Annual Report of the... Department of Health of... The City of New York

1902

ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK

FOR THE

YEAR ENDING DECEMBER 31, 1902.

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DECEMBER 31, 1902.

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DEPARTMENT OF HEALTH.

REPORT FOR THE YEAR ENDING DECEMBER 31, 1902.

DEPARTMENT OF HEALTH, CITY OF NEW YORK,
SOUTHWEST COR. FIFTY-FIFTH STREET AND SIXTH AVENUE,
BOROUGH OF MANHATTAN, NEW YORK, December 31, 1902.

Hon. SETH LOW, *Mayor of the City of New York:*

SIR—In accordance with the provisions of section 1168, chapter 466, Laws of 1901, the Board of Health has the honor to submit the following report of the operations of the Department of Health for the year ended December 31, 1902:

PUBLIC HEALTH.

The condition of the public health during the year, in spite of the steady increase in population and the continued congestion in the more crowded districts, has been better than for any year since the organization of this Department. The death rate has fallen to 18.75 per thousand as compared with 20.00 in 1901 and 20.57 in 1900. The deaths numbered 68,085 as compared with 70,720 in 1901 and 70,872 in 1900. The death rate in the section corresponding to the former City of New York was 19.49 per thousand, not only the lowest on record, but not approached in any year since 1814, which year presented an unusually low death rate, 19.66; but the latter has always been questioned by statisticians on the ground that in the first half of the nineteenth century records of mortality were loosely kept. The death rate of 17.88 in the Borough of Brooklyn is the lowest in that section since 1866, and in all probability the lowest ever recorded in the history of the City of Brooklyn.

While the mortality from infectious diseases varied considerably from that of the previous year, presumably following certain laws regarding which students of medicine must still confess ignorance, yet it is to be noted that in 1902 there was a marked decrease in the number of deaths from those diseases, chiefly the contagia, which are regarded as largely preventable. For example, deaths from smallpox decreased 100, from scarlet fever 222, from diphtheria and croup 53, and from pulmonary tuberculosis 566. There was also a marked decrease in the deaths from diarrhœal diseases occurring in children under two years, the figures showing a saving of 858 lives; this was due in part, no doubt, to the less trying meteorological conditions prevailing during the summer of 1902, and partly, it is hoped, to measures taken by this Department to assure medical care and proper feeding to children in the tenement districts; particularly, also, to the efficient work of the Tenement House Department in improving the conditions under which a large proportion of the city's population lives, and to the work of the Department of Street Cleaning, which has kept the streets of the more crowded sections of the city cleaner, we believe, than ever before, and, by the generous use of water from the City hydrants, has done much to cleanse the streets of disease-breeding filth.

Various activities of the Department of Health in connection with the suppression of the diseases cited above will be found in detail below, and in the reports of the several division chiefs hereto appended.

SMALLPOX.

The most interesting medical problem confronting the Department on January 1, 1902, was that of the suppression of smallpox, which had gained a strong hold upon this city in 1900 and 1901, in the latter of which years 1,198 cases and 410 deaths were recorded. The disease was not confined to this city, but had been, and still is, very prevalent in several of the larger cities of this country as well as in the smaller towns and the country districts. In this city an extra force of from 150 to 200 vaccinators was immediately set to work and kept continuously employed for six months. Letters were sent to all the larger manufacturing establishments and business houses urging the importance of vaccination, and no effort was spared to make the news generally known that the Department would vaccinate freely any one desiring it, and would send a vaccinator or vaccinators to any factory or shop, where vaccination might be done at the convenience of the persons there employed. The result of this work was a total of 810,000 vaccinations, or more than twice the number obtained by the Department in any previous year. Within six months the disease was under control, and the year which had opened with 140 cases of smallpox in January closed with 9 in December, in spite of the fact that the inhabitants of this city are frequently exposed to contagion from other neighboring cities, notably Philadelphia, where the disease is still prevalent, more than 600 cases having occurred as late as the first six months of 1903. A detailed statement of the efficient work of the vaccinating corps, by Walter Bensel, M. D. (then Assistant Chief Medical Inspector), who had charge of the work, will be found appended to this report.

The high standard of the Department with respect to the manufacture of vaccine virus has been maintained. A description of the methods of manufacture employed will be found appended.

Observation of the conditions under which the recent epidemic of smallpox spread until finally checked brings new evidence regarding the periodical recurrence of this disease, and regarding the best means of suppressing it. The only means is constant public and private vaccination. Your Board has lost no opportunity of impressing this fact upon the public and upon physicians, seeking to remind the latter of their duty in this respect. As a result of the efficiency of vaccination, what was once the most dreaded of contagious diseases is now the easiest to prevent. If the general public were to take care to render themselves immune from smallpox by vaccination, the disease would soon die out in this country. It is, therefore, the highest duty of Boards of Health and of physicians to insist upon frequent vaccination, whether smallpox is prevalent or not. The periodicity of this disease is well established. The people of New York should see that the next outbreak of it finds them not unprepared.

TUBERCULOSIS.

While the great importance of preventive measures in checking the spread of pulmonary tuberculosis has long been recognized in New York City, it was found early in 1902 that the Department of Health might readily extend its work in relation to consumptives to a considerable degree without calling upon the City authorities for extra appropriations at that time. In the absence of any public sanitarium to which tubercular patients might be sent, the chief preventive measures have been the renovation or disinfection of infected premises after the death or removal of a tuberculous patient; the prevention of spitting in public places and the spread of information instructing consumptives how to avoid infecting persons with whom they come in contact. It had been found that the practice of this Department, when the disinfecting corps was kept busy with ordinary cases of contagious disease, was to require that fumigation should be performed in due course after these routine cases, and that fumigation after tuberculosis should be performed whenever an opportunity offered, which was frequently some weeks after premises had been left infected at the death or departure of the tuberculous patient. A system was instituted whereby greater care and promptness were exercised in these cases. The number of disinfections after tuberculosis was considerably increased and is steadily increasing. Thorough renovation of premises infected by tuberculosis has also been insisted upon, and 1,332 renovation orders were issued during the year, as compared with 474 such orders in 1901. The work of the laboratory in examining specimens of sputum for tubercle bacilli was considerably extended, about 12 per cent. more having been examined than in any previous year. The attention of all physicians was called to the necessity of reporting tuberculosis cases occurring in their practice. Dispensaries and hospitals were also notified that this Department believed that they were not reporting all the cases that came to them. As a result of this notification the number of cases reported from institutions increased during the year by 22 per cent., and this system of reporting is now so complete that only a small proportion of the cases of tuberculosis occurring in this city fail to come under the notice of this Department while the patient is still alive. The total number of deaths from tuberculosis was 4,893, as compared with 5,233 in 1901; the death rate was 2.29 as compared with 2.50 per thousand.

In connection with this subject, this Board desires to reiterate with, if possible, added emphasis, its recommendations to the City authorities for a municipal sanitarium for consumptive patients. Experience has shown, and is showing daily, that, while the preventive measures above cited are effectual to a considerable extent, yet the problem of checking a disease which alone causes fully one-eighth of the deaths in this city each year will not be solved until the City provides a place where its consumptives who are still in the curable stage may cease to be a menace to the health of their associates, and at the same time have an opportunity to be themselves completely restored to health. It is conceded that the chances for recovery of a tuberculosis patient confined to a city tenement are so small as to be negligible, whereas each of these patients becomes, with the progress of the disease, more and more a menace to the health of every person with whom he comes in contact. Entirely aside from the humanitarian aspect of the question, it cannot be doubted that the taxpayers of New York City would be amply repaid for their outlay upon a tuberculosis sanitarium by an increase in the aggregate earning power of the city's inhabitants, hundreds, perhaps thousands, of whom will owe their very lives to the fact that their native city cared enough for their welfare to remove from them the greatest single menace to the public health.

DIPHTHERIA.

A large increase in the number of diphtheria and croup cases reported is to be noted, these cases reaching 15,319, as compared with 12,329 in 1901 and 12,913 in 1900. On the other hand, the deaths from diphtheria were actually fewer than in 1901 and 1900, the figures being 20.15 in 1902, 20.68 in 1901, and 22.77 in 1900. For this remarkable reduction in the percentage of fatal cases two reasons account; first, the pressure brought upon physicians to report cases of this disease, and second, the greater facilities offered to them for the examination of cultures, the aim of the Department having been to secure supervision over all cases where Klebs-Loeffler bacilli were found by culture to be present. Physicians have long known that the bacillus of diphtheria is obtainable in some cases from the throats of persons apparently in perfect health and exhibiting none of the clinical signs of diphtheria. The Department's reasons for taking cognizance of these cases is that the bacillus of the disease seems often to have been transmitted with virulence equal to that found in severe cases.

In order to bring all diphtheria cases under proper control, a very considerable extension of the work of the Division of Bacteriology has been necessary, as will be seen from the following statement:

	1902.	1901.
Bacteriological diagnoses of suspected diphtheria	16,653	13,544
Cases found to be true diphtheria	7,757	5,851
Cases found not to be true diphtheria	6,837	5,426
Cases bacteriological diagnosis indecisive	2,059	2,277
Bacteriological examinations of healthy throats in infected families	620	236
Later bacteriological examinations of diphtheria (convalescents)	14,483	10,810
Cultures taken by Medical School Inspectors	892	90
Amount of diphtheria antitoxin produced (cubic centimeters)	157,975	132,475

No effort has been spared to make the bacterial diagnosis laboratory useful to physicians, who have been encouraged by every available means to make use of its facilities in the diagnosis of diseases occurring in their own practice. On March 1, 1902, a new system was put in operation whereby physicians forwarding diphtheria cultures are immediately notified by telephone of the result of the examination of these cultures. Thus, cultures left at the Department's numerous culture stations throughout the city are collected during the late afternoon and evening, and the results of the examination are telephoned to the physician the next morning before he leaves his home to make his daily calls. This system has been greatly extended in Brooklyn and established in Queens and The Bronx, while in Manhattan 34 culture stations have been added and five discontinued.

The reduction in case mortality in diphtheria shown in the figures above may be accounted for also by the wider use of antitoxin. The value of this remedy in diphtheria appears to vary directly according to the promptness with which it is administered. In order to obtain the prompt administration of the serum in suspected cases, the Department has supplied all the larger dispensaries in Manhattan with antitoxin as well as with culture tubes, in order that cases of diphtheria first seen there might be injected with the serum without delay. In addition, the city has been divided into eight antitoxin districts, in each of which an inspector is now always on call ready to give free injection of antitoxin or to intubate. The use of the serum for persons exposed to diphtheria has also been greatly extended. Cases injected by the antitoxin inspectors showed a case mortality of only 5 5-10 per cent., or about one-half of the percentage of mortality in the diphtheria cases throughout the city; out of the very large number of persons immunized by these inspectors, only six subsequently contracted diphtheria. These figures bear the strongest possible testimony in favor of wider use of antitoxin. Considerations of the expense of manufacture or in the ability of the person to pay for it should not enter into the question of the use of this efficient preventive of disease.

TYPHOID FEVER AND MALARIA.

The increase in the number of cases of typhoid fever during the year was common to most sections of the United States. Part of the increase shown by the figures from New York City, however, may be ascribed to the action of the Department in then first calling physicians to account for failing to report these cases. Wider opportunities were given to all physicians for bacteriological examinations for typhoid, and the number of specimens of blood and serums subjected to the Widal test increased from 1,702, in 1901, to 3,369 in 1902. The positive reaction was obtained in 35 per cent. of these specimens as compared with 24 per cent. in the previous year. Examinations of urine from cases of suspected typhoid fever for Ehrlich's diazo reaction were begun on June 1, at which time a circular letter was prepared and issued to physicians offering them this additional facility.

Examinations of blood in cases of suspected malaria were also begun late in the summer, and the registration of cases of malarial fever by physicians was thereafter required. A special report on this work is appended. The main conclusion from it is that in a relatively large proportion of the cases of malaria prevalent here the disease appears to have been contracted within the city limits. The intimate relation between this disase and the anopheles variety of mosquito having been established, efforts were made to put an end to the breeding of mosquitoes in various places within the city limits where stagnant water collected. Inspections were had in all boroughs, and a large number of orders were issued upon property-owners requiring the draining and filling of vacant lots, etc. The great expense of these operations and the length of time required materially retarded the progress of this work, but efforts have been made with considerable success to educate property-owners upon the necessity of these measures, and in a majority of cases they are now disposed to co-operate with the Department. Plans for drainage of large low-lying areas, notably lands in the neighborhood of Sheepshead Bay, in the Borough of Brooklyn, the lands in the Borough of The Bronx bordering upon the upper reaches of the East river, and the land between the hill country of Staten Island and the waters of the bay were also begun.

