, as the matured result of my observations at the Berlin Congress and at other similar conventions, that you call an International Congress for the Prevention of Disease.

Such a gathering, held under your patronage, would call together the men in all parts of the world who are fighting the cause of disease, as distinguished from the physicians who are engrossed with combatting the effects of disease.

That there is need for such a congress is illustrated by the fact that there is no international body that gives more than passing attention to the prevention of disease, yet confessedly this is of far greater importance than the doctoring of the sick, for prevention means the delivery of great numbers of people from the whole train of evils that follow the seizure of one of a family with sickness.

It seems to me that by bringing together the great sanitarians, health officers and others identified with the work of prevention, in a congress in which the discussion of methods of treatment would be forbidden, you could bring rich blessings upon the whole world, and could round out the first term of your Presidency by setting in motion influences that would save hundreds of thousands of lives in the years to come.

That there is necessity for conference on methods of preventing disease, has been recognized by the instructive annual conventions of the American Public Health Association, by the periodic conferences of state health officers instituted by the late Dr. Wyman and by the establishment of a section of the American Medical Association for the study of prevention

This need of the age has been recognized also in the incorporation of the word "prevention" in the titles of associations formed to deal with tuberculosis and infant mortality, but it has been the unfortunate experience of these praiseworthy movements that the vital necessity for prevention has been forced into the background by the eagerness of medical delegates to discuss methods of treatment and by the zeal of professional charity workers to expound their plans of organization and of institutional work

In order that the subject of the prevention of disease should have the opportunity for discussion that its vast importance demands, it is necessary that this matter be made the sole purpose of a gathering of scientists and publicists, at which no subsidiary issue shall have hearing.

I am sure that it will stir you profoundly to contemplate the good that such a congress could achieve -- the potentiality of such a movement for the benefit of the human race, and I hope that your wise and far-seeing statesmanship, which has made so mightily for the public weal, will dictate the assembling under your inspiring leadership of a congress that will mark an epoch in the promotion of the public health.

Very sincerely yours,

*Nathan Straus*



REPORT BY

*Nathan Straus*

OFFICIAL DELEGATE ON THE PART OF THE  
UNITED STATES

BY APPOINTMENT OF THE PRESIDENT  
ON

**Progress Made in America in the  
Prevention of Tuberculosis**

SUBMITTED TO THE

SEVENTH INTERNATIONAL CONGRESS  
AGAINST TUBERCULOSIS

ROME, APRIL 15, 1912



## REPORT BY NATHAN STRAUS.

OFFICIAL DELEGATE ON THE PART OF THE UNITED STATES  
BY APPOINTMENT OF THE PRESIDENT.

# PROGRESS MADE IN AMERICA IN THE PREVENTION OF TUBERCULOSIS.

TO THE

SEVENTH INTERNATIONAL CONGRESS AGAINST TUBERCULOSIS  
ROME, APRIL 15, 1912.

Mr. President and Members of the Congress:

**T**HE message with which I am charged by the government of the United States is—

“Prevent tuberculosis. Stop it at its sources.”

My government, as the result of twenty years' investigation, believes that the disease can be checked, controlled and finally practically eradicated. Smallpox, yellow fever and the bubonic plague have been stamped out in America, not by mere treatment of the victims, but by scientific preventive measures that went to the origin of the infections.

Our aim now is to end the ravages of the Great White Plague, and it is my duty as delegate from the government of the United States to report particularly the measures that we believe offer the means and the hope of delivering humanity from this scourge. If any facts are necessary to give urgency to this cause, it should be remembered that at the present rate of infection, one out of every nine persons now living will die from this most terrible of all the plagues that have ever afflicted human kind. Tuberculosis causes 10.7 of all deaths in the United States.

**\$14,500,000 FOR ALLEVIATION.**

The problems of the treatment of the disease have been admirably handled by the physicians in co-operation with the philanthropic. In the past year \$14,500,000 has been spent in America in combating tuberculosis, two-thirds of this sum being money appropriated from public funds, the rest the contributions of the people.

But the demands for funds to maintain institutions for the tuberculous are breaking the back of philanthropy. Each year the necessities of this work increase, and it becomes more and more difficult to secure adequate means to alleviate the sufferings of the ever increasing army of victims of this dreaded disease.

The growth of the work is illustrated in these figures, compiled by the National Association for the Study and Prevention of Tuberculosis, showing the principal lines of activity for each year since 1905:

	Asso- ciations.	Sanitoria and hospitals.	Dispen- saries.	Open Air schools.	Preven- torium.
Founded before 1905.....	18	111	18	..	..
“ during 1905.....	15	18	6	..	..
“ “ 1906.....	18	16	14	..	..
“ “ 1907.....	46	30	45	1	..
“ “ 1908.....	109	45	118	2	..
“ “ 1909.....	167	67	59	10	..
“ “ 1910.....	117	68	62	16	1
“ “ 1911.....	128	96	43	62	..
Totals .....	618	451	365	91	1

These figures show an increase in the number of associations and institutions from 147 prior to 1905 to 1,526 by the end of 1911, a gain of 1,048 in six years.

#### THE TUBERCULOUS PATIENT LESS A MENACE.

The vast work summarized in the above figures has been chiefly one of alleviation, only incidentally tending to prevent tuberculosis. But it is to be recognized that in caring properly for tuberculous victims and in teaching the public the nature and dangers of the disease, much important preventive work has been done, and the tuberculous patient has been made less a menace to the community.

Chief among the measures tending to prevent the spread of the plague from man to man have been these—

- Segregation of patients in the more infectious stages.
- Compulsory reporting of all cases to the health officers.
- Sanitary disposition of sputum.
- Checking of expectoration in public places.
- Disinfection of tenements.
- Letting sunlight into tenements.
- Abolition of the common drinking cup.
- Warfare upon the house fly.
- Teaching the gospel of fresh air.
- Rescuing children from tuberculosis environments.
- Open air schools for children susceptible to tuberculosis.
- Tuberculosis exhibitions.

#### INCREASE IN TUBERCULOSIS.

Though progress has been made, in varying degrees, along all these lines of prevention, I was compelled, two years ago, to present to the National Association for the Study and Prevention of Tuberculosis facts



that proved that tuberculosis was steadily increasing in New York City, as shown by the number of new cases reported to the Health Department, and to urge the necessity of resorting to the measures adopted in the first work of **prevention** undertaken in the United States.

It was in 1892 that I inaugurated this work by supplying pasteurized milk in New York City to protect the babies from infection through the use of tuberculous milk, and in 1894, in "The Forum," I stated:

I hold in the near future it will be regarded as a piece of criminal neglect to feed young children upon milk that has not been sterilized (pasteurized). Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it special susceptibility to tuberculosis.

#### INVESTIGATIONS BY THE GOVERNMENT.

It was at about the same time that the United States Government undertook investigations that have resulted in the complete demonstration of the fact that **the milk from tuberculous cows is a real and considerable factor in the persistent increase of tuberculosis among human beings.**

It was in 1893 that Dr. Theobald Smith and Dr. E. C. Schroeder, of the United States Department of Agriculture, proved the infection of milk with tubercle bacilli, and in the following year they demonstrated the value of the tuberculin test in the diagnosis of bovine tuberculosis.

When Dr. Koch, in 1901, presented his famous assumption of the non-communicability of bovine tuberculosis to human beings, Dr. Schroeder began the series of investigations that established, in 1902, the probability, and in 1905-6, the **certainty, that tuberculosis among cattle was a factor in the causation of human tuberculosis.** Besides this, he proved a number of facts with regard to the tubercle bacilli, the most important being that the bacilli may lie latent in animal tissues.

#### TUBERCLE BACILLI IN DAIRY PRODUCTS.

By subsequent investigations Dr. Schroeder demonstrated the mode of infection with tubercle bacilli, the manner in which the bacilli from tuberculous cattle pass into milk and dairy products, the persistence and vitality of the bacilli in milk, butter and cheese.

Meanwhile, Dr. John R. Mohler, of the United States Department of Agriculture, solved the mystery of the apparent difference between tubercle bacilli in bovine and human tissues by showing that **the variation was one of form only,** and that each morphological type may

change to the other when transplanted. Thus he demolished the last prop of those who argued that bovine and human tuberculosis were not the same disease.