Medical School Inspection.

From January 1, 1902, throughout the remainder of the school year, or until July 1, 1902, the system of medical school inspection in force since the inception of that work, several years ago, was continued with such minor modifications as seemed to promote the efficiency of the corps. The inspectors of this force received $30 per month for their work, and were required merely to visit the school some time during the day and inspect any child excluded by principals or teachers on suspicion of contagious disease. This system had the radical defect of making the teacher the diagnostician. That is was not effective had been continually manifest from the figures of contagious disease cases reported among children of school age. Even if the Medical School Inspector performed the duty assigned to him, he frequently arrived too late to arrest the contagion, or did not see an ailing child until that child had spread contagion quite generally throughout the class-room which it occupied. Obviously, an early and correct diagnosis was extremely important, and this the system failed to furnish. During the summer of 1902 plans were perfected under which fewer inspectors were employed, but they were requird to do much more than make a routine call at a school for fifteen minutes a day, and so were put on the same basis as medical inspectors, thereby becoming available not only for school duty, but for any emergency duty required by the Department. To each was assigned a school which he was required to visit before 10 A. M. each school day. Beside the daily examination of pupils suspected of having contagious disease, they were ordered to examine, at stated intervals, generally from a week to ten days, every child in the school, taking cognizance not only with regard to the ordinary contagious diseases, such as measles, scarlet fever, whooping-cough and the like, but also any affections of the eyes, nose, throat or skin, excluding any pupils whose condition warranted the belief that its presence in a class-room might result in transmitting contagion of any kind to other children. With the co-operation of the Board of Education, this system has resulted in a very decided diminution of the number of cases of contagious disease common to children of school age. The system as thus outlined has been considered with interest by the health officers of other cities and adopted with certain modifications by several of them.

Following are some statistics of the work performed by Medical School Inspectors:

Year.	Scholars Examined.	Scholars Excluded.	Daily Average Attendance.
1900	126,003	13,348	413,842
1901	100,582	10 448	447,980
1902	5,063,766	53,903	502,125

CONTAGIOUS EYE DISEASE.

Rigid inspection of the eyes of school children, undertaken at the suggestion of Richard H. Derby, M. D., a member of the Medical Advisory Board of this Department, disclosed the fact that trachoma had been for several years largely on the increase, especially among children of the East Side. When children were excluded for this cause they sought treatment from private practitioners or in dispensaries in order that they might be allowed to return to school as soon as possible. The dispensaries, however, appeared to be unable to handle all the cases which came to them without securing extra grants from the City for that purpose. With a view to relieving them of this undue pressure, and of securing early treatment for children excluded from school, an eye hospital and clinic were established in the autumn of 1902, with the assistance of the trustees of Bellevue and Allied Hospitals, in one of the old Gouverneur Hospital buildings, and in this, under the charge of physicians of this Department, treatment has since proceeded at the rate of about 15,000 cases per month. A detailed report of this ophthalmological work and of plans for its extension will be found appended.

SCHOOL NURSES.

With the increase of exclusions from school as a result of more rigid examination by the Medical School Inspectors, it was seen that in many cases children excluded were not securing prompt and satisfactory treatment—the result either of ignorance or inability on the part of the parents. A nurse was accordingly employed to follow up the excluded children after they had been absent unduly long and to treat them or see that they secured treatment in minor cases, notably of eye disease and pediculosis. The operations of this nurse proved to be so successful that additional ones were appointed, and their work has now developed into a nursing corps of fair size, which, in the opinion of this Board, should be extended until every school in the tenement districts has a nurse attendant upon it. This work has met with marked favor from the Department of Education and, latterly, from the parents of the children who come under treatment.

CONTAGIOUS DISEASE HOSPITALS.

The condition of the City's contagious disease hospitals at the beginning of the year 1902 was found to be such that immediate and radical measures were necessary to bring the plant up to any state of efficiency. The hospitals were utterly inadequate to supply the City's needs. Many of the buildings in use were sadly out of repair, without adequate toilet and sanitary facilities; in fact, almost entirely unsuited for the work. It is difficult to see how physicians who were cognizant of these conditions could have failed to arouse public opinion and demand immediate improvement.

Passing by matters of faulty administration, nursing and supplies, remedies for which were quickly found, the fact remained that the aggregate of hospital accommodations was miserably deficient, most continental cities, for example, being able to accommodate in their contagious disease hospitals from two to four times the number of persons per unit of population that New York could accommodate. Application was immediately made to the Board of Estimate and Apportionment for an appropriation for new construction and repairs, and $500,000 was thus obtained, of which $75,000 was for repairs to existing plant. With this appropriation Riverside and Kingston Avenue Hospitals were repaired and fitted with proper sanitary accommodations, the steamboat "Franklin Edson" was rebuilt, and the chief new construction work of the year, a six-story pavilion for scarlet fever patients, was begun on the Willard Parker Hospital grounds at the foot of East Sixteenth street. This new pavilion will hold 250 patients and will cost from $375,000 to $400,000. The work is in charge of W. Wheeler Smith, Esq., a specialist in hospital architecture, who has embodied in the building what are believed to be the best and most modern ideas upon the subject. With this fine building under way, and existing buildings put into thorough repair, a good beginning has been made in the work of reconstructing and enlarging the City's contagious disease hospital facilities.

It is the settled belief of the present Board of Health that each borough should have its own contagious disease hospital plant. Many American cities having far less population than our smaller boroughs are, nevertheless, far better prepared to treat contagious disease. To remedy this defect the Board has taken steps to acquire land in Queens and Richmond boroughs for the erection there not only of isolation hospitals, but of ambulance stations and disinfecting plants. The practice of carrying contagious disease patients from outlying portions of Queens and Richmond boroughs to North Brother Island has been little short of barbarous.

Sanitary Work.

For some time prior to January, 1902, the sanitary inspection work of the Department had been in charge of the Division of Inspections, while the Division of Offensive Trades and Food Inspection was separately administered. It was deemed wise to consolidate these three divisions under one head, both in Manhattan and Brooklyn. This obviated any confusion which might arise in inspections as to the proper assignment of complaints to the sanitary or to the Offensive Trades Division, and also permitted the division of the larger boroughs into districts, each in charge of a Sanitary Inspector, whereas formerly they had been an inspector of each of these divisions in a district. An efficient Sanitary Inspector is capable of attending not only to sanitary complaints, but to interest himself and gain experience in such questions as the conditions surrounding the storage and sale of food products and the like, thus broadening the field and increasing the scope of the individual inspector's work and his understanding of general questions. Up to September 1, 1902, the work of the Tenement House Department was carried on by this Department, and as the Department force had been very decidedly reduced in January, 1902 (15% of the 1,000 employees having been dropped in order to keep within the salary fund), the Division of Inspections was severely tried in attempting to handle the Tenement House Department and general inspection work at the same time. Its efficiency, however, had been much increased by the consolidation of divisions, so that the Department was able to handle quickly and effectively all sanitary matters brought to its attention.

The work of the Division of Inspections may be classified in more important items as follows:

	1902.	1901.	1900.
Total inspections and reinspections	141,058	93,427*	114,772*
Tenement houses	25,429**	41,015	70,910
Lodging houses	1,092	1,012	2,708
Private dwellings	9,120	6,807	5,859
Mercantile establishments	13,312	13,073	1,525
Manufactories and workshops	3,225	1,634	1,700
Stables	2,107	731	1,101
Sunken and vacant lots	2,344	1,165	1,507
Nnmber of complaints forwarded with orders	25,485	29,495	28,240
Negative reports forwarded	26,486	20,608	29,189
Reinspections on orders	57,317	64,465	64,277

* Not including division of offensive trades.
** January 1 to September 1.

One of the main causes of failure in efficiency in this Department has been that mere issuing and filing of orders for the improvement of sanitary conditions, the abating of nuisances and the stoppage of the sale of adulterated milk and food products has been regarded as sufficient performance of its duty by the Department. Efficient co-operation upon the part of the Law Department is necessary in many cases in order to secure any remedial action. It is gratifying, therefore, to be able to report the highly efficient work done by the officers of the Bureau of Penalties attached to the office of the Corporation Counsel. Evidence of this efficiency may be

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gained from the following table showing the amount of fines imposed by the Courts of Special Sessions and City Magistrates upon conviction:

	1902.	1901.	1900.
Manhattan	$13,229 00	$5,107 00	$7,540 00
Bronx	25 00	134 00	25 00
Brooklyn	2,700 00	866 00	530 00
Queens	1,405 00	160 00	195 00
Richmond	....	25 00	....
Total	$17,359 00	$6,292 00	$8,290 00

Scope of Inspection Work.

It was the view of your Board that the Health Department's efficiency should not be measured merely by the manner in which it handled citizens' complaints, but that in order properly to supervise the health of the city it should examine particularly into the sanitary conditions of all premises where a large number of people are wont to congregate. To that end special attention was given to the condition of lodging-houses, public markets, police stations, churches and theatres; the result being a large number of orders which were carried through and resulted in remedial action. The number of lodging-houses in this city is not unusually large, but the lodging-house population of Manhattan Borough alone is estimated to exceed 17,000 persons, or an average of 172 for each lodging-house. Their population is a floating one whose mode of living has led to careless habits, so that considerable inspection work was needed to bring the tenants and proprietors to a proper comprehension of the standard of living demanded of them by the officers of this Department. Violations of the law as to overcrowding were also corrected.

Action was taken by the Department looking to the improvement in sanitary conditions in public markets, and when the results of inspections were obtained the Board notified the Borough President and Comptroller that these markets must either be repaired or closed. Most of the buildings had been erected in a time when little attention was paid to sanitary requirements, and their drainage systems were in most cases extremely unsanitary. Drainage from ice-boxes, fish-stands and floors were discharged into drains through untrapped waste pipes, so that the food offered for sale was exposed almost directly to gases and vapors from the sewers. Filthy and unventilated water-closets were also found. As a result of these inspections and orders, the City authorities have decided to discontinue several of the markets and have repaired the remainder, so that the conditions under which food is sold upon these and other market premises has been considerably improved.

THE CHINESE QUARTER.

Upon the outbreak in San Francisco of a disease much resembling Bubonic plague, it was decided by your Board that extraordinary measures should be taken to put the Chinese quarter of this city in good sanitary condition. To this end, with the consent of the Tenement House Department, Sanitary and Medical Inspectors from the Health Department were sent into Chinatown with broad instructions as to the suppression of nuisances and the issuance of orders in connection therewith. While conditions in general were found more favorable than might have been expected, yet opportunities were found for much remedial action. One tenement owner who was served with orders for the improvement of the sanitary condition of his premises stated, among other objections to obeying, that he had owned the tenement for twenty years, during which time he had not been "bothered by the Board of Health;" but he and other owners were led to make necessary repairs and alterations. The Medical Inspectors took cognizance of all persons residing in that quarter, expecting that on account of the intimate association between the Chinese of this city and San Francisco a case of the supposed plague might break out here at any time. The Bureau of Vital Statistics was instructed to withhold burial permits in all cases where persons died in the Chinese quarter until the body had been examined by an officer of this Department. All these measures were taken secretly and there was no public alarm. Happily no cases of the disease mentioned above developed.

INSPECTION OF THE SUBWAY.

The inspection work of this Department was considerably increased during the year because of unsanitary conditions growing out of the construction of the Rapid Transit Subway. The sub-contractors, in their excavation work, broke or otherwise damaged a great number of sewer pipes, and in many cases permitted the escape of raw sewage into the subway cut, where it would lie, with quantities of surface drainage and rain water, to create a nuisance for the neighborhood in which it was.

Moreover, the residents along the route found the cut a convenient place to deposit refuse. Especially was this true of the manufacturing and tenement districts below Hudson street and in The Bronx, where tons of refuse had to be collected and carted away. In addition to these nuisances the sub-contractors in most cases failed to provide water-closet accommodations for their workmen until required to do so by this Department. A squad of Inspectors and Sanitary Police were specially detailed to subway inspection work, not only to handle citizens' complaints regarding it, but to make daily inspections of the entire length of the subway cut, some 14 miles, and issue proper orders. In this way the discomforts and nuisance resulting from the subway excavation were minimized. Night work on the subway was stopped on complaints of citizens in all cases except where the Chief Engineer certified that the pursuance of such work for a short time was absolutely necessary to the progress of the subway.