Dr. M. P. Ravenel, of the University of Wisconsin, and Dr. Theobald Smith, of Harvard, made the demonstration of the bovine source of much human tuberculosis complete by finding the germs of distinct bovine type in the tissues of children who had been killed by tuberculosis.

#### AMERICAN INVESTIGATIONS CORROBORATED.

These American investigations were verified in every particular by the independent work of the British Royal Commission on Tuberculosis, as set forth in their reports of 1904, 1907 and 1911.

And Prof. von Behring, the famous discoverer of the antitoxins of diphtheria and tetanus, in the Cassel lecture of 1903, declared:

**The milk fed to infants is the chief cause of consumption.**

So well established was this fact when the Sixth International Congress Against Tuberculosis met in Washington in 1908 that not even the presence and the dominating personality of Dr. Koch, the discoverer of the tubercle bacillus, could restrain the Congress from dismissing his supposition of 1901 with the declaration that:

Measures are to be continued against bovine tuberculosis, and its transmission to man is to be recognized.

#### FACT UPON WHICH HOPE OF PREVENTION RESTS.

Thus has been vindicated the absolute truth of the fact upon which rests the hope of **preventing tuberculosis**, the fact, as now confirmed by Dr. Osler, the famous American whom we have loaned to the University of Cambridge, namely—

That the two great causes of tuberculosis are:

- The tuberculous patient, and
- The tuberculous dairy cow.

Evidence of the prevalence of tuberculosis of bovine source among human beings, particularly among the very young, has multiplied rapidly.

Dr. W. H. Park, director of the Research Laboratories of the New York City Health Department, has found the tubercle bacilli of bovine type in nine out of fifty-four cases of tuberculosis in children over five years and under sixteen. In children under five years he found the bovine germ in twenty-two out of eighty-four cases examined.

On the basis of these studies, Dr. Park estimates that 10 per cent. of all children dying from tuberculosis in infancy die from milk infection.

None may determine in how many of the cases of tuberculosis in infants and adults the bovine source of the disease remains unproved simply because the bacillus has changed its form from the bovine to the human type through residence in human tissues, as Dr. Mohler has proved possible.

#### DR. SCHROEDER'S WARNING.

The importance of this cause of tuberculosis—raw milk from tuberculous cows—has acquired greater urgency from each investigation. The evidence has been cumulative and can no longer be ignored. The reason for estimating this source of infection as of the greatest importance is thus stated by Dr. Schroeder:

Milk is frequently infected with living, virulent tubercle bacilli. There is nothing hypothetical, circumstantial or inferential about this. It is a fact, a plain, experimentally demonstrated fact.

After showing how the inhalation theory of human infection has been overestimated, Dr. Schroeder writes:

We must not forget the significant fact that tubercle bacilli in milk are not on floors or on pavements or on places where they may or may not enter our bodies; they are located in articles of food, to be eaten, in most instances, in a raw state, and therefore are inevitably consumed in large quantities.

Dr. Sims Woodhead, of the British Royal Commission on Tuberculosis, writes:

Every tuberculous cow is either an actual or potential center of infection. We cannot get rid of the Great White Plague until we take bacilli of bovine origin into consideration.

#### PREVALENCE OF BOVINE TUBERCULOSIS.

The urgency of these facts is illustrated by the prevalence of tuberculosis among cows and the frequency with which the tubercle bacilli are found in milk and other dairy products.

Dr. Alfred E. Hess, of the Tuberculosis Preventorium for Children, near Lakewood, N. J., in an investigation of the New York City milk supply, found tubercle bacilli in 16 per cent. of 107 samples of milk.

Dr. John F. Anderson, director of the Hygienic Laboratory at Washington, examining 223 samples from the Washington milk supply, after the Agricultural Department had diligently weeded out tuberculous cattle, found 6.72 per cent. contained tubercle bacilli.

Dr. A. D. Melvin, chief of the Bureau of Animal Industry, in guarding the meat supply of the country in the past year, condemned more

than one million carcasses for tuberculosis, or one out of every fifty animals slaughtered.

The persistence of the disease in dairy herds was strikingly proved the past year by the application of the tuberculin test to 8,141 cattle in the herds that supply Washington with milk. Where the animals had not been previously tested, 16.06 per cent. were found tuberculous; where diseased animals had been previously removed from the herds after earlier tests, it was found that an average of 3.95 per cent. of the dairy cows were tuberculous.

This is a world-wide condition—bovine tuberculosis exists in all countries to an alarming extent, except in the Channel Islands, where the tuberculin test is systematically applied and a rigid quarantine is maintained. This is illustrated by the fact that examination of the cattle slaughtered in the Heidelberg district in Germany showed that 46 per cent. were tuberculous.

#### PASTEURIZATION THE REMEDY .

It is this condition that has made necessary measures to **prevent the consumption of live tubercle bacilli by human beings**. On this point all the experts of the United States Government are agreed. Their opinion is expressed by Dr. Schroeder in his report on "Milk as a Carrier of Tuberculosis Infection." He writes:

It is a simple matter to destroy tubercle bacilli in milk and cream by pasteurization.

For those who are opposed to pasteurization it may be well to call attention to the fact that the United States Public Health Service has shown anew that the benefits derived from it immeasurably outweigh the disadvantages attributed to it.

It is clearly desirable that milk and cream should either be pasteurized or should be obtained from cows that are known to be free from tuberculosis and are stabled, pastured and milked in a healthful environment.

An exhaustive investigation of the milk problem was made by the Public Health Service in 1907, by a corps of twenty experts under the direction of Dr. M. J. Rosenau, head of the Hygienic Laboratory, now professor of Hygiene and Preventive Medicine at Harvard. This inquiry by impartial scientific men, who had no other object than to ascertain the truth, proved that raw milk was a considerable factor in spreading tuberculosis and other infectious diseases, that pasteurization does effectually prevent milk and other dairy products carrying the infections into the human system, that the process does not impair the taste, digestibility or nutritive qualities of the milk. The report was summed up by the late Dr. Walter Wyman, then surgeon general, in these words:

**Pasteurization prevents much sickness and saves many lives.**

## STAND TAKEN BY THE MEDICAL PROFESSION.

Both in 1910 and in 1911 the National Association for the Study and Prevention of Tuberculosis issued warnings against the use of tuberculous milk. In the resolutions adopted last June, this body declared:

That the bovine tubercle bacillus causes serious and fatal tuberculosis in human beings.

That milk from tuberculous cattle appears to be the medium through which transmission of bovine tuberculosis to human beings most commonly takes place.

That all cows furnishing milk for human consumption be subjected to the tuberculin test, and that all animals which react be excluded from dairy herds.

That where these measures cannot be efficiently carried out, this association recommends the efficient pasteurization of milk as a safeguard against the transmission of bovine tuberculosis to mankind.

The same stand was taken by the highest medical authority in the United States, the American Medical Association, at its annual meeting at Denver, in June, 1911, when its Committee on Standard Measures of Procedure for the Control of Bovine Tuberculosis in Relation to the Milk Supply, decided:

That milk must come from cattle—

    Tested once a year with the tuberculin test, or

    Subjected to careful physical examination every three months—

Or it must be pasteurized.

In defining pasteurization the Committee on Regulations for the Pasteurization of Milk held that—

The "flash" process is to be condemned.

The "holding" process shall be the only one recognized as efficient.

The milk must be held for twenty minutes at 145 degrees Fahrenheit (63 degrees centigrade), or for five minutes at 160 degrees Fahrenheit (71 degrees centigrade).

In this connection Dr. W. C. Woodward, health officer of the District of Columbia, and secretary of the American Public Health Association, pointed out that it is not possible to rely absolutely on the ratings given dairy farms in the score-card system, for conditions relating to cattle themselves count only 14 points out of 100, so that it would be possible for a dairy to have a good rating with every cow tuberculous.

## PASTEURIZATION IN CITIES.

Three cities have made beginnings in the practical application of this method of preventing tuberculosis and other infectious diseases.