OFFENSIVE TRADES.

Of the offensive trades, the suppression of which is by law committed to the Department of Health, the larger slaughter-houses in the Borough of Manhattan and Brooklyn, and the poultry slaughter-houses outside of the assigned slaughter-house districts, demanded particular attention from the Sanitary Bureau. Early in 1902 the various inspectors who had been previously detailed to the various slaughtering-houses were withdrawn, and a general inspection was instituted by the Chief Sanitary Inspector and by subordinates competent to issue proper orders for the removal of offensive conditions. The result was the promulgation of a large number of orders, covering practically all the slaughter-houses in the city. Compliance with most of these orders was had without resort to the courts, and, in consequence, the condition of the slaughter-houses was very greatly improved, so that no complaints have been received from the residents in the slaughter-house neighborhood. The establishment of new premises has been restricted as far as possible by the Board, and always to the slaughter-house district, while consolidation of some existing plants has, in several instances, resulted in the demolition of small buildings and the erection of new and modern abattoirs on a large scale. Less nuisance proceeds from the new and properly equipped plants than from the older and less sanitary structures.

As a result of official information indicating that poultry slaughter-house keepers were not conforming to the requirements of this Department, orders were issued, and in some cases permits were revoked until poultry slaughterers conformed to the requirements. The business of poultry slaughtering is almost always offensive, and within the built-up portions of the city can only be conducted with the greatest care. These slaughter-houses are, however, a necessity, owing to the fact that a large proportion of the population of this city is of the Jewish faith, and will therefore use only fresh-slaughtered poultry. For this reason your Board has endeavored to see that no neighborhood where there is a demand for a poultry slaughter-house should be left unsupplied, while keeping the number of these slaughter-houses within reasonable limits, and demanding that they should be conducted in the most sanitary manner possible. The industry has grown tremendously, but it is believed that the conditions under which it is conducted are now better than ever before. It is now required that cages in which the fowl are kept shall be covered with galvanized iron or other impervious material, and that they shall be easily flushed and cleansed. The floors of the slaughter-houses were also required to be water-tight and properly drained, and the killing beds were required to be floored and sheathed with non-absorbent material and connected with a sewer-trapped drain. The requirements for the removal of refuse and offal have also been made much more strict.

SMOKE NUISANCES.

Your Board in 1902 was confronted with unusual conditions in the prosecution of smoke nuisances. In the spring of the year, after vigorous measures had been taken and the number of existing nuisances reduced from upwards of 200 to less than a score, a strike in the anthracite coal regions broke out, and continued during most of the summer. The effects of this strike were felt in the coal market throughout the year. Until near the close of the year it was very difficult for manufacturers and large users of coal to obtain anthracite for their steam plants. During this time prosecutions of smoke offenders in the courts was virtually suspended by order of the Board, the Law Department being requested not to press cases, although the proper evidence, as a result of inspections, was obtained in due course and placed upon record. Every effort was made by the Department to induce users of soft coal to burn it in a manner which would create little or no nuisance, and Inspectors of the Department were able, by personal effort, to demonstrate in many cases that soft coal could be used without causing offense. This policy had been decided upon because it was felt by your Board that to force manufacturers and others into the use of smoke consumers and other devices intended to reduce the amount of smoke from stacks, would result merely in great expense to those who installed these devices, without corresponding relief from the smoke nuisance, as there is no smoke consumer of which the

Department of Health can testify to the efficiency. Much better results were obtained by care in stoking than by the use of any patented devices.

Upon the breaking of the coal strike, the supply of anthracite coal gradually increased, and before the end of the year smoke nuisances had again been reduced to a very small number. There was not a single offender against that section of the Code who has not been served with proper orders, and, upon the continuance of the nuisance, taken into the Magistrates' Courts upon a warrant or summons. The result is that the city is now freer from smoke than it was before the coal strike.

STABLES.

The occupancy of premises as stables within the built-up portion of the city is always likely to produce a nuisance, especially if the stables are not properly connected with sewers and if the manure therefrom is not removed daily. Early in the year 1902 inspections were had of all stables within the built-up portions of the city, and orders were issued where necessary. The inspections and reinspections of stables by Sanitary Inspectors in 1902 amounted to 2,107 as compared with 731 in 1901 and 1,101 in 1900. In addition, 13,432 inspections were made by Sanitary Police attached to this Department for the purpose of requiring owners of stables to remove manure daily. As the manure of the Borough of Manhattan alone amounts to more than 1,300 tons per day, it will be seen what a source of possible nuisance was obviated by this work.

MERCANTILE ESTABLISHMENTS.

Under the law governing the employment of women and children in mercantile establishments, the enforcement of which is a duty by this Department, 13,312 inspections were made by the Division of Inspections in mercantile establishments as compared with 1,373 in 1901 and 1,525 in 1900. These inspections led to orders for the improvement of the sanitary conditions and ventilation in places where women and children are employed.

The workings of the Child Labor Law were also considered by the officers of this Department and recommendations made in co-operation with the Child Labor Committee and other philanthropic bodies, which resulted in beneficial amendments to the law. Indiscriminate issuance of certificates was also stopped; and in certain cases, where it was found that teachers had been lax in their representations to this Department upon applications, these teachers were promptly brought to book, with the result, it is believed, of making them more strict in the statements made. The work of the division receiving these applications may be thus summarized:

	1902.	1901.	1900.
Children applying for certificates	22,086	30,406	30 895
Certificates granted	14,482	23,492	22,296
Certificates refused	3,024	2,203	1,714

Inasmuch as 13% of the certificates applied for were refused as compared with 7% in 1901 and 5% in 1900, it may be inferred that the requirements of the law as to study in public schools and as to physical condition were more strictly followed in 1902.

INSPECTION OF FOODS.

One of the most important fields of activity for the Sanitary Bureau of this Department continued to be the inspection of foodstuffs consumed by people of this city. These inspections were much broadened during the year, and your Board, while convinced that much improvement in the foodstuffs resulted, must express its regret that it had not a sufficient force at its command to extend the scope of the work further. The investigations now in progress by the United States Government and by foreign governments only go to confirm in a most striking manner the conclusions of your Board that the subject of the prevention of food adulteration is one still in its infancy, and that it will provide a field wherein sanitarians can be of great benefit to the people of this country. So-called commercial interests, the result of competition between manufacturers and other producers of foodstuffs, has resulted in wholesale adulterations and substitutions in their products. No more important field offers itself to the Department of Health of this City that work for the purification of these supplies and the punishment of dishonest adulterators. This work should be taken up by the Department on a large scale without delay.

MILK.

The protection of the City's milk supply from adulteration and contamination forms one of the most important branches of the work of the Sanitary Bureau. Adulteration and artificial preservation of milk directly contribute to the increase in the death rate among children, and probably among adults. In case of young children it is far more important, because milk forms the principal article of their diet. Your Board is convinced that the proper way to protect the milk supply of this city is to begin at the farms and see that the stables and dairies supplying New York City with milk are kept in sanitary condition. To this end inspectors of this Department were, early in 1902, dispatched to dairy farms along the several lines of railway which bring milk to this city, with instructions to visit farms, investigate the condition of dairies, the source of their water supply and, in general, to endeavor to educate farmers to the proper idea of sanitary milk production. Circulars of information were also sent out to farmers wherever it was found necessary.

The next step was to see that the milk was transported under proper conditions and not tampered with or contaminated upon the journey to this city. With this in view, the attention of all the railway companies was called to the necessity of having their milk cars properly iced. At the freight terminals inspectors were placed to examine and take samples of milk for analysis, covering at all times, as far as possible, the large quantity of milk received here, which amounts to nearly one and one-half million quarts per day. It had long been known to the Department that certain wholesalers habitually practiced adulteration of milk, and inspections were directed especially to their shipments until evidence was obtained which resulted in the conviction of several upon second and third offenses. The ordinary fine imposed in these cases is $25, but in one instance the Court imposed a fine of $500. The result was that a number of these swindlers were driven out of business, and the milk supply correspondingly improved.

Milk is sold in about 7,000 places in the Borough of Manhattan alone. In many of the stores it is sold as an adjunct to groceries. The grocery men state that it is not a source of direct profit to them, but that they must have it because their customers will go elsewhere if they do not supply milk as well as groceries. The conditions under which milk is sold in these places are frequently bad. It is often impossible to provide proper icing, and in many cases the storekeeper prefers to live in rooms in the rear of the store, where he or his family can attend to the store in the intervals of domestic duties. Owing to the danger of transmitting disease germs in milk, the Department of Health has for several years included in the Sanitary Code a requirement that premises where milk is sold shall not communicate directly with living rooms. Until January, 1902, however, this had not been strictly enforced. Since that time it has been, with the result that a number of small grocers have given up the sale of milk, greatly to the satisfaction of the Department and to the furtherance of its efforts for purity in milk. The public would be as conveniently and far more sanitarily served if there were very many fewer places where milk is sold. Further details regarding the conduct of the milk inspection work will be found in the report of the Chief Inspector of the Borough of Manhattan, which is hereto appended. Attention is also called to the detailed reports upon the inspection of fruit, meat, fish and the manufacture of carbonated waters.

Bureau of Records.

During the year the offices of the Bureau of Records were entirely remodeled. In this reconstruction two objects were in view. First, to place the vital statistics in a fireproof vault. Though impossible of duplication, they had, prior to 1902, been kept in ordinary tin file cases on the third floor of a non-fireproof building. Former tenants of the headquarters building, however, had left in the basement a large swimming tank with masonry walls three feet thick, and with sufficient cubic capacity to accommodate all the records for some time to come. An appropriation was secured from the Board of Estimate and Apportionment, and the tank was covered with a steel roof and otherwise fitted to accommodate the records. A fireproof elevator connects the new vault with the office of the Registrar of Records, and only such records as are in immediate use are kept upstairs. When they have served their purpose they are immediately returned to the vault. A rearrangement of the offices was also made, so that citizens desiring to obtain transcripts of the records might be accommodated without having to visit several offices in the building in turn. This work is now done entirely in one room, and is much expedited thereby. The work of indexing the records of past years has also been set on foot. Previous to that operation searches of the records have been tedious and expensive, as the amount of work which one searcher could do in a day was very limited. Records of past years have also been rebound, and, where necessary, compiled. Many of the volumes were found to be so worn out as to be falling into decay.

Purchase of Supplies.

The accounts and supplies of this Department are under the control of the Clerk of Accounts and Supplies, whose report is appended. Early in the year it was found that the expense of administering that branch of the work and the cost of supplies were much larger than they should be if contracts were awarded to the lowest bidder at public letting. Specifications were therefore prepared for use in the purchase of all standard supplies, and this much simplified the accounting work of the Department and permitted a reduction of the clerical force from 15 to 12.

Part of the work of this office was the sale of the Department's laboratory products, namely, the various antitoxins and vaccine virus. The Department maintains stations in numerous drug stores throughout the city where these products are sold. The cash receipts from the sale of antitoxin for 1902 were $20,534.54, and for vaccine virus, $11,481.12. In addition to local sales, the Department has been supplying several cities and towns outside New York City. Antitoxin is supplied to the poor of this city free of cost upon a statement by the attending physician that the patient is unable to pay for the serum. Considerable objection was made during the year by the representatives of manufacturing chemists on the ground that the Department was doing a commercial business in laboratory products. It was also found that certain physicians were abusing the privilege they had of obtaining free antitoxin for poor patients. On the one hand, the impropriety of selling antitoxins in virtual competition with private firms, and, on the other hand, the difficulty of drawing a line in cases of the local free distribution of antitoxin—these considerations led your Board to conclude that it should cease outside sales of antitoxin and should distribute its laboratory products free to all residents of this city upon the request of the attending physician or in other proper manner. Recommendations embodying these views will be transmitted to the Board of Estimate later. At the same time, it will be necessary, if this policy is carried out, to make proper provision for the salary accounts of the Division of Bacteriology, which have been paid heretofore out of the proceeds of the sale of laboratory products. The bacteriological laboratories of this Department are so essential to the maintenance of the public health that any decrease in the work done by them would be most unfortunate. On the other hand, it would be more honest for the City to dissociate absolutely in its accounting the proceeds of laboratory sales and the expenditures for salaries of laboratory workers.

Your Board desires to testify at this time to the efficiency and zeal of the officers and employees of the Department of Health. Their work has been done with honesty of purpose and with increasing effectiveness, as is evidenced by the fact that, in spite of a reduction of 15 per cent. in the force, more and better work has been performed during the year. Such disciplinary measures as the Board has found necessary have been undertaken not merely to punish bad workers, but to stimulate good ones, while promotion has rewarded efficient service in so far as the Board has been able to give it.

Respectfully submitted on behalf of the Board of Health,

ERNST J. LEDERLE,
President.

ALVAH H. DOTY, M. D., }
JOHN N. PARTRIDGE, } *Ex-officio Members of the Board of Health.*

NOVEMBER 14, 1903.

Dr. E. J. LEDERLE, *President:*

SIR—A report of the work of the Department of Health for the past year comprises a record of increased efficiency in all divisions, of the abolition or reorganization of several, of the introduction of some extremely important modifications and extensions of the service, and of the preparation of a broad scheme for the provision of suitable hospital accommodations and disinfection facilities for all of the five boroughs of the city.

I shall not consider in this report in detail the changes thus brought about in the purely medical affairs of the Department, but would refer for such information to the reports of the heads of the different divisions already forwarded to you. I desire, however, to direct your attention to certain larger questions of sanitary policy and administration as related to the Department of Health of New York City and its work.

For a number of years past this Department has occupied a prominent position among the sanitary authorities of the world because of the very progressive attitude and policy in the surveillance of the infectious diseases. It has become the custom of sanitarians everywhere to look to the sanitary officers of New York City to introduce important innovations in and additions to the procedure generally followed in sanitary work.

Great changes have been brought about in sanitary methods and the scope of the work of sanitary authorities has been materially broadened within the past ten years through the agency and influence of this Department. In 1892 the Department of Health of New York City established the first municipal bacteriological laboratories in the world and adopted soon after a plan for systematic bacteriological examinations in the diagnosis and surveillance of such infectious diseases as the existing scientific knowledge renders possible. The policy of utilizing in every way all the discoveries of modern scientific medicine for increasing the efficiency in the surveillance of infectious diseases was definitely adopted. The methods for the bacteriological diagnosis of Asiatic cholera, diphtheria, tuberculosis and other infectious diseases as applied on a large scale for municipal work were devised and first placed in operation here. The production of diphtheria antitoxin was undertaken in the laboratories of the Department of Health at a time when this remedy was inaccessible to the poor. This was one of several measures designed to facilitate the introduction of diphtheria antitoxin in order that it might be more rapidly brought into general use, and thus a larger and earlier reduction in the morbidity and mortality rate from diphtheria in this city be attained.

These and other measures of similar character have served to attract the attention of sanitary authorities universally, and have been very widely adopted in other cities, both in this country and abroad. But while the work of the Department of Health in certain lines attracted wide attention in other more patent respects, New York City was far behind other cities, both great and small, in Great Britain and on the Continent. Perhaps the most notable defect was the failure to provide suitable hospital facilities for the care of contagious diseases and efficient means and methods for the disinfection of infected goods and premises.

Very early in the present year the Board took steps to meet this most fundamental and vital defect in the organization and equipment of the Department. Comprehensive plans were drawn up and adopted looking to the erection of suitable and commodious hospitals and disinfecting plants at convenient points in the Boroughs of Queens, Richmond and The Bronx, which have been entirely without such facilities; and for remodeling, rebuilding and largely increasing similar plants in Manhattan and Brooklyn. Necessarily much time has been consumed in the preparation of plans, but these are now well under way. When fully completed, New York City will have adequate and modern hospital facilities for the care of contagious diseases and satisfactory disinfecting plants. With the vast tenement population of this city, no permanent or satisfactory solution of the problems presented by these diseases can be found without such facilities, to say nothing of the wholly improper practice necessitated in the past of the removal of cases of small-pox and measles in some instances eighteen or twenty miles to a hospital. The completion of the hospitals and disinfecting plants now in process will mark a new period in the history of the prevalence of the contagious diseases in New York City.

The practical stamping out of small-pox during the year by the wholesale vaccination of the people of New York, the prompt detection and isolation of cases and proper disinfection, constitutes a splendid demonstration of what an intelligent and efficient sanitary administration may speedily accomplish, even in a great city where the difficulties seem insuperable in the crowded tenement-house districts and in lodging-houses.

The systematic medical inspection of schools was established in New York some years ago, but the methods adopted had been found most unsatisfactory and disappointing in their results. The reorganization of this work was decided upon early in the year, but was not put into operation until the beginning of the school year. It has already produced most striking results. It is, however, as yet too early to foresee how far-reaching the effects of the plan, as it is now being carried out, will be, but I believe very much may properly be anticipated from it.

The death rate for the past year in this city has fallen to the lowest point in its history, and too much significance can hardly be attached to this fact. It is true that favorable climatic conditions have obtained for the most part throughout the year, but in this respect the year 1902 is not alone in the nearly 40 years since the organization of this Department. It may also be said that generally in the United States until in very recent years (and even now, with the exception of the largest cities), the vital statistics have been so defective and inaccurate as to have had little value. In New York City, however, partly as the result of the geographical situation, the death records may be accepted as closely approximating absolute accuracy. As no life tables have as yet been prepared for the United States, it is impossible to obtain a corrected death rate, or to determine accurately the mean lifetime in any locality. To the average layman, and even to most physicians, the death rate of a city or town conveys little information. It does not occur to him that the death rates in a community indicate the average duration of the lifetime of the inhabitants, and is therefore of vital importance to every individual. How significant, however, this is may be seen when we consider that in 1866, with a death rate of 33 in New York City, the average lifetime of each infant born in the city was probably less than 28 years, while, on the basis of last year's death rate, the mean lifetime has increased to more than 40 years. That is, since 1866, on an average, not less than 12 years have been added to the mean lifetime of each infant born in this city. While much of this gain has been accomplished through the reduction in infant mortality, still a very large reduction has also been brought about in the death rates in later periods of life. Taking the tubercular diseases, in which a large proportion of the deaths occur at the middle periods of life, the reduction in the death rates in the last fifteen years means a saving of at least 6,000 adult lives a year in this city, chiefly at the best working period of life.

I append a table showing the total deaths and the death rate under fifteen years of age, each year, from pulmonary tuberculosis and tubercular meningitis since 1892. This shows an absolute decrease in the total number of deaths of 25 per cent. during the last ten years, notwithstanding the large increase in the population, and a decrease in the death rate of 40 per cent. I regard this showing as full of significance. It indicates in the most striking manner the unexpectedly successful results of the preventive measures adopted by the Department in relation to this disease. It is during the last ten years that the most active steps in the way of prevention have been taken, the registration of tuberculosis dating from 1893.

The influence of preventive measures is almost invariably earliest shown in the death rates in infants and young children, and this is especially to be looked for in such diseases as tuberculosis, for in the earlier periods of life the disease is likely to be more rapid and the, susceptibility greatest, while the exposure to home and house infection is the more pronounced.

The education of consumptives and their families as to the careful disposition of expectoration, the renovation and disinfection of apartments occupied by consumptives, and the removal of many consumptives to properly equipped institutions have accomplished this result. A moment's thought will show how much more exposed are the children in a consumptive's family in a tenement-house than are any of the other members of the family. The children are creeping on the floors soiled with expectoration; rubbing infected dust from all accessible places and quickly transferring it to their mouths, and are in close and intimate personal contact with the consumptive father or mother.

This table seems to me to have even more significance than the second, which shows a decrease of 40 per cent. in the total tubercular death rate since 1886, when this work was first undertaken by this Department. If we compute the value to the City of the lives saved each year we find that the economic gain to the City in this one disease alone equals at least ten times the total expenditure of the City for the maintenance of the Department of Health and its work. It is estimated that the value of every life on the average in this country is not less than $2,000; the cost of each life to the community at 20 years of age is at least this amount. The 6,000 deaths from tuberculosis saved during the last year as compared with the number which would have occurred had the death rate been the same as it was in 1886, means the saving to the City of lives worth twelve millions of dollars. If we add to this sum the cost of the sickness and the loss of the services and wages of these persons during the long illness, averaging at least six months, we have an additional cost of at least $300, making $1,800,000 more, or a total saving to the City during 1902, as compared with 1886, in the reduction of tubercular deaths of nearly $14,000,000. The total appropriation made by the Board of Estimate for the maintenance of the Department of Health for the year 1902 was $984,391.48.

There can be no question, I believe, as to the fact that no expenditure made by a nation, city or community brings such large returns to the community in health, happiness and prosperity as that made for the conduct of its sanitary affairs. These expenditures bring returns not of three or five or even ten per cent., but of one hundred, five hundred and one thousand per cent.

Respectfuly submitted,

HERMANN M. BIGGS, Medical Officer.

TABLE I.

Deaths from Pulmonary Tuberculosis and Tubercular Meningitis 0-15 Years, Old City of New York, 1892-1902.

		0–5.	5-10.	10–15	Total Under 15	Total Both Under 15	Death Rate per 1,000 Entire Population.
1892	Tubercular meningitis	541	50	14	605	858	0.50
	Pulmonary tuberculosis	158	39	56	253		
1893	Tubercular meningitis	542	54	11	607	866	0.49
	Pulmonary tuberculosis	157	34	68	259		
1894	Tubercular meningitis	522	63	13	598	808	0.45
	Pulmonary tuberculosis	128	32	50	210		
1895	Tubercular meningitis	526	43	16	585	824	0.44
	Pulmonary tuberculosis	165	24	50	239		
1896	Tubercular meningitis	454	45	12	511	711	0.37
	Pulmonary tuberculosis	120	32	48	200		
1897	Tubercular meningitis	462	47	8	517	714	0.37
	Pulmonary tuberculosis	128	25	44	197		
1898	Tubercular meningitis	481	49	10	540	716	0.36
	Pulmonary tuberculosis	100	31	45	176		
1899	Tubercular meningitis	475	45	12	532	758	0.38
	Pulmonary tuberculosis	143	28	55	226		
1900	Tubercular meningitis	447	57	18	522	715	0.35
	Pulmonary tuberculosis	116	35	42	193		
1901	Tubercular meningitis	392	49	16	457	657	0.31
	Pulmonary tuberculosis	117	28	55	200		
1902	Tubercular meningitis	400	59	14	473	634	0.206
	Pulmonary tuberculosis	88	26	47	161		

TABLE II.

In 1881 the death rate in New York City from pulmonary tuberculosis per 1,000 inhabitants was 4.27. As shown in the following table it has steadily fallen since then, until in 1902, it was only 2.29 per 1,000, a reduction of over 45 per cent. In other words, in 1881, with a population of 1,244,511 there were 5,312 deaths from pulmonary tuberculosis, while in 1902, when the population had increased to 2.139,000, there were only 4,893 deaths from this disease—418 less than 21 years previously, although the population had increased more than 700,000.

Table Giving Death Rate, Number of Deaths, and Other Data Concerning Tuberculosis in the City of New York from 1881 to 1892.

I.—MANHATTAN AND THE BRONX.