Chicago, under the leadership of the then Health Commissioner, Dr. W. A. Evans, began in 1907 to require the pasteurization of all milk not

from tuberculin-tested herds. This measure led to the general cleaning up of dairies and the removal of tuberculous cattle from many herds. It has been fought, however, by politicians, who succeeded in invalidating the requirement of the tuberculin test, but the present health commissioner, Dr. G. B. Young, is framing new regulations that will compel the pasteurization of milk from untested herds.

In New Jersey, however, the town of Montclair adopted a law requiring the tuberculin test for cattle in herds supplying the town with milk, and after a long battle in the courts, led by M. N. Baker, president of the local health board, the right of a community to thus protect the health of its people has been fully sustained by the highest court.

In Washington the influence of the health officer, Dr. Woodward, has been potent in increasing pasteurization.

In New York City public demand has promoted pasteurization, and now the Health Department has put into force new regulations that are expected to have the effect of compelling the pasteurization of all milk not conforming to high sanitary requirements.

#### TUBERCULOSIS IN NEW YORK CITY.

It is interesting in this connection to note the record of the number of new cases of tuberculosis reported in New York City in each of the last ten years:

Year.	New cases.	Per 1,000 of population.
1902.....	12,914	3.55
1903.....	15,219	4.07
1904.....	18,723	4.88
1905.....	20,831	5.18
1906.....	20,085	4.83
1907.....	19,725	4.60
1908.....	23,325	5.27
1909.....	25,667	5.62
1910.....	32,065	6.72
1911.....	24,747	4.96

It is significant that the first check in the increase in the number of new cases of tuberculosis occurred in the years 1906 and 1907, following such extensive agitation of the perils of raw milk that some of the dealers began to supply properly pasteurized milk, while many housewives saw to the protection of their households by boiling the milk used in their homes.

Then concerted attacks were made upon pasteurization, a raw milk campaign was conducted by large milk interests, and the rate of increase in tuberculosis went up each year till it reached the high mark of 1910.

The reaction came in the Fall of 1910, with an increase in efficient pasteurization by some dealers, with the practical abolition of the "flash" process, by which milk was heated for an instant and sold under the label "pasteurized"; there was an increase in home pasteurization; the city and charitable agencies duplicated my system of pasteurized milk depots until there were 78 in operation in 1911, and there was for the year a drop of over 40 per cent. in the number of new cases of tuberculosis.

#### PASTEURIZE AND THEREBY PREVENT.

Dr. Park has just made known the results of observations made in co-operation with the Rockefeller Institute of Medical Research. The cases of 500 babies were watched, and the results of feeding them with different kinds of milk were observed. Dr. Park reports:

The observations proved that mother's milk is the best milk for a baby and that pasteurized milk is the next best. One group of fifty babies had been given pasteurized milk for three weeks, then half of them were changed to good milk not pasteurized. Eleven of the twenty-five became ill, which proved conclusively the good effect of pasteurization. We discovered that it wasn't the chemical combination of milk that hurt, but the amount of bacteria.

There is little that America can add to the knowledge of methods of preventing the infection of the well by tuberculous human beings, but there is much that America can say to the nations out of its experience and official investigations as to the importance of considering the other great cause of tuberculosis—the use of milk and other raw dairy products from tuberculous cattle. And this is the message that I bring from my government:

**Pasteurize and thereby prevent tuberculosis.**

#### THE ONLY GUARANTEE OF SAFETY.

Officially the American government and the American medical profession content themselves with recommending the pasteurization of milk not from tuberculin-tested cattle. Personally I go farther.

Several years ago I contracted for a supply of milk from a model dairy, where the most elaborate and costly system of cleanliness was in vogue. The Health Department found the milk reeking with tubercle bacilli. Fortunately, during the brief time that I used this milk it was thoroughly pasteurized.

About the same time the milk produced under the certification of the New York County Medical Society by one of the most famous dairy farms in the State showed an increase in bacteria, tuberculosis was found in the herd, and it developed that from the unknown date of the in-

vasion of tuberculosis into the herd to its discovery, customers who were paying 20 cents a quart for this milk to be safe from tuberculosis were in reality using tuberculous milk without suspecting their danger. **Pasteurization would have protected them.**

Several weeks ago the certified milk supplied to my laboratory was found to average 200,000 bacteria to the cubic centimeter before pasteurization. It was practically free from germ life as supplied to the babies at my milk depots after pasteurization.

These personal experiences make me insist that none but certified milk be bought for my infant milk depots, as this is confessedly the best milk that can be obtained; but I know so well the fallibility of this system that I require that every drop of this certified milk be **thoroughly pasteurized before being supplied to the babies.**

It is from twenty-one years' practical experience that I speak when I commend all efforts to produce clean milk from healthy cows, but recognize that there is really no such thing as raw milk that can be depended upon to be clean and pure and free from disease day after day, even though it be produced with such elaborate precautions that it costs three times as much as the ordinary market milk and is out of the reach of all except the wealthy.

It is because of this condition that I urgently advise that **every quart of milk be thoroughly pasteurized**, lest by any chance the germs of tuberculosis or other diseases be carried to one of the little ones and his food becomes his death.

This is prevention, practical, vindicated by impartial experts and by twenty-one years' experience.

#### TUBERCULOSIS PREVENTORIUM FOR CHILDREN.

Besides urging this congress to promote the prevention of tuberculosis by recommending the pasteurization of milk and other dairy products, America offers another idea that has been found wonderfully successful in rescuing from this plague children who are predisposed to tuberculosis or who live in tuberculous environments.

With this object in view I initiated the Tuberculosis Preventorium for Children at Lakewood, N. J., in 1909. Dr. H. M. Biggs, health officer of the City of New York, estimated that there were at that time in the tenements of the city 40,000 children who had been exposed to tuberculosis and who would in all probability fall victims to the plague. There was no institution that offered to them means of escape from the disease.

With the advice of the famous Dr. Abraham Jacobi, the preventorium was planned to give such children life in the open, with pure food, under wise supervision. The institution was moved to Farmingdale, N.



J., and permanently established, with the co-operation of philanthropic people, on land given by Arthur Brisbane.

The last annual report shows that of 143 children admitted and staying an average of 106 days, 29 were made entirely well and have probably been permanently rescued from tuberculosis, while 64 were so decidedly improved as to make their escape from the disease likely.

The work has proved that it is possible to snatch children from the certain doom of tuberculosis, to make them well and strong, instead of allowing them to become victims of the plague, and thus to make real headway against tuberculosis, and to make useful, self-supporting citizens of those who would otherwise be public charges. It is a work both of mercy and of wise public economy.

The idea embodied in the preventorium has since been copied in other institutions in America and in foreign countries, and it is reasonable to believe that this movement will have important results in the battle against tuberculosis.

#### PREVENTION THE WORD.

Both in this work of taking children from tuberculous surroundings and in pasteurizing the milk supplies so as to stop the infection of the babies with tuberculosis, we have in America methods of prevention that we are earnestly endeavoring to commend to our own people and to the other nations of the world, for we feel that in these measures we have the means by which tuberculosis can be overcome.

What pasteurization has done wherever tried it will do in a larger way when resorted to more generally, and the 40 per cent. drop in tuberculosis in New York City, when only part of the milk supply was pasteurized, will be paralleled and outdone, and we will make headway against the Great White Plague, instead of allowing it to destroy our civilization and our race.

The message that I bring to you is practically the same as that which I carried to Berlin as the delegate from the United States Government to the Third International Congress for the Protection of Infants, except that then I was dealing with all the diseases that are carried in raw milk, and now my subject is the one dread malady that holds all humanity in terror.

This is an age of vast expenditure for battleships and armies. All Europe is staggering under the burden of maintaining huge engines of destruction. With an hundredth part of this outlay the greatest war of all the ages could be fought out; the greatest foe of humanity, tuberculosis, could be conquered. Instead of battlefields strewn with the dead there would be cities, towns and villages made happy by the saving of

parents and children, of brothers and sisters, from the dreaded white death.

**Prevention** is the word that I took to Berlin and that I now bring to Rome, and **prevention** means pasteurization. Upon this the health agencies of the United States Government are agreed. This stand is indorsed by the National Association for the Study and Prevention of Tuberculosis and by the American Medical Association, and my message is confirmed by the dean of the American medical profession, Dr. Jacobi, in the words, "Use no raw milk."