YEAR.	General Population.	Total Deaths All Causes.	General Death Rate.	Total Tuberc. Deaths.	Death Rate All Tuberc.	Deaths Phthisis.	Deaths Other Tuberc.	Per Cent. of Tuberc. on Total Deaths.	Death Rate Phthisis.	Total No. Cases Tuberc. Reported inc. Duplicates.	Duplicates.	No. Spec. Sputum Exam.
1881	1,244,511	38,624	31.04	6,133	4.92	5,312	811	15.85	4.27			
1882	1,280,857	37,924	29.61	6,052	4.72	5,247	805	15.96	4.10			
1883	1,318,264	34,011	25.80	5,943	4.51	5,290	653	17.47	4.01			
1884	1,356,764	35,034	25.82	6,039	4.45	5,235	804	17.28	3.86			
1885	1.396,388	35,682	25.55	5,945	4.26	5,196	749	16.66	3.72			
1886	1,437,170	37,351	25.99	6,349	4.42	5,477	872	16.99	3.81			
1887	1,479,143	38,933	26.32	6,007	4.06	5,260	747	15.43	3.56			
1888	1,522,341	40,175	26.39	6,073	3.99	5,260	813	15.12	3.46			
1889	1,566,801	39,679	25.32	6,041	3.86	5,179	862	15.22	3.30			
1890	1,612,559	40,103	24.87	6,409	3.97	5,492	917	15.98	3.41			
1891	1,659,654	43,659	26 31	6,109	3.56	5,160	949	13.99	3.11			
1892	1,708,124	44,329	25.95	6,061	3.55	5,033	1,028	13.67	2.95			
1893	1,758,010	44,486	25.30	6,163	3.51	5,124	1,039	13.85	2.91			
1894	1,809 353	41,175	22.76	5,720	3.16	4,658	1,062	13.89	2.57	4,166		511
1895	1,873,201	44,420	23.18	6,283	3.35	5,205	1,078	14.47	2.78	5,824		1,147
1896	1,906,139	41,622	21.84	5,926	3.11	4,994	932	14.24	2.62	8,334		1,856
1897	1,940,553	38,877	20.03	5,791	2.98	4,843	948	14.89	2.50	9,735		2,703
1898	1,976,527	40,438	20.46	5,901	2.99	4,957	944	14.59	2.51	10,798	2,239	2,920
1899	2,014,330	39,911	19.81	6,209	3.08	5,238	971	15.56	2.60	10,484	2,472	3,115
1900	2,053,979	43,227	21.04	6,179	3.01	5,278	901	14.29	2.57	9,639	2,436	3,512
1901	2,095,686	43,307	20.66	6,049	2.89	5,233	816	13.97	2.50	12,135	3,005	4,397
1902	2,139,632	41,704	19.49	5,744	2.68	4,893	851	13.77	2.29	13,383	3,738	4,631

II.—GREATER NEW YORK.

YEAR.	General Population.	Total Deaths All Causes.	General Death Rate.	Total Tuberc. Deaths.	Death Rate All Tuberc.	Deaths Phthisis.	Deaths Other Tuberc.	Per Cent. of Tuberc. on Total Deaths.	Death Rate Phthisis.	Total No. Cases Tuberc. Reported inc. Duplicates.	Duplicates.	No. Spec. Sputum Exam.
1898	3,272,418	66,224	20 26	9,265	2.69	7,724	1,541	13.97	2.25			3,945
1899	3,356,722	65,344	19.47	9,575	2.70	8,016	1,559	14.65	2.26			4,500
1900	3,444,675	70,872	20.57	9,630	2.80	8,154	1,476	13.59	2.37	14,433	2.456	5,289
1901	3,536,517	70,717	20.00	9,389	2.65	8,135	1,254	13.28	2.30	17,588	4,191	6,744
1902	3,632,501	68,112	18.75	8,883	2.45	7,571	1.312	13.44	2.08	16,614	4.268	7,820

DEPARTMENT OF HEALTH—CITY OF NEW YORK,
SOUTHWEST COR. 6TH AVENUE AND 55TH STREET, BOROUGH OF MANHATTAN,
NEW YORK, December 31, 1902.

Hon. ERNST J. LEDERLE, *President, Board of Health, and Chairman of the Finance Committee:*

SIR—Agreeable to your instructions, I submit herewith a report of the work done in the office of the Clerk of Accounts and Supplies during the year 1902.

So far as can be ascertained, no regular report has ever been made by the clerk in charge of this office since its organization as a distinct branch of the service. A brief resumé of the history of its establishment and of the work performed is therefore appended.

ORIGIN OF THE OFFICE.

In March, 1866, under the provisions of chapter 74 of the laws of that year, the Board of Health of the Metropolitan Sanitary District of the City of New York was organized, succeeding what was formerly known as the City Inspector's Office. It is interesting to note that this Board had jurisdiction over much the same territory as that covered by the present City of New York. The Metropolitan Sanitary District, so called, covered the counties of New York, Kings, Westchester and Richmond and the towns of Newtown, Flushing and Jamaica, in the County of Queens. The regulation of the finances of this Board was intrusted to one of the Commissioners, who was designated as Treasurer. The actual recording of the transactions was done by a clerk assigned to the Treasurer, known as the Treasurer's bookkeeper. Some thirty-two pages of the annual report of the Board of Health for the year 1866 are devoted to the Treasurer's report. These reports continue to appear in the annual reports up to 1871. From that point on there is nothing in the annual reports in relation to the finances, except the bare statement of the appropriations awarded to the Department by the Board of Estimate and Apportionment, and, in some instances, a table showing in the aggregate the expenditures from the different funds.

In the report for the year 1866 appears the following interesting paragraph:

> "Your attention is respectfully called to the annexed report of the Treasurer of this Board, from which it appears that the total amount expended in the Metropolitan Sanitary District, for general and extraordinary expenses, from its organization in March to November, 1866, has been $178,633.91. Of this sum, $17,791.24 was expended at Seguine's Point for the purpose of providing proper quarters for well persons arriving at this port upon vessels on which cholera and other contagious diseases had occurred. The amount of extraordinary expenses necessarily incurred in this district, in the presence of impending pestilence, and to prevent the development and spread of cholera, has been $95,696.91, leaving the ordinary expenses of the Board for a period of over eight months only $65,145.76. The strict economy with which the finances of the

Board have been managed is a fact which must gratify every taxpayer and every citizen interested in the proper government of the cities of this district."

No definite statement is made in this report as to the number of employees on the pay-rolls for the year 1866, but it appears to be approximately one hundred, a large number of whom were on duty only temporarily owing to the prevalence of an epidemic of cholera. The statement of the expenditures for the year contains some interesting items not now covered by this Department. The Department provided its own stationery and paid for its own printing, at a cost of $8,545. An item of advertising appears, amounting to $1,696. The sum of $4,005 was paid for "Supplies for Police"; street cleaning claims, $3,418.

Taking the Commissioner's statement just quoted above of the ordinary expenses of the Board, namely, $65,145.76, and deducting therefrom roughly items which are now paid from the funds of other Departments, it would appear that the cost, approximately, to take care of the health of the citizens living in the territory now covered by the present City of New York was at the rate of $75,000 per annum. In contrast to this, it took $984,391 in 1902. In the latter year the number of employees had reached, approximately, 1,000. In 1866 the Department did not control any hospitals for contagious diseases, excepting the temporary structures known as the "Battery Barracks" and the "Red House Hospitals" and two small buildings in different parts of Brooklyn, all of which were used for the treatment of the cholera cases, and which were abandoned on October 1 of that year, the epidemic having been suppressed.

In the year 1870 the Treasurer's office was abandoned and the work transferred to a committee of Commissioners, known as the Finance Committee. From that date to this the work of supervising the purchase of supplies and the keeping of the Department's accounts has been under the direct supervision of the Finance Committee, of which the President of the Board has always been the Chairman. The actual work of keeping the records has been "shunted" from one office to another, until the separation and establishment of the office of the Clerk of Accounts and Supplies, which took place in the year 1890.

In 1873 a new charter was passed by the Legislature. This charter abolished the Metropolitan Sanitary District and created a Health Department for New York City only. Under the rules of the Board of Health as thus constituted the work of keeping the accounts and purchasing the supplies was intrusted to the Secretary's office. The Finance Committee, however, was still responsible, as is shown by the following quotations from the rules of the Board:

> "Sec. 6. To the committee of finance shall be referred all questions in respect to salaries and the procuring of supplies; and it shall audit all bills and accounts, and report the same in detail monthly; and shall have supervision of the office of the secretary and the attorney.

"Sec. 22. No expense shall be incurred by any officer or employee of this board without the order of the board or the written approval of the department and one other member of the finance committee, and until the same has been entered upon the books of the secretary, and a written order issued therefor.

"Sec. 23. The pay-rolls of the officers and employees of this department shall be prepared monthly by the secretary, and when approved by the board shall be forwarded to the comptroller.

"Sec. 24. All necessary supplies for this department shall, when duly ordered, be purchased under the direction of the chairman of the finance committee, and as far as possible by contract."

As late as the year 1895, the entire work of recording the financial transactions of the Department, purchasing its supplies, drawing up the pay-rolls, and caring for its books, blanks and stationery, was looked after by the Clerk of Accounts and Supplies, with the assistance of an office boy. From that date the work of the Department increased very rapidly in all its branches, which meant increased work in this office.

In the latter part of the year 1894 the Department began the manufacture of Diphtheria Antitoxin. In the middle or latter part of the year 1895 arrangements were made to put this, together with the other products of the Department, including Vaccine Virus, on sale in certain drug stores throughout the city. The handling of these products and the keeping of the records of the accounts of these sales was at first done by the clerks attached to the laboratories. The work, however, soon grew to be too much for this force in addition to their other duties, and so the entire matter was placed under the control of the Clerk of Accounts and Supplies. In December, 1897, the number of employees in the office of Accounts and Supplies had increased to four. With the consolidation of the present Boroughs of Brooklyn, Queens and Richmond, and the former City of New York (now the Boroughs of Manhattan and The Bronx), the work in this office more than doubled. The force gradually increased until in the early part of 1902 there were fifteen employees in the office. During the year 1902 this number shrunk to twelve, at which point it remains at this date.

As constituted on December 31, 1902, the work of the office of Accounts and Supplies had grown to cover the following six distinct subjects:

1st. The keeping of the appropriation accounts, including the preparation of the annual estimate and the auditing of all bills for payment.

2d. The preparation of the pay-rolls.

3d. The purchase of all supplies.

4th. The care of the books, blanks and stationery required by the Department and the making of the annual and special requisitions therefor.

5th. The preparation of all contracts.

6th. The sale of the laboratory products and the keeping of the books of account therefor.

Appropriation Accounts.

A statement is appended to this report showing the appropriations awarded to the Department, so far as these are ascertainable, from the year 1866 to date. A statement is also attached showing in detail the appropriations for this Department for the year 1902. Scarcely another Department in the City Government has as many different funds in its appropriation as the Department of Health. Some 25,000 entries are made each year in the appropriation ledgers. These entries are checked annually with those in the Finance Department, and almost without exception they balance with the Comptroller's entries. Such differences as have arisen in the past, and during the year 1902 in particular, have been due in a large measure to deductions from bills made at the Finance Department, of which this Department had not been notified.

Special appropriations were made to the Department during the year by bond issues, notable among which was an issue of $425,000 of Corporate Stock for new buildings, and an issue of $75,000 of revenue bonds for repairs and alterations to the various buildings under the Department's control (statement of the amounts of the various bond issues is also appended). From the latter sum the Department was enabled to make some much-needed repairs to its office building at the corner of Fifty-fifth street and Sixth avenue, and to construct thereat a fireproof vault for its records of vital statistics.

Two annual estimates were called for during the year 1902; one in the early part of the year, to cover 1902 appropriations, and the other required on September 1, to cover 1903 appropriations.

An effort has been made to shorten the time formerly required to prepare bills for audit and payment at the Finance Department. The process is necessarily slow owing to the great number of hands through which bills must pass. A very distinct gain, however, has been accomplished, and there are bright prospects of still better work during the ensuing year.

A radical change was made in the method of keeping track of the liabilities of the Department, so that the condition of the appropriations might be readily ascertained from day to day. A book which purported to give this information, but from which it required the work of two clerks at least three days to collect the necessary data, was so revised that the same information can be obtained in five minutes' time. Other changes were made in the routine which greatly facilitated the work and made the net results clearer and better in every way.

PAY-ROLLS.

With nearly one thousand names on the pay-rolls, many of which are constantly shifting (especially in the hospital service), and with the roster of all employees to be prepared semi-annually, it now takes the time of one man to care for this branch of the work. A card index system was established some time in 1899, which gives on a separate card the record of each employee.

A number of bond issues for vaccinators and other temporary help increased the number of pay-rolls, so that for one month there were over twenty-five different rolls, carrying a varying number of names, from three to two hundred and twenty-five. The rolls as forwarded to the Finance Department were practically without exception found by the latter to be in proper form and without errors.

Blank checks are furnished by the paymaster's office, and it has been customary for a number of years to fill out these checks, transmitting them to the Finance Department, with the pay-rolls. Payments to the employees of the Willard Parker, Reception and Riverside Hospitals have always been made by cash. The paymaster issues one check for the full amount of each roll, which is cashed by the Department, and the money placed in pay envelopes, and the employees paid by the Chief Clerk or his assistant. This method was pursued at these institutions as the City paymaster objected to paying at the Contagious Disease Hospitals.

PURCHASE OF SUPPLIES.