PAPER BY

*Nathan Straus*

FOUNDER OF INFANT MILK DEPOTS

DELEGATE FROM THE AMERICAN PUBLIC HEALTH  
ASSOCIATION AND FROM THE STATE OF NEW YORK

ON

**The Function of Voluntary Organizations  
in the Campaign for the Betterment of  
Milk Production and Distribution**

SUBMITTED TO THE

XVTH INTERNATIONAL CONGRESS ON  
HYGIENE AND DEMOGRAPHY

WASHINGTON, D. C.  
FRIDAY, SEPTEMBER 27, 1912



# THE FUNCTION OF VOLUNTARY ORGANIZATIONS IN THE CAMPAIGN FOR THE BETTERMENT OF MILK PRODUCTION AND DISTRIBUTION.

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BY NATHAN STRAUS  
OF NEW YORK CITY

*Founder of Infant Milk Depots.*

**B**EFORE dealing with the subject assigned to me by the committee on program, I must express my deep satisfaction with the action of the organizers of this congress in making the ruling idea and purpose of this great international gathering the PREVENTION OF DISEASE.

When I returned from my mission to Berlin, where I represented the United States Government at the International Congress for the Protection of Infants, I was impressed with the idea that great good could be done humanity by a congress devoted, not to the treatment of ailments, but to their prevention, and I embodied this idea in my report to President Taft, with the suggestion that he call such an international congress.

At that time the arrangements for the holding of this congress in America were already under way, and I am happy to see from the program that the active managers of the congress have acted generously upon the President's suggestion that my idea of a great international gathering devoted to the prevention of sickness be applied in the planning of the work of this congress.

I truly believe that many thousands of lives will be saved by the work we are doing here, for, as I stated in the very first article that I wrote upon public health questions a score of years ago,

*"One ounce of prevention is worth a ton of cure."*

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## PUBLIC DUTY AS TO MILK SUPPLIES.

I do not for one moment admit that the betterment of milk production and distribution is properly the work of voluntary organizations. It is the duty of the public authorities to see that the milk supplies are pure and wholesome. I have maintained this position from the very

beginning of my own work, a score of years ago, and within the last five years it has come to be recognized that the municipality and the State are primarily responsible for the milk supplies.

This was the position I took in my letter to the Mayors of the American cities on June 8, 1895, and in the paper that I submitted at the National Conference of Mayors and Councilmen at Columbus, Ohio, on September 29, 1897, in which I said:

I appeal to you as if you were standing beside a great river in whose current were constantly swept past hundreds of drowning infants. This stream is a very real thing if people would but recognize its existence, and all its yearly tribute of death is paid because of the public neglect of some of the simplest precautions for the saving of children's lives.

You, gentlemen, have the means under your control by which these drowning babies can be saved. I ask you, will you not apply them? Men are found capable of acts of heroism in presence of danger less threatening and less surely fatal.

All that I plead for is the extension of the activity of local Boards of Health in a sphere which is legitimately theirs, but which they have, so far, lacked the conviction and the courage to occupy. I shall not have spoken in vain if I have succeeded in impressing you with the fact that the dictates of humanity and of public duty combine in demanding that this backwardness should exist no longer.

#### THE ONLY MEANS OF SAFETY.

Three years later, on November 15, 1900, having found by practical experience, extended over nine years, that there was no safety save in pasteurization, in a public appeal I said:

Milk is the one article of food in which disease and death may lurk without giving any suspicion from its taste, smell or appearance.

If the pasteurizing of the entire milk supply were made the function of the municipality, it would be an exceedingly clever business investment, for the money expended would be returned a hundred fold. This is looking at it from a practical, commercial standpoint, besides which, from a humanitarian point of view, the amount of suffering and disease which would be prevented is incalculable.

When the news of a railroad wreck and accompanying loss of life is telegraphed across the continent it is followed by a shudder of horror, and if any life-saving precautions have been lacking there is raised a cry of vengeance against the "soulless" corporation, whose duty it is to provide every safeguard for life.

But what of the thousands of infants whose lives pay the penalty of lack of precaution? No shudder of horror passes over the land; no cry for reform is raised, yet just as surely as the proper precaution would have prevented that railroad catastrophe, just so surely would the lives of the thousands of these helpless infants be saved did our municipal authorities adopt the preventive measures shown to be effective.

It was because the municipal authorities were not alive to their opportunity and their duty that there were place and work for voluntary organizations. It was because individuals and associations took up this work of protecting the babies and prosecuted it with increasing energy

and effectiveness year after year that there has at length come a great awakening, and we now have Boards of Health in hundreds of cities more or less effectively working for the betterment of the milk supplies.

And it is because this branch of municipal endeavor is yet new, because the work is only partially done, that there is yet work for the voluntary organizations, both in teaching the municipal authorities what to do and how to do it, and in pushing them on to the full performance of their duty to the babies.

### TUBERCULOSIS IN RAW MILK.

When the peril of tuberculosis in raw milk came forcibly to my attention, more than twenty years ago, there was practically no attention paid to this serious menace to humanity. In fact, the very man who had the distinction of isolating the tubercle bacillus scouted the idea that is now proved a fact, and with unscientific recklessness denied, that consumption could be contracted by drinking the milk from tuberculous cows.

Therefore, we had not merely an uninformed public to instruct, but a misinformed public to rescue from a foolish error. The peril of raw milk was a new idea. I was regarded as an alarmist when I wrote in the Forum in November, 1894:

I hold in the near future it will be regarded as a piece of criminal neglect to feed young children upon milk that has not been sterilized (pasteurized). Milk is not always good in proportion to the price paid for it, nor free from the germs of contagion because it has come from cattle of aristocratic lineage. The latter quality, as recent experience has shown, carries with it special susceptibility to tuberculosis.

The time was not ripe, the way had not been paved for official action by the public health authorities to protect the public from dangerous raw milk. My warnings of the perils that lurked in milk were received with incredulity, or with derision, or with open and bitter attacks. But I persisted, with the result that to-day there is practical agreement, almost complete unanimity, on the part of medical men and sanitarians.

### DECISION BY EXPERTS.

The years that bridge the space between the warnings that I sounded in the early nineties and the recent report of the Commission on Milk Standards have been for the most part weary, discouraging years; but all that is now a matter of the past, and we have at last the deliberate decision of an able and impartial commission of experts that—

While public health authorities must necessarily see that the source of supply and the chemical composition should correspond with established definitions of milk as a food, their most important duty is to prevent the transmission

of disease through milk. This means the control of infantile diarrhoea, typhoid fever, tuberculosis, diphtheria, scarlet fever, septic throat infections and other infectious diseases in so far as they are carried by milk.

Septic sore throat deserves special mention because of the frequency in recent years with which outbreaks of this disease have been traced to milk supplies.

The commission recognizes the magnitude of the milk industry, and that the improvement of milk supplies is primarily an economic problem.

But while the basic problem is economic, and must eventually be solved by commerce, public health authorities must show the way and must establish standards and regulations in the interest of consumers, the value of which even the consumers themselves often fail to appreciate.

While the process of pasteurization is a matter which has attracted a great deal of attention in recent years, the commission has not entered into any discussion of its merits or demerits, but has given it recognition in its classification as a process necessary for the treatment of milk which is not otherwise protected against infection.

The commission thinks that pasteurization is necessary for all milk at all times excepting certified milk or its equivalent. The majority of the commissioners voted in favor of the pasteurization of all milk, including certified. Since this was not unanimous, the commission recommends that the pasteurization of certified milk be optional.

#### WORK OF NOTABLE VOLUNTEERS.

This much have I quoted from the clear and definite recommendations of the Commission on Milk Standards. This report is the work of a voluntary organization, inspired by a voluntary organization, and summing up in its membership the vast deal of earnest study and practical experience that has been acquired in the great co-operative work of many individuals and associations.

It comes to us with the authority of seventeen able, earnest and eminent men, who have served humanity well, men whose names I recite here as illustrating the great work that has been done by volunteers in this fight that has been so vitally necessary to the protection of humanity and of its most helpless members—the babies:

Dr. W. A. Evans, professor preventive medicine, Northwestern University; health editor Chicago Tribune, Chicago, Ill., chairman.

Dr. B. L. Arms, director of bacteriological laboratory, Department of Health, Boston, Mass.

Dr. John F. Anderson, director of Hygienic Laboratory, United States Public Health Service, Washington, D. C.

Prof. H. W. Conn, director of bacteriological laboratory, Connecticut State Board of Health; department of biology, Wesleyan University, Middletown, Conn.

Dr. E. C. Levy, Health Officer, Richmond, Va.

Dr. A. D. Melvin, Chief of Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.



Dr. William H. Park, Director of Laboratories, Department of Health of New York City, foot of East Sixteenth street, New York City.

Mr. Raymond A. Pearson, Commissioner of Agriculture, Albany, N. Y.

Dr. M. P. Ravenel, director of Hygienic Laboratory, University of Wisconsin, Madison, Wis.

Prof. M. J. Rosenau, Department of Hygiene and Preventive Medicine, Harvard Medical School, Boston, Mass.

Prof. Henry C. Sherman, Department of Chemistry, Columbia University, New York City.

Dr. A. H. Stewart, antitoxin laboratories, Department of Health and Charities, Philadelphia.

Dr. William Royal Stokes, bacteriologist to State and City Health Departments, Baltimore.

Prof. William A. Stocking, Department of Dairy Industry, Cornell University, Ithaca, N. Y.

Mr. Chester H. Wells, Health Officer, Montclair, N. J.

Dr. L. L. Van Slyke, Department of Chemistry, New York Agricultural Experiment Station, Geneva, N. Y.

Dr. Charles E. North, Consulting Sanitarian, member New York Milk Committee, New York City, secretary.

This Commission's platform of effective and efficient measures for the betterment of milk production and distribution comes as the sequel of a quarter of a century of voluntary labors on behalf of the babies—it comes as the flower and fruit of efforts of which my own have been only a part.

But my subject is not entirely retrospective. Voluntary effort and voluntary organization has worked out a definite and comprehensive plan of betterment that is fully and emphatically indorsed by the Public Health Service and the Department of Agriculture—that is indeed but a modification of the measures advocated by these Federal agencies as a result of the thorough investigation of the milk problem by the Public Health Service under President Roosevelt.

This program needs to be applied and enforced in every city of the land.

This, I maintain, is the chief and imperative work and duty of voluntary organizations at this stage of the campaign for the betterment of milk production.

All infant milk depots maintained by private philanthropy are but examples to the municipalities of what ought to be done by the public officials with public funds. All milk committees are first and chiefly

agencies charged with the responsibility of seeing to the adoption and enforcement of this program that has grown out of a quarter of a century of earnest work.

### FUNCTION OF MILK DEPOTS.

In regard to the function of milk depots I feel obliged to emphasize one lesson from my own long experience, namely:

That the fundamental and vital duty of the milk depot is to furnish milk in nursing bottles, one feeding to the bottle, properly modified according to formulae suited to the different ages of babies, and pasteurized in the bottles. This assures the highest degree of safety.

The supplying of dipped milk—of milk drawn from cans and put in containers brought by the mothers—ought to be rigorously prohibited. It is bad enough to allow dipped milk to be sold for general use. It is criminal to supply milk in this way for babies, however good the milk may be in the first place, for the reason that the sensitive fluid is thus exposed to contamination.

I must maintain, therefore, that the milk depot fails to fulfill its primary object unless it supplies milk for infant feeding—milk modified and then pasteurized in the nursing bottles.

As to the efficacy of this direct and simple method of preventing sickness among the babies, I wish to cite the record of my own work in New York City during the past Summer:

*With an average of 2,200 babies supplied with milk from my laboratories there was just one death, and that was due to pneumonia.*

In this connection I should say that in all the twenty-one years of my work I have been guided in all things by the friendly advice of that greatest of all specialists on infant feeding, the dean of the American medical profession, Dr. Abraham Jacobi, whom the medical men of two hemispheres delight to honor.

### DISTRIBUTION OF MILK.

Instruction of mothers is important. Medical attention is important. I have always supplied both. But these things are secondary, and I cannot but regard it as a grievous error to regard these things as fundamental, and to make secondary the dispensing of the food the babies require—for it is the food, clean, safe, wholesome food, that the babies need more than anything else in the world.

I speak of this frankly and plainly, because there is an unfortunate disposition on the part of well-meaning people to exaggerate the "consultation" to the detriment of the fundamental duty of the infant milk depot. In some cases the resources of the organization are exhausted upon nurses and doctors, and little is done in the way of feeding the babies. The mothers are overwhelmed with instructions, while the babies cry in vain for the food that is their essential need.

And so it has been in New York, where my seventeen depots are the only ones out of a hundred that supply modified pasteurized milk in nursing bottles ready for use upon warming.

Nothing could be further from my purpose than to discourage the well-meaning people who have taken up this work, but I think I have a right to speak out of my experience, which has extended over a longer term of years and has reached more babies than any other work, and to say to the people who have lately embarked upon this important work in all kindness and sincerity that they are in danger of minimizing the real effectiveness of their efforts.

#### HOME PASTEURIZATION.

As to modification and pasteurization of milk in the home, it is indeed very desirable that the mothers should be taught how to prepare the milk for their babies, and I have tried to make it easy for them to do so by devising a simple home pasteurizer. But even its use is feasible only for the better situated classes. Where the mother goes out working, returns in the evening tired, worn out by her labors, to find perhaps her baby crying for its bottle, it is cruel to demand that she should follow out the complicated and difficult process of modification and pasteurization. Besides, it must be remembered that conditions in tenements do not ordinarily make it possible for mothers to do this work properly and with the scrupulous cleanliness that is essential.

The object, therefore, should not be to substitute home-prepared feedings for those supplied by the milk depot, but to encourage the use of the depot milk where it can be had, and only to teach the mothers how to prepare the feedings where they cannot get the better prepared milk from properly conducted pasteurized milk depots.

And in case of home preparation, with all the increased probability of contamination, it is even more than otherwise necessary to insist strictly upon pasteurization.

In all that is said of infant milk depots, it is ever to be remembered that these institutions are for babies that, for one reason or another, are deprived of the better sustenance of breast feeding, and the very first duty of all these institutions is to persuade and encourage mothers, wherever it is physically possible, to nurse their babies as nature intended.

#### PURPOSE TO BE KEPT IN VIEW.

To sum up briefly, all individual or organized voluntary efforts will fail of their purpose unless they tend directly and powerfully and unitedly to fix the responsibility where it belongs—on the municipal and State health authorities; unless they tend to compel such authorities to take up energetically the work of regulating milk production and distribution and the maintenance of pasteurized milk depots for the babies; unless they see to it that the work of such public agencies is carried out definitely and uncompromisingly along the lines set by the Commission on Milk Standards and the Public Health Service.

Many days will pass before these results are achieved, before the milk supplies of our cities are really and efficiently safeguarded by the officials charged with that duty. Meanwhile there is work to be done.

The babies cry for protection against disease; their mothers lift their hands in frantic supplication for their little ones. Disease and death throw their shadow over the cradle and engulf the mothers of the land in the inextinguishable sorrow that we can ward away from the home.

It is a call to battle—a call to united and energetic action. In this emergency it is not enough to talk; it is not enough to educate the public and the health officers. We must do all this, but we must do more. We must bend all our energies, strain all our resources to save the babies that are now living and all those who will come into the world before the tardy hand of official administration has been quickened and strengthened to grapple with this menace to the home and to the land.

#### GREAT POSSIBILITIES.

We need infant milk depots, we need doctors and nurses consecrated to the work of assuring to the little ones the food that they need free from the taint of disease. We need the co-operation of the poor and the purses of the rich. As I have often said, it is a work beyond the means of any one man or set of men—it is a work for all men and all women.

It is a work too big and great with possibilities of human good to afford room for jealousies or for disputes about non-essentials or about methods. It is not a clinical work. The babies are human beings, not subjects for study and exhibits for committees or doctors. They are human beings threatened with death, and it is our function to save them—not to talk about them, not to experiment with them, not to catalogue them, but to give them the chance to live that they can have only in properly pasteurized milk properly modified, with such medical attention as may be needed in particular cases.

This is a work to stir the good red blood in every man and woman who has the fundamental instincts of humanity, a work that has greater possibilities of good than any other that I have ever heard of, a work that will pay dividends in the satisfaction that can come only in helping the little ones, in making their hands chubby and their faces rosy and giving them the fair start in life to which they are entitled.