A radical departure was made during the year in the method of purchasing supplies. Early in the year word was received from the Comptroller notifying the Department that supplies which were likely in the aggregate to exceed $1,000 must be purchased by contract. It had been the custom from the organization of the Department to buy all supplies, with the one exception of coal, in the open market. Steps were at once taken to prepare contracts covering all such supplies as were likely to exceed $1,000, and the latter part of June saw the first contract let, that being the one for milk. In more or less rapid succession followed the contracts for meat, fish, ice, bread, mineral waters, vegetables, fruits, groceries, drugs, chemicals, disinfectants, liquors and horse feed. Efforts were made to have the specifications drawn accurately and with such clearness that bidders could readily determine the character of the goods required. Where it was impracticable to draw the specification to explicitly describe the article required, samples were exhibited, and bidders were required to bid on goods equal to the sample. The opening of bids showed a lively competition for the Department's business. In preparing the specifications and in selecting the type samples the standards of the various articles were almost without exception raised to a point much above what the Department had been receiving. The contractors in making their deliveries pretty generally adhered to the specifications, and very little trouble was experienced from the delivery of inferior goods. The prices in almost every instance were as low, and in some instances lower, than the Department had previously been paying for a lower grade of goods.

The draughting of detailed specifications, and the fixing upon one price for a given time under the contract system, had the effect of largely eliminating one source of trouble which the Department had experienced in the purchase of its supplies. It was customary, prior to the adoption of the contract system, to request estimates from three or more firms every time a given commodity was required. The process was something like this: If the article should happen to be canned tomatoes, for instance, a request would be sent out for the required number of cases of "best" canned tomatoes. No size of can would be mentioned, and it was left to the imagination of the bidder as to what the term "best" meant. Bids would be received from A, B and C, respectively, at $1.50, $1.45 and $1.40 per dozen. In the course of a week or so another request would be sent to the same parties for the same commodity. A and B, mindful of C's previous price, and both anxious to get the business, bid lower. The bids come in, A's, $1.35; B's, $1.30; C's, $1.40. Again bids are called for, and A and C make an effort to get the business. A bids $1.25, B and C $1.30. The next time bids are called for A would bid $1.25, B $1.20 and C $1.15. So this would go on until there would be a strong complaint from one of the hospitals as to the grade of the goods. No effort had been made to see that the Department was really getting the best grade of goods and the proper size can. In one particular commodity by this method the price had been beaten down from 22 cents per pound to 8 cents per pound. It is needless to add that the quality went down with the price. This trouble has been largely obviated by the contract system.

Much valuable assistance was extended to the Department by business men in the various trades in giving advice as to the preparation of the specifications and in furnishing samples for the type standards.

In the purchase of miscellaneous supplies not under contract, determined efforts were made both to better the qualities and to decrease the cost. More general bidding was invited than had been in vogue during the years just preceding. This bidding was invited, wherever the case would warrant, from actual manufacturers of the various commodities, with the consequent saving of the middleman's profit. Where possible, the request for estimate was drawn more specifically, so that all bidders could obtain an intelligent idea of the qualities and sizes required, thus placing all bidders on an equal footing, with a consequent assurance of a good, fair competition. The goods delivered averaged better as to quality and cheaper as to price than in the preceding years.

During the year 1902, some 3,000 or more requisitions passed through this office, each requisition averaging at least five separate orders, making approximately 15,000 orders which were issued by the Clerk of Accounts and Supplies. In the first half of the year, before the adoption of the contract system, this meant the sending of at least two, and, in some instances, as many as five, requests for estimates for every order issued. Some idea of the vast amount of detail can be gathered from this statement.

BOOKS, BLANKS AND STATIONERY.

A change of administration, ushering in new ideas, new methods and new work, always means an increased number of blanks and books. Many changes were made in the existing forms in use, and numerous new blanks for use in new work were required during the year. The number of special requisitions sent to the City Record office was unprecedented, and the work of this particular branch of the office very much increased. Great trouble was experienced with the printing contractor over the deliveries on the annual contract. Many items were not delivered until December, which should have been delivered early in the year.

Great quantities of out-of-date blanks were culled from the store-room and were made into pads where practicable. Instances existed where certain blanks had been ordered, year in and year out, in large quantities, which were not being used. In one particular case the accumulation dated from as far back as the year 1890. These blanks were all destroyed. Steps have been taken to see that this waste is stopped.

Contracts.

Reference has been made in another part of this report to the fact that the method of purchasing a large proportion of the supplies had been changed from open orders to public bidding. This necessitated the draughting of the contracts and specifications. In the early part of the year this was done by a clerk in the Secretary's office, and later by the Assistant Chief Clerk in the Borough of Manhattan. In the latter part of the year all contract work was transferred to the office of the Clerk of Accounts and Supplies. In addition to the numerous supply contracts, which were drawn twice during the year, once for 1902 supplies, and again for 1903 supplies, an unusually large number of contracts for other purposes were drawn. In the expenditure of the new building fund of $425,000, and the repair fund of $75,000, already mentioned, a number of contracts were required to be drawn. Altogether some twenty-five or more contract forms were prepared, as against an average of five in the years preceding.

Sale of Laboratory Products.

Elsewhere mention is made of the fact that the sale of the various antitoxins and the vaccine virus manufactured by the Department was handled through the office of the Clerk of Accounts and Supplies. The Department had established, in certain drugstores throughout the city, regular stations for the sale of these products, which it still maintains. Diphtheria antitoxin is consigned, and the other antitoxins and vaccine virus are sold to these stations. Each station is required to keep an ample supply of fresh stock on hand, so that physicians and others may obtain the Department of Health's product within a few blocks of their residences, and within a few moments of the discovery of the need therefor. A laboratory assistant assigned to this office makes monthly visits to each of these stations, taking up the old stock and leaving new. He also acts as a collector, receiving the money due from the sale of the consigned antitoxin. During most of the year two collectors attended to this duty, but it was found that one could readily cover all the territory, and the other was consequently transferred to duty in another branch of the service. The cash receipts from the sale of antitoxin for 1902 were $20,534.54, and for vaccine virus, $11,481.12. In addition to the sales made through the regular consignment stations, the Department has been supplying the City of Chicago and other towns and individuals outside the limits of New York City. Provision has been made so that the deserving poor in this city may obtain these products when needed, free of cost. It is intended in this way to make the use of antitoxin as general as may be, in the hope that the consequent saving in lives in cases of diphtheria will be greatly increased. A system of so-called free-slips has been established. This consists of a blank on which the doctor attending the case certifies that payment for the antitoxin required in the particular case would be a hardship to the particular individuals interested. These slips are turned in to the drug stores where stations have been established, and are accepted by our collector in settlement of the antitoxin which has been delivered to the doctor signing the slips.

The books of account covering this branch of the Department's business have been in very bad condition. The Commissioners of Accounts had occasion to criticise very severely the manner in which they were kept, in a report made by them in January, 1901. At that time their experts balanced the books and gave the Department a clean, fresh start. About the middle of this year the Commissioners of Accounts again sent their examiners to go over these books, and they are still working on them.

Some changes have been made in the forms of the books, which have increased their effectiveness and at the same time materially decreased the amount of work on them. It is estimated that some changes, to be started January 1, 1903, will make it possible to post in sixty entries items that now take 3,500 or more postings in one month.

Pension Fund.

In addition to the distinct divisions in this office already mentioned might be added the care of the Department of Health Pension Fund and the keeping of the books of account therefor. This fund has now reached the sum of $113,459.81. The number of pensioners on the roll is now sixteen, with an annual expenditure of $12,158.34. The pension fund receives its accretions from the fees charged for searches and transcripts of the records of vital statistics and from the fines which are imposed by the courts for violations of the Sanitary Code. The income for the year 1902 was $29,281.85, and the net increase in the fund over and above the expenditures for the year was $17,123.51.

Conclusion.

While far from accomplishing all that is apparent could be done to improve the manner of conducting the financial end of the Department's business, a distinct gain has been made toward establishing the work on a good business basis. The office of the Clerk of Accounts and Supplies in the Department of Health is unique in the City administration. In other municipal departments there are bookkeepers, who keep the appropriation books and who do nothing else. There are pay-roll clerks, who draw up the pay-rolls and who do nothing else. There are bill clerks, a purchasing agent, stationery supply clerks, contract clerks, etc., each in offices by themselves, and each in charge of their respective duties, and who are responsible only for the particular branch of the service to which they are assigned. In this Department, however, all these things are combined in the office of the Clerk of Accounts and Supplies. The detail work is very large, and, in closing this report, it is only proper that special mention should be made of those employees in the office who so ably seconded the efforts to better the service and to improve the condition of the work of the office in all its branches.

Respectfully submitted,

F. D. BELL,

Clerk of Accounts and Supplies.

A Statement of the Expenditures and Appropriations from 1866 *to Date is Here Given.*

1866.	Expenditures (8 months)	$178.633 91
1867.	"	180.395 13
1868.	"	163.834 50
1869.	"	182.258 24
1870.	"	169.478 27
1871.	"	194.976 54
1872.	(Amount not stated.)	
1873.	"	163.381 23
1874.	"	215.885 84
1875.	"	242.250 00
1876 to 1888.	Amounts not given in the Annual Reports.	
1889.	Appropriation	413.600 00
1890.	"	394.426 50
1891.	"	402.615 88
1892.	"	452.111 61
1893.	"	566.427 56
1894.	"	458.645 17

1895.	Appropriation		$495,830 25
1896.	"		536,052 52
1897.	"		581,358 00
1898.	"	(Consolidation)	958,496 50
1899.	"		1,110,538 49
1900.	"		1,055,515 00
1901.	"		1,053,990 00
1902.	"		984,391 48

APPROPRIATIONS, 1902.

Title.		
Board and Secretary		$42,026 00

BOROUGH OF MANHATTAN.

Supplies and Contingencies	$20,000 00	
Hospital Fund	36,953 56	
Disinfection	26,880 00	
Salaries	239,400 00	
Bacteriological Laboratory	49,796 00	
Salaries, Medical School Inspection	48,820 00	
Law Expenses, Marshal's Fees	500 00	
Removal of Night Soil, etc	30,000 00	
Sanitary Police	20,999 60	
Volunteer Life Saving Corps	1,000 00	
		474,349 16

BOROUGH OF THE BRONX.

Supplies and Contingencies	$2,750 00	
Hospital Fund	30,000 00	
Disinfection	1,500 00	
Salaries	61,600 00	
Salaries, Medical School Inspection	6,000 00	
Removal of Night Soil, etc	11,850 00	
Sanitary Police	4,666 64	
		118,366 64

BOROUGH OF BROOKLYN.

Supplies and Contingencies	$10,000 00	
Hospital Fund	23,500 00	
Disinfection	9,200 00	
Salaries	144,000 00	
Salaries, Medical School Inspection	14,000 00	

Title.		
Law Expenses, Marshal's Fees	$1,000 00	
Support of Ambulance Service	20,600 00	
Removal of Night Soil, etc	20,000 00	
Sanitary Police	13,099 76	
		$255,399 76

BOROUGH OF QUEENS.

Supplies and Contingencies	$2,000 00	
Hospital Fund	1,000 00	
Disinfection	2,500 00	
Salaries	23,600 00	
Salaries, Medical School Inspection	2,000 00	
Support of Ambulance Service	2,400 00	
Removal of Night Soil, etc	14,950 00	
Sanitary Police	3,266 64	
		51,716 64

BOROUGH OF RICHMOND.

Supplies and Contingencies	$1,500 00	
Hospital Fund	1,000 00	
Disinfection	2,000 00	
Salaries	27,200 00	
Salaries, Medical School Inspection	2,000 00	
Removal of Night Soil, etc	6,500 00	
Sanitary Police	2,333 28	
		42,533 28

Total Revised Appropriation, 1902 .... $984,391 48

REVENUE BOND FUNDS, 1902.