*Nathan Straus*





Department of State.  
Washington, August 17, 1911.

Nathan Straus, New York:

Sir—Referring to this department's letter of the 20th ultimo, inclosing the certificate of your designation as a delegate on the part of the United States to the Third International Congress for the Protection of Infants, to be held at Berlin, in September, I desire to inform you that you were selected for this service because of the facts that you were a pioneer in the establishment of infants' milk depots in this country, having used your time, means and influence, without stint for the past twenty years, both in the United States and abroad, to promote the proper feeding of babies and to protect them from tuberculosis and other infectious diseases; and that the methods which you have practiced and advocated have been indorsed by the Public Health Service after a thorough investigation by a corps of twenty experts under Surgeon-General Wyman.

It is desired to have you communicate to the congress the results reached by the experts of the Public Health Service and of the Department of Agriculture and apprise the delegates of the other nations of the measures undertaken in this country to protect life and to commend these methods to their people.

It is further desired that you report to the department the results of the congress, especially with a view to giving the country the benefit of the assembled experience of the delegates of the various countries.

I am, sir, your obedient servant,

P. C. KNOX, Secretary.





## WORK ON TWO CONTINENTS.

While President of the New York City Board of Health in 1896 Mr. Straus was distressed over the excessive death rate among the city's waifs, who were kept in institutions on Randall's Island. In 1898 he erected a pasteurization plant on the Island. Without any other change in the regimen or diet, except that the milk was pasteurized instead of being used raw, the death rate dropped from an average of 41.81% for the years 1895-7 to an average of 21.75% for the next seven years.

Prior to this, in 1896, Mr. Straus began distributing pasteurized milk in Brooklyn, through the Diet Dispensary, with five stations. This work has been taken over by the Brooklyn Children's Aid Society, which maintains 16 stations.

In 1903 the work was begun in two other cities by the gift of Pasteurization Plants to the Milk Commission of the Chicago Children's Hospital and to the Philadelphia Modified Milk Society.\* Both plants are still in operation and the work is carried on with great success. In 1904 Mr. Straus similarly equipped the St. Louis Provident Association.

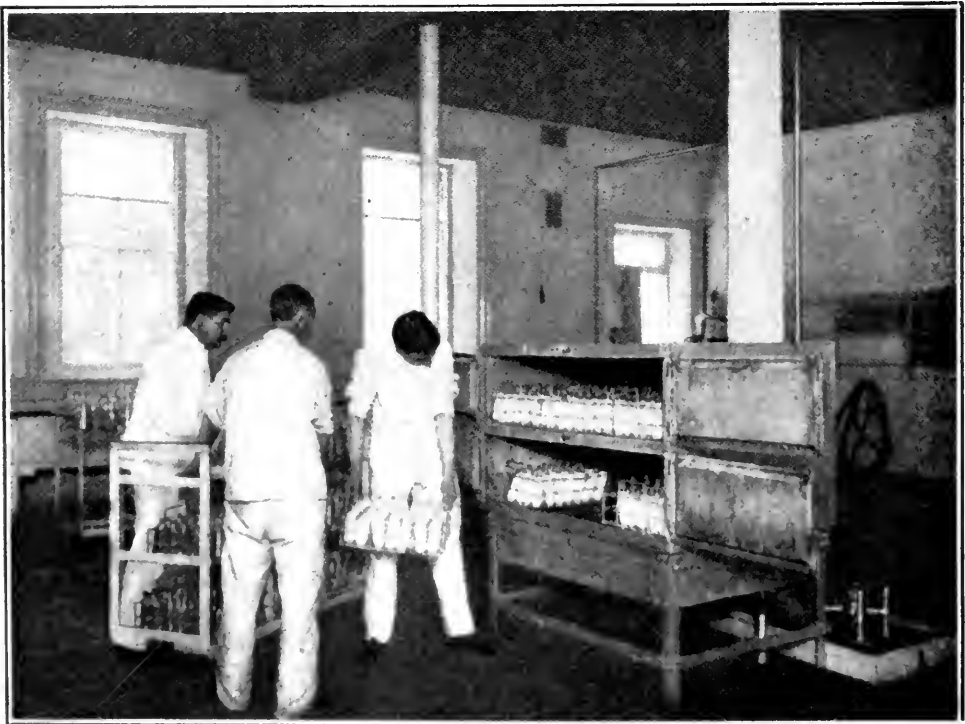
In 1908 he gave a plant to Dublin, which has been maintained by the Women's National Health Association, under the patronage of the Countess of Aberdeen, wife of the Viceroy, with the result that the death rate among the babies supplied with pasteurized milk has been only 55 per thousand, while the mortality among the rest of the babies of Dublin has been three times as great.

In the same year the Women's Society for the Care of Infants, under the patronage of the Dowager Grand Duchess Luise of Baden, accepted a pasteurization plant for Karlsruhe, which reduced the death rate among the babies under the care of the society to 6.3%, while in the entire city the death rate among the babies was 17%.

Remarkable results were obtained near Berlin, at Eberswalde, which was also supplied with a Pasteurization Plant, presented to the President of the Vaterlaendische Frauen Verein. During the excessively hot



**THE PHILADELPHIA PASTEURIZED MILK SOCIETY.**  
Filling the Bottles by Machinery.



**THE PHILADELPHIA PASTEURIZED MILK SOCIETY.**  
Placing the Filled Bottles in the Pasteurizing Oven.

Summer of 1911 there were only two deaths in this town among the babies supplied with pasteurized milk, while in Berlin proper the death rate for the same months was double the average of previous Summers.

In 1907 Mr. Straus established a pasteurization plant at Heidelberg and in 1908 at Sandhausen, District of Heidelberg, Germany, maintaining each for a year at his own expense. In the latter village all the children under two years were supplied with pasteurized milk, with the result that the death rate, which for five years had averaged 46 per cent., was cut down to less than 20 per cent.

In the spring of 1908 exhibitions were given with a model plant at Frankfurt-on-Main, Berlin, Vienna and London.



EXHIBITION MADE WITH MODEL PLANT AT THE INTERNATIONAL TUBERCULOSIS CONGRESS AT WASHINGTON, IN OCTOBER, 1908.

This plant was also exhibited in operation at the International Tuberculosis Congress at Washington in October, 1908, and was awarded honorable mention. It was also shown at the Tuberculosis Exhibition in the American Museum of Natural History, New York City, in December, 1908, and at the Philadelphia Tuberculosis Exhibition in February, 1909.



STATION AT 1319 H ST. N. W., WASHINGTON, D. C.



In these years assistance was given in the erection of plants at Toronto, Canada, and Wilkes-Barre, Pa.

In Washington Mr. Straus erected a plant in 1910 and maintained it for two years. The death rate per annum among the babies fed on this milk was 6.2 per cent. and none of these were lost from intestinal disorders or infectious diseases. The Washington plant was afterwards donated and shipped to the Gota de Leche (Gouttes de Lait) Society in Manila, Philippine Islands, at the request of the War Department, Bureau of Insular Affairs, Washington, D. C.

In connection with his work Mr. Straus has written numerous magazine articles and has presented papers to a number of international congresses.

In 1905 he attended the first Congress of the "Gouttes de Lait" at Paris, urging that "It is milk—raw milk, diseased milk—which is responsible for the largest percentage of sickness in the world." He met with little support. In 1907 he attended the Second International Congress of this organization at Brussels, presenting a paper on "The American Solution of the Milk Problem," (see page 89) and the congress declared "That milk for children should be boiled, sterilized, or pasteurized—never used in the raw state."

In 1911 this body assembled at Berlin under the title of the Third International Congress for the Protection of Infants, and Mr. Straus, as the sole official delegate from the United States Government, presented a report on "The Progress Made in America in the Protection of Child Life" (see page 159) and a paper on "Twenty Years' Practical Experience in Modifying and Pasteurizing Milk for Infant Feeding" (see page 169).