DATE.		FOR	AMOUNT.
1902.			
Jan.	21	Vaccinators	$30,000 00
"	21	Disinfection and Fumigation	25,000 00
Mar.	21	Vaccinators	30,000 00
Feb.	7	Destruction of Cattle	67 50
May	16	Destruction of Cattle	320 00

DATE.		FOR		AMOUNT.
1902.				
May	16	Destruction of Cattle		$90 00
"	23	Destruction of Cattle		22 50
June	6	Medical Inspection (Summer Corps)		25,000 00
July	18	Necessary Expenses for Preserving the Health of the City, for use of Contagious Disease Hospitals	Manhattan	10,000 00
			The Bronx	15,000 00
			Brooklyn	12,000 00
"	18	Destruction of Cattle		50 00
Aug.	21	Destruction of Cattle		22 50
Dec.	19	Destruction of Cattle		90 00
July	11	Special Revenue Bond, Alterations, Repairs, etc., to Buildings and Steamboat "Franklin Edson." Consolidated December 26		75,000 00
Nov.	7	Vaccinators		20,000 00
		Total		$242,662 50

Corporate Stock, 1902.

1902.			
June	6	New Buildings	$425,000 00

Department of Health—City of New York,
Southwest Cor. 6th Avenue and 55th Street, Borough of Manhattan,
New York, December 31, 1902.

To the Secretary of the Board of Health, of the Department of Health, of the City of New York:

Dear Sir—I have the honor to respectfully present the following report of work performed pursuant to your orders and under my personal supervision and direction during the year 1902, which includes the proper indexing and filing of all applications, reports and communications presented to the Board of Health for consideration, and the action thereon; the recording of the minutes of said Board and all necessary detail work in connection therewith; the issuing of "Notices of the Board," requiring the abatement of nuisances, upon facts and evidence contained in the written reports of personal inspections made by the Sanitary Inspectors of the Department;

the issuing of the necessary written orders authorizing the Assistant Registrar of Records to make searches and furnish transcripts of the records of births, marriages and deaths on file in this Department, and attending to all correspondence pertaining thereto; the receiving of all fees for same, and the proper authentication of said transcripts under the seal of the Board; the receipt and distribution each day of all official mail addressed to the Department, and the mailing of all official correspondence; the general supervision of the telephone service, and the care and maintenance of the building occupied by the Department, located at the southwest corner of Fifty-fifth street and Sixth avenue, including the help necessary to maintain the premises in a proper and suitable condition.

Official Reports, Communications and Applications.

Reports, communications and applications are presented to the Board through the Secretary, for consideration and final action; they are numbered and filed numerically, and are indexed alphabetically under the subject matter, by means of the card system. The minutes of the Board and all applications for permits are indexed and filed in the same manner.

The following is a summary of the reports, communications and applications considered by the Board of Health:

Special reports and communications presented to the Board for action	516
Premises declared a public nuisance	135
Premises ordered vacated	119
Premises overcrowded	60
Miscellaneous permits granted by the Board	950
Lodging-house permits granted	162
Cow permits granted	104
Mercantile permits granted	162
Applications for permits denied by the Board	852
Registration certificates issued to Master Plumbers	878

Notices of the Board.

During the year ending December 31, 1902, the number of notices issued by the Board was 33,044. These notices call the attention of owners, lessees and agents to violations of the Sanitary Code in each case, and require the necessary alteration, repairs, cleaning and improvement of the premises named within five days from the receipt of the notice. If, upon reinspection, it is found that the requirements of the notice have not been complied with, a suit for penalty is commenced against the delinquents under section 82, chapter 355, Laws of 1873.

The following is a summary of the number of notices of the Board issued in the respective boroughs:

Borough of Manhattan	20,679
" Brooklyn	6,202
" The Bronx	2,773
" Queens	1,927
" Richmond	1,463
Total	33,044

The subject-matter of the notices of the Board above referred to are as follows:

Alleys cleaned, disinfected, graded, paved, connected with sewer.

Air-shafts cleaned, disinfected, graded, paved, connected with sewer.

Apartments cleaned, disinfected or ventilated.

Areas connected with sewer, cleaned, disinfected, pavements of graded and repaired.

Balusters of stairs repaired.

Basements cleaned and disinfected.

Business of lard-rendering, slaughtering, gut cleaning, fat rendering, storing bones, manufacturing fertilizers, smoking sausages or storing rags discontinued.

Buildings cleaned or inclosed.

Ceilings cleaned, whitewashed or repaired.

Cellars cleaned, made water-tight, cemented, connected with sewer, ceilings plastered, doors repaired.

Cellars vacated as places of living or sleeping.

Cesspools disinfected, emptied, cleaned, filled, constructed, repaired or covered.

Chimneys repaired, extended, cleaned or obstructions removed.

Cisterns disinfected, emptied, cleaned, covered or provided.

Clothes-poles reset.

Coops cleaned, disinfected or removed.

Cows removed.

Dogs removed.

Drains cleaned, constructed, covered, repaired, removed, obstructions in removed, or connected with sewer.

Excavations cleaned, repaired, relaid, graded or connected with sewer.

Fences repaired or constructed.

Fire escapes cleaned or obstructions removed.

Fixtures trapped and waste pipes therefrom connected on outlet side of water-closet traps.

Flashings provided over woodwork or sinks.

Floors cleaned, repaired, relaid, graded, cemented or connected with sewer.

Fowls removed.

Gas mains and pipes repaired and gas provided in dark halls and rooms.

Garbage and ash receptacles provided, removed, cleaned and disinfected.

Gutters (house or street) provided, repaired, cleaned, disinfected, obstructions in removed, connected with street sewer, street gutter or cesspool.

Halls cleaned and filthy or defective floor coverings removed.

House drains provided with running traps and fresh-air inlets.

Hydrants repaired, constructed or removed.

Housekeepers provided for tenements.

Ice-boxes connected with properly trapped, water-supplied open sinks.

Joints closed or calked with lead.

Leaders repaired, provided, extended, adjusted, connected with sewer, street, gutter or privy vault.

Lodging-houses discontinued.

Lots (vacant) cleaned, disinfected, inclosed, filled, graded, connected with sewer or street gutters.

Manure vaults, boxes or receptacles disinfected, emptied, cleaned, covered, filled, constructed or lined.

Manholes covered and repaired or removed.

Offensive trades and business discontinued or removed.

Pigeons removed.

Pipe (soil, supply, vent, waste, sewer or iron) provided.

Pipe (soil, waste or supply) repaired, trapped, removed, extended, graded, cemented, ventilated, or repaired, and openings closed and obstructions removed.

Privy vaults disinfected, emptied, cleaned, ventilated, lined with brick, repaired, cemented, constructed, filled or removed.

Privy houses cleaned, disinfected, repaired, constructed, removed, adjusted to vaults or seats of provided with cover.

Pumps provided or repaired.

Rabbits removed

Railings provided or repaired.

Roofs repaired or cleaned and roof bulkheads repaired.

Roof tanks provided, cleaned or covered.

School-sinks provided, cleaned or repaired.

Sewer pipes provided, repaired, obstructions in removed, trapped or openings inclosed.

Sinks provided, repaired, cleaned, removed, flushed, connected with street sewer or street gutters.

Sidewalks cleaned, repaired, graded, flagged or obstructions in removed.

Skylights repaired and provided.

Slaughter-houses cleaned, repaired or connected with sewer.

Smoke pipes extended or repaired.

Soil pipes discontinued as rain leaders.

Spaces cleaned, disinfected, graded, cemented, filled or connected with sewer.

Stables cleaned, removed, repaired or connected with street sewer.

Stagnant water removed.

Stairways cleaned or repaired.

Trees removed.

Urinals cleaned, disinfected, repaired, flushed, connected with sewer, removed or floor covered with zinc.

Walls cleaned, whitewashed or repaired.

Wash roofs repaired.

Wash trays trapped, provided.

Water-closets repaired, cleaned, disinfected, flushed, constructed, ventilated or connected with street sewer.

Water-closet pans adjusted to preserve water-seal, bowls burnt out and retarred. cisterns provided, window-sashes repaired and glazed.

Yards cleaned, disinfected, filled, graded, paved, grade of pavements repaired, relaid in cement or connected with street sewer.

Transcripts.

Applicants for searches and transcripts of the records of births, marriages and deaths on file in the Bureau of Records are required to satisfy this Department that the information desired is to be used for a proper purpose, and are then granted, upon payment of the prescribed fee, a written order signed by the Assistant Chief Clerk, and issued to the Assistant Registrar of Records, authorizing the search and issuance of a transcript of the record which, in accordance with the regulations of the Board is authenticated by affixing the seal of the Board of Health, and attested by the signature of the Assistant Chief Clerk. Where search is made, and the record is not found to be on file, an official certificate is issued to that effect.

The following is a summary of fees received for searches and transcripts of the records of births, marriages and deaths in the respective boroughs, and deposited to the account of the "Health Department Pension Fund":

Borough of Manhattan	$8,580.60
Borough of Brooklyn	3,333.50
* Borough of The Bronx	293.20
Borough of Queens	292.20
Borough of Richmond	108.30
Total	$12,607.80

* From June 23, 1902.

Official Mail-Matter.

The first delivery of the mail of the Department is received each day not later than 8.45 A. M., and is at once assorted and referred to the different divisions.

All letters addressed to the Department of Health are opened and carefully scrutinized. Communications requiring an answer, and all complaints received within the jurisdiction of this Department, giving the name and address of the author, are promptly acknowledged. Complaints received requiring the attention of other City Departments are immediately forwarded.

The same routine follows the receipt of each mail during the day. The last delivery is received at 3.45 P. M. each day, except Saturday, when it is received at 11.45 A. M.

The regulations of the Department require that all official correspondence be delivered to this office for mailing not later than 3.30 P. M. each day except Saturday, when it must be received not later than 11.30 A. M.

Mail received from the various divisions is not allowed to accumulate, but is mailed at intervals during the day.

A careful and accurate account of postage stamps, postal cards, and wrappers purchased for the use of the Department, together with a daily record of the amount used by the respective divisions in the transaction of the business of the Department, is kept in this office.

Telephone Service.

The Department is equipped with a telephone switchboard service connecting with the main office of the various divisions, and also a direct wire to the desk of each chief of the division, thus insuring to the public prompt and efficient service at all times.

Owing to an increase in the telephonic communications received by this Department, it has been found necessary to establish an all-night service and to require the services of two telephone switchboard operators from 8 A. M. to 5 P. M. each day except legal holidays, when direct wires to the Division of Contagious Diseases are used, that office being always open for the transaction of public business both day and night.

Department Building, Southwest Corner 55th Street and 6th Avenue.

The help necessary to maintain the above premises in a proper and suitable condition consists of a uniformed force of twenty-three (23) employees, eighteen (18) of whom are under the direct supervision of a Foreman of Laborers, who is held responsible for the sanitary condition of the building, and the work performed by those under his control.

The work is divided as follows :

WATCHMEN.

Two (2) watchmen patrol the building from 3 P. M. to 6 A. M. They make a tour of each floor in the building every two hours and wind the electric indicators stationed thereat, which register the exact time of each visit. They are also required to attend to the elevator and front door, and are held responsible for the safety of the building during their respective tours of duty.

ELEVATOR ATTENDANTS.

Two (2) elevator attendants have alternate tours of duty, begining at 6.30 A. M. and ending at 6 P. M., changing at noon each day.

CLEANERS (MALE AND FEMALE).

The female cleaners, nine (9) in number, work from 6 A. M. to 9 A. M. daily; while the male cleaners, five (5) in number, are employed from 6 A. M. to 12 M. each day.

ENGINEER'S DEPARTMENT.

The Engineer has complete charge of the boilers, steam plant, heating and electrical apparatus of the building, and is required to make all necessary repairs; to examine and keep in proper working order the fire apparatus, including the filling of the roof water tanks, and to maintain at all times a working pressure of fifty (50) pounds of steam for pumping purposes, as a protection against fire.

He is directly responsible for all matters pertaining to his branch of the service, and for the work performed by each of the three firemen under his control, who are required to work in alternate daily shifts of eight hours each.

OFFICE FORCE.

The office force reports each day at 9 A. M., and each one is required to finish the duties assigned to them before leaving for the day, irrespective of the official office hours; thus insuring strict attention to the work of the Department, and resulting in prompt transaction of the business relating to this office.

In forwarding this report I desire to express my high appreciation of the faithful and efficient service of the clerks and employees attached to this office, and the fact that their capacity, devotion to duty and interest in the work of the Department has greatly aided me in the management of this branch of the service.

Respectfully submitted,

JAMES McC. MILLER,
Assistant Chief Clerk

Office of the Assistant Corporation Counsel for the Boroughs of Manhattan, Brooklyn, The Bronx, Queens, and Richmond.

BOROUGH OF MANHATTAN.

Orders received from the Board of Health for prosecution	9,144
Notices of intention to commence action issued	9,144
Nuisances abated after issuance and service of notice	8,398
Civil actions commenced to recover penalties	1,522
Civil actions pending last year	383
Judgments recovered in Municipal Courts in favor of the Department of Health	84
Judgments vacated and set aside by order of the Court	58
Civil actions discontinued upon request of the Board of Health	1,714
Civil actions discontinued on orders transferred to Tenement House Department	87
Civil actions now pending year ending December 31, 1902	78
Executions issued	39
Judgments collected	5
Amount of costs, penalties, and judgments collected in civil actions and paid to Secretary of Board	$1,739
Criminal actions pending last year	274
Criminal actions commenced for violation of Sanitary Code	868
Defendants held for trial	587
Defendants convicted by Magistrates	130
Defendants discharged by Magistrates	151
Judgments of conviction in Court of Special Sessions	771
Judgments of acquittal in Court of Special Sessions	78
Criminal actions now pending year ending December 31, 1902	12
Amount of fines imposed by Court of Special Sessions, upon conviction	$12,954
Amount of fines imposed by City Magistrates	$275
Appeals by the Department	2
Appeals by the defendants	2
Appeals discontinued in favor of Department	1
Appeals now pending	3

BOROUGH OF THE BRONX.

Orders received from the Board of Health for prosecution	1,374
Notices of intention to commence action issued	1,374
Nuisances abated after issuance and service of notice	1,010
Civil actions commenced to recover penalties	292

Civil actions pending last year	43
Judgments recovered in Municipal Courts in favor of the Department of Health	18
Judgments vacated and set aside by order of the Court	5
Civil actions discontinued upon request of the Board of Health	289
Civil actions now pending, year ending December 31, 1902	33
Executions issued	1
Amount of fines imposed by Court of Special Sessions upon conviction	$25

BOROUGH OF BROOKLYN.

Orders received from the Board of Health for prosecution	1,844
Notices of intention to commence action issued	1,550
Nuisances abated after issuance and service of notice	469
Criminal actions commenced for violation of Sanitary Code	267
Defendants held for trial	170
Defendants convicted by Magistrates	9
Defendants discharged by Magistrates	87
Judgments of conviction in Court of Special Sessions	144
Judgments of acquittal in Court of Special Sessions	13
Criminal actions now pending year ending December 31, 1902	14
Amount of fines imposed by Court of Special Sessions upon conviction	$2.700

BOROUGH OF QUEENS.

Orders received from the Board of Health for prosecution	712
Notices of intention to commence action issued	435
Nuisances abated after issuance and service of notice	337
Civil actions pending last year	4
Civil actions discontinued upon request of the Board of Health	2
Judgments collected	2
Amount of costs, penalties and judgments collected in civil actions and paid to Secretary of Board	$20
Criminal actions commenced for violation of Sanitary Code	38
Defendants held for trial	36
Defendants discharged by Magistrates	2
Judgments of conviction in Court of Special Sessions	27
Judgments of acquittal in Court of Special Sessions	8
Criminal actions now pending year ending December 31, 1902	1
Amount of fines imposed by Court of Special Sessions upon conviction	$1,405

BOROUGH OF RICHMOND.

Orders received from the Board of Health for prosecution	233
Notices of intention to commence action issued	233
Nuisances abated after issuance and service of notice	90
Civil actions commenced to recover penalties	68
Judgments recovered in Municipal Court in favor of the Department of Health	1
Civil actions discontinued upon request of the Board of Health	51
Civil actions now pending, year ending December 31, 1902	10

SANITARY BUREAU.

Department of Health,
Sixth Avenue and Fifty-fifth Street,
New York, December 31, 1902.

To the Honorable Board of Health:

Sirs—I have the honor to submit the report of the work performed in the Sanitary Bureau during the year 1902.

The Sanitary Bureau of the Department of Health is under the charge of the Sanitary Superintendent, assisted by five Assistant Sanitary Superintendents, one in charge of each borough.

Frederick H. Dillingham, M. D., in charge of the Borough of Manhattan.

Joseph H. Raymond, M. D., in charge of the Borough of Brooklyn.

Edward F. Hurd, M. D., in charge of the Borough of The Bronx.

Samuel Hendrickson, M. D., in charge of the Borough of Queens.

John T. Sprague, M. D., in charge of the Borough of Richmond.

The Sanitary Bureau is charged with the duty of inspecting and reporting, in proper form, all nuisances or causes of danger to the public health; with the execution of orders of the Board; with the care of contagious diseases; with the inspection of foods and offensive trades; with the inspection of mercantile establishments and issuance of employment certificates; with the pathological, bacteriological and chemical research and investigations, and with the inspection of scholars attending the public, parochial and private schools.

The number of inspections and reinspections made was 1,276,842, classified as follows:

By the Division of Inspections	996,709
By the Division of Contagious Diseases	259,032
By the Division of Bacteriology	21,101
Total	1,276,842

The number of complaints returned was 41,229, classified as follows:

By the Division of Inspections	39,722
By the Division of Contagious Diseases	188
By the Division of Bacteriology	1,319
Total	41,229

The number of complaints received from citizens was 37,440, all of which were referred to the Sanitary Inspectors and the Sanitary Police for investigation and report.

The Sanitary Superintendent, during the same period, under instructions and authority of the Board, granted 4,395 permits to discharge cargoes, under proper vouchers from the Health Officer of the Port, and 11,856 miscellaneous permits, under the Sanitary Code.

The following tabulated statement and summary shows the date, location, cause of action and the result of vacation of premises by the Board of Health, in compliance with the requirements of sections 1176 and 1299 of the New York City Consolidation Act of 1901:

Borough of Manhattan.

No.	Date.	Location.	Cause.	Result.
1	Mar. 5	1903 Second avenue	Defective plumbing and defective drainage	Complied June 26.
2	" 5	157 East 112th street	Defective drainage	" Mar. 14.
3	" 5	120 Manhattan street	"	Vacated Mar. 13; complied May 13.
4	" 12	135 Delancey street	"	Complied Mar. 26.
5	" 19	121 Bowery	Defective plumbing	" Apr. 16.
6	" 26	151 Ludlow street	Defective plumbing and defective drainage	" Apr. 12.
7	" 26	227 East 44th street	Public nuisance	Vacated Mar. 27; complied Apr. 26.
8	Apr. 2	94½ Essex street	Defective drainage	Complied Apr. 12.
9	" 2	241 West 17th street	"	" " 19.
10	" 2	313 East 23d street	"	" " 26.
11	" 2	647 West 152d street	Defective plumbing and defective drainage	" " 12.
12	" 9	24 Orchard street	Defective drainage	" " 16.
13	" 9	84 Allen street	"	" " 16.
14	" 30	418 West 16th street	Defective plumbing	" May 5.
15	June 11	88 Ludlow street	Defective plumbing and defective drainage	" July 19.
16	" 18	Manhattan "L" Railway	Public nuisance	Work progressing.
17	July 2	79 West 104th street	Defective plumbing	Complied July 21.
18	" 16	34th street Crosstown R.R.	Public nuisance	Work progressing.

No.	Date.	Location.	Cause.	Result.
19	July 23	207 West 19th street	Defective drainage	Complied Aug. 1.
20	" 23	94 Lexington avenue	Defective drainage and defective plumbing	" " 8.
21	" 23	236 West 10th street	Nuisance	" July 30.
22	" 23	238 West 10th street	"	" " 30.
23	" 30	557 West 140th street	Public nuisance	Vacated Aug. 10.
24	Aug. 20	31 West 140th street	Defective drainage	" Sept. 8.
25	" 20	33 West 140th street	"	" " 8.
26	" 20	35 West 140th street	"	" " 8.
27	" 20	37 West 140th street	"	" " 8.
28	" 20	39 West 140th street	"	" " 8.
29	" 20	430 East 102d street	Public nuisance	Vacated Aug. 30; complied Sept. 23.
30	" 20	561 West 57th street	Defective plumbing	Work progressing.
31	" 27	238 East 20th street	Public nuisance	Complied Sept. 19.
32	" 27	78 Mulberry street (rear)	"	" Oct. 3.
33	" 27	80 Mulberry street (rear)	"	" " 3.
34	" 27	78 Mulberry street (front)	Defective plumbing and defective drainage	" " 3.
35	" 27	80 Mulberry street (front	Defective plumbing	" " 3.
36	" 27	261 West 54th street	Defective drainage	" " 1.
37	Sept. 3	415 East 101st street	"	" Sept. 29.
38	" 3	171 West 98th street	"	" " 17.
39	" 3	345 East 57th street	Public nuisance	Vacated Sept. 10; complied Dec. 15.
40	" 3	347 East 57th street	"	Vacated Sept. 10; complied Dec. 15.
41	" 3	349 East 57th street	"	Vacated Sept. 10; complied Dec. 15.
42	" 3	351 East 57th street	"	Vacated Sept. 10; complied Dec. 15.
43	" 3	353 East 57th street	"	Vacated Sept. 10; complied Dec. 15.
44	" 3	390 East 4th street	Defective plumbing and defective drainage	Complied Sept. 8.
45	" 3	177 Monroe street	Public nuisance	" Oct. 24.
46	" 33	179 Monroe street	"	" " 24.
47	" 10	248 West 29th street	Defective plumbing	" " 4.
48	" 10	South east corner of 33d street and 8th avenue	Defective drainage	" Sept. 27.
49	" 17	835 Eleventh avenue	Defective plumbing	" " 24.
50	" 17	833 Eleventh avenue	"	" " 25.
51	" 17	831 Eleventh avenue	"	" " 25.
52	" 17	643 West 42d street	Nuisance	" " 25.
53	" 17	645 West 42d street	"	" " 24.
54	Oct. 1	9 Hester street	Defective drainage	" Oct. 13.
55	" 1	11 Hester street	"	" " 13.
56	" 1	415 East 101st street	Public nuisance	" " 23.

No.	Date.	Location.	Cause.	Result.
57	Oct. 8	212 East 24th street	Public nuisance	Complied Nov. 1.
58	" 8	155 East 27th street	Defective plumbing and defective drainage	" Oct. 28.
59	" 8	549 East 52d street	Defective plumbing	" " 16.
60	" 22	659 Sixth avenue	Defective drainage	" Dec. 13.
61	" 29	130 West 25th street	Public nuisance	Vacated Sept. 10.
62	Nov. 28	11 Ludlow street (front)	Defective plumbing and defective drainage	Complied Dec. 5.
63	" 28	155 East 79th street	Defective plumbing	" " 18.
64	Dec. 2	143 West 33d street	Public nuisance	Work progressing.
65	" 2	145 West 33d street	"	"
66	" 24	1430 Amsterdam avenue	"	Complied Dec. 30.
67	" 24	1432 Amsterdam avenue	"	" " 30.

Borough of Brooklyn.

No.	Date.	Location.	Cause.	Result.
1	Apr. 14	206 Classon avenue	Defective plumbing and defective drainage	Forwarded to Tenement House Department, December 1.
2	" 14	206½ Classon avenue	Defective plumbing and defective drainage	Forwarded to Tenement House Department, December 1.
3	" 14	208 Classon avenue	Defective plumbing and defective drainage	Forwarded to Tenement House Department, December 1.
4	" 30	157 Prospect avenue	Defective plumbing and defective drainage	Vacated May 9.
5	May 6	2003 Fulton street	Defective plumbing and defective drainage	Complied May 26.
6	" 14	53 Grand street	Defective plumbing and defective drainage	Forwarded to Tenement House Department, August 1.
7	" 14	55 Grand street	Defective plumbing and defective drainage	Forwarded to Tenement House Department, August 1.
8	" 14	316 Seventy-sixth street	Defective drainage	Complied July 9.
9	" 14	459 Baltic avenue	Defective plumbing and defective drainage	Forwarded to Tenement House Department, December 1.
10	" 28	1014 Pacific street	Defective plumbing and defective drainage	Complied Dec. 19.
11	June 4	722 Second avenue	Defective plumbing and defective drainage	" July 10.
12	" 4	726 Second avenue	Defective plumbing and defective drainage	" July 10.
13	July 2	Brooklyn Rapid Transit	Public nuisance	Work progressing.
14	" 16	578 Seventeenth street	Defective plumbing and defective drainage	Complied Aug. 19.
15	" 23	174 Fifty-second street	Public nuisance	Work progressing.
16	Sept. 24	10 Liberty street	Defective