His earliest magazine article was on "How the New York Death Rate Was Reduced" and was printed in the "Forum" in November, 1894. (See page 33.) On June 8, 1895, he wrote an open letter to the Mayors of the American cities (see page 42) and on September 29, 1897, before the National Conference of Mayors and Councilmen at Columbus, Ohio, he submitted a paper on "The Influence of a Pure Milk Supply on the Death Rate of Children" (see page 57). In July, 1905, he presented a paper on "Infants' Milk Depots" (see page 73) before the British Medical Association at Leicester, England.

On December 4, of the same year, he emphasized his stand that the supplying of pure milk was a municipal duty and that it was a necessary function of government to see to the pasteurization of milk as a means of checking the Great White Plague. He submitted a statement entitled "Pure Milk or Poison?" (see page 83) at the conference held at the Academy of Medicine, New York City, on November 20, 1906, and supported the pasteurization ordinance that was introduced in the New York City Board of Aldermen. This measure was first put in force in Chicago by Dr. W. A. Evans, the Health Commissioner, in 1909, requiring the pasteurization of all milk that was not from tuberculin-tested cattle, and was adopted, with some modifications, by New York City in 1911.

While in Heidelberg Mr. Straus on July 24, 1908, delivered a lecture on "Milk Pasteurization an Economic and Social Duty" (see page 103) before the students of political economy in the University of Heidelberg, and under the title "America's Latest Contribution to the Milk Question" (see page 119) he reviewed the report of the milk investigation conducted by experts of the United States Government and published under the title "Milk and Its Relation to Public Health."

While at Heidelberg Mr. Straus perfected a device for pasteurization of milk in the home. To promote its use he refused to patent it and gave permission to any tinsmith to make such pasteurizers from plans which he freely supplied. This pasteurizer was awarded a gold medal and diploma at the Concours General d'Hygiene at Paris in November, 1908.

In September, 1909, Mr. Straus helped to check the typhoid epidemic at Cassel, Germany. The disease was traced to a sanitary dairy run under strict superficial supervision. This dairy was forbidden to continue the distribution of milk. Mr. Straus shipped 200 home pasteurizers to the town and by their use no new cases developed and the epidemic was gradually stopped.

On November 28, 1908, Mr. Straus issued a statement on "The Difference Between Real Pasteurization and Commercial Pasteurization," (see page 118) which has had the effect of practically abolishing the fraudulent process by which milk was heated for a fraction of a second and then passed off upon the public as "pasteurized."

In December, 1908, he protested to the authorities of New York State that farmers were not protected against tuberculous cows and that babies were not saved from diseased milk.

In 1909, in an open letter to the National Association for the Study and Prevention of Tuberculosis, Washington, D. C. (see page 141), Mr. Straus proved that the vigorous campaign against tuberculosis had failed to check the Great White Plague, giving as the reason the neglect of precautions against tuberculous milk; in 1910 the association warned against such milk, and in 1911, under the presidency of Dr. Ravenel, definitely "recommended the efficient pasteurization of milk as a safeguard against the transmission of bovine tuberculosis to mankind."

In May, 1909, Mr. Straus presented a paper on "The Necessity for the Pasteurization of Milk and the Benefits Attained Thereby" to the International Congress of Applied Chemistry at London (see page 135). The following month, at Budapest, before the International Dairy Congress, he presented a paper on "The White Peril; How It May Be Avoided" (page 139). In July, 1909, at Stockholm, he submitted a report to the Seventh International Congress on Tuberculosis on "The Infection of Children by Milk from Tuberculous Cows" (see page 145) and a paper on "Progress in America in the Fight Against Tuberculosis."

On August 31, 1909, Mr. Straus presented to the International Medical Congress at Budapest a paper on "Prevention of Infectious Diseases Caused by Milk" (see page 151), and at a later session of the same Congress he submitted detailed figures to prove that tuberculosis, instead of being conquered, was on the increase, owing, he charged, to the neglect of prevention against tuberculous milk.

In September, 1910, Mr. Straus presented a paper on "Saving Children from Milk-Borne Diseases" (see page 157) at the 38th Annual Meeting of the American Public Health Association at Milwaukee, Wis. In 1911 he served on the Committee of this Association on the Conservation of Child Life.

In 1911 the Commission on Milk Standards, after a year's investigation and study, reported the standards desirable in milk production, holding—

"That in case of all milk not either certified or inspected, as required in these standards, pasteurization is compulsory."

A majority of the Commission favored the pasteurization of all milk, but as there was not unanimity on this point, the pasteurization of certified and inspected milks was left optional.

In April, 1912, as official delegate from America to the Seventh International Congress Against Tuberculosis, at Rome, Mr. Straus submitted a report on "Progress Made in America in the Prevention of Tuberculosis" (see page 181), and at the Fifteenth International Congress on Hygiene and Demography at Washington in September, 1912, he presented a paper on "The Function of Voluntary Organizations in the Campaign for the Betterment of Milk Production and Distribution" (see page 195).





## OTHER PHILANTHROPIC WORK.

The establishment of the Infant Milk Depots in 1892 quickly led Mr. Straus into other philanthropic work by bringing him into personal touch with the tenement dwellers. He was among the first to see how their necessities were made acute by the panic of 1893, when over 39,000 families were left without means of sustenance by the wage-earners being without work.

The first step was the establishment of coal depots. The people of the tenements bought their coal by the bucket, at from ten to fifteen cents for 15 or 18 pounds. Mr. Straus established depots in November, 1893, at which he supplied 20 pounds of coal for five cents. Obtaining 10,000 tons from J. Pierpont Morgan at a reduced price, and securing the free use of piers from the Dock Department for coal depots, the price was reduced to 25 pounds for five cents. In this way over a million and a half buckets of coal were supplied to the poor at a little less than the car-load rate. No coal was given away directly, all being supplied for cash or on tickets that Mr. Straus distributed to the really needy through the charity societies.

This work attracted the attention of Mr. Morgan, who asked Mr. Straus to duplicate and extend the enterprise with \$50,000 that he offered for the purpose, upon the condition that his name should not be disclosed in connection with the gift. This was the only aid that Mr. Straus ever accepted in his work. He agreed to manage the work, the fund to be administered by a committee, and in January, 1894, he opened a store in Grand Street where, for five cents, or upon presentation of one of the tickets issued through the charity societies, 25 pounds of coal was supplied, or a pound of bread, or 6 ounces of tea or coffee, or 1¼ pounds of sugar, or 3¼ pounds of flour.

The city was thronged with homeless men who could get no work, and for these Mr. Straus in January, 1894, opened four lodging houses at which he supplied bed and breakfast for five cents or on presentation of one of the tickets. This work was managed for him by the Rev. Charles H. Yatman, the evangelist, with remarkable success.

The number of persons lodged and supplied with breakfast was 64,409. In addition 49,531 other meals were furnished.

At the coal depots and at the Grand Street store the following supplies were distributed:

	Pounds
Coal .....	37,551,200
Sugar .....	375,150
Bread .....	370,694
Flour .....	151,508
Coffee .....	69,812
Tea .....	48,563

The total number of tickets sold was 2,217,262.

When the distress was abated and the coming of warm weather ended the need for the lodging houses the equipment was distributed among the poor on the basis of a cot, three sheets, a pillow, two pillow cases, a pair of blankets, a rubber sheet and a chair for one five-cent ticket. This was so successful in promoting more sanitary living conditions among the poor, and especially in providing separate beds for consumptives, that many times the number of cots from the lodging houses were thus distributed.

One of the stations for the distribution of coal and food supplies was on the pier at East Third Street. Mr. Straus asked the Dock Department to roof over this pier and make it a recreation place for mothers and children from the tenements. This request was refused. However, he persisted in advocating the idea, with the result that the city adopted the policy of establishing Recreation Piers, which have become a lasting benefit to the tenement house dwellers during the hot summers. Of such Recreation Piers there are now ten adjacent to the congested districts. On five of these Mr. Straus maintains Pasteurized Milk stations in the summer months.

During the war with Spain in 1898 Rabbi Joseph Krauskopf, of Philadelphia, was sent as a Special Commissioner by the National Relief Commission to minister to the soldiers in Cuba. He reported to Mr. Straus the serious need of pure water and ice for the American troops in Santiago de Cuba. There was a balance of \$15,000 left from the Morgan fund of 1893-4, and with the consent of the committee, Mr. Straus purchased an ice plant with a capacity of 13 tons a day and a water distillation plant with a capacity of 20,000 gallons a day. This he sent to Cuba, where he erected and operated the plant under the supervision of Dr. Krauskopf, to the great relief of the soldiers and the checking of sickness among them.

At the Mass Meeting in Cooper Union on October 8, 1910, called to persuade Mr. Straus to continue his milk stations, when unjust attacks had disposed him to drop the work, Father J. J. Curran, of Wilkes-Barre, revealed what had been known to very few. He recalled the great anthracite coal strike, which began in May, 1902, and which was estimated to have cost the country \$142,000,000. Father Curran, who has ever labored for the betterment of the condition of the miners, said that in August, after the strike had gone on for three months, he came to New York with another emissary of John Mitchell to engage Mr. Straus' good offices on behalf of the strikers. He told Mr. Straus that the operators were willing to take back the miners at an increase in their wages, but that the proposition had been rejected by the miners because the operators were not willing to bind themselves to take back all the strikers.

Father Curran related that Mr. Straus at once said: "I will pay the men who are not taken back and will support their families until the men secure work elsewhere."

As the outcome of this interview the late lamented William N. Wilmer, with A. L. Kinkead and Sylvester Byrnes, Mr. Straus' secretaries, went to Wilkes-Barre to confer with the miners. And at the New York end Mr. Straus exerted every effort and all his influence, working actually day and night towards bringing the contending factions together. Using Father Curran's words, "Although in the background, Mr. Straus pushed the issue to ultimate success." Everything was so prepared that when President Roosevelt stepped in the second time, using the "Big Stick" on behalf of the miners, the strike was settled on October 17th.

Of all the strenuous times through which we have lived in the numerous efforts to help humanity, the coal strike episode was by far the severest.

Mr. Straus' first gift for the prevention of tuberculosis was the erection of a small cottage in connection with Dr. Trudeau's work in the Adirondacks. This was nearly thirty years ago. During the years that followed he aided in many ways the establishment of sanatoria for the victims of the Great White Plague. But always the idea was uppermost in his mind that prevention was better than cure.

Finally in 1909 he put into operation a plan that had been forming in his mind for years. On his property at Lakewood, N. J., in the pine belt, he gathered children from the tenements who had been exposed to

tuberculous environment or who had shown predisposition to the plague, and by life in the open air and good food he demonstrated that they could be built up physically and equipped with power to resist the tendency to the disease.

After six months of successful experiment he launched his plan for a Tuberculosis PREVENTORIUM for Children, thus originating the first idea of such an institution. He offered his interest in the Lakewood property to the Society formed under the presidency of Marcus M. Marks. But owing to objections by the residents of Lakewood the institution was established at Farmingdale, N. J., on land given by Arthur Brisbane, and Mr. Straus substituted the nucleus for a building fund for the gift of the property.

Meanwhile, at the beginning of 1909, when the world was shocked by the earthquake in Italy, Mr. Straus rushed quantities of food, clothing and medical supplies to the stricken land at the first report of the disaster. In charge of a physician and an assistant from his New York Milk Laboratory he shipped on the steamship "Hamburg" on January 5th and on the "Barbarossa" on the 6th, medical supplies and provisions for thousands of families to Italy. The Hamburg American Steamship Co. and the North German Lloyd Co. both took these supplies to their destination free of charge.

Relief stations were set up at Naples and Messina, where the refugees from the earthquake region found medical relief, and where the distribution of the supplies was conducted in the most systematic and helpful manner. (For supplies distributed see page 221.)

In 1912 Mr. Straus visited Palestine and was horrified at the distress caused by poverty and by sickness. He established a Department of Health for Palestine with headquarters in Jerusalem under the direction of Dr. William Bruenn, a graduate of the Medical Department of the University in Berlin. He also opened soup kitchens in Jerusalem for the feeding of the starving people, and work rooms to give work to the unemployed.

I have recorded here the works and deeds of Mr. Straus that have come under my personal observation only. As I write this, in January, 1913, Mr. Straus has arranged to return to Palestine to enlarge the work that he has undertaken there on a previous visit last Winter. This time we are taking along three trained nurses to attach to the Health Department and inaugurate district nursing in a scientific manner.

Comitato di soccorso delle Colonie estere di Napoli  
**PRO MESSINA E CALABRIA**

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Napoli. 27 Gennajo 1909.

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*M. Meissner*







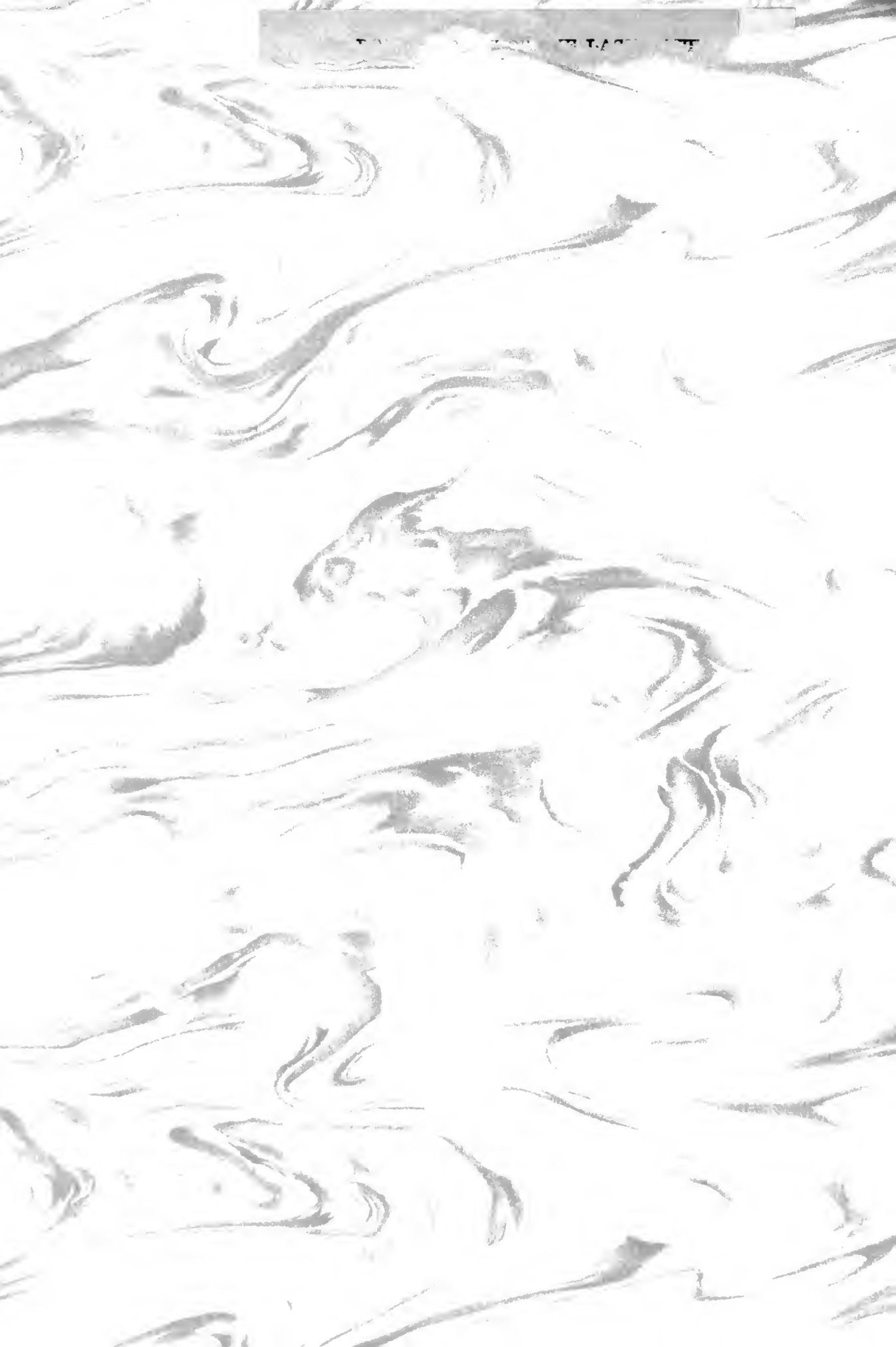
























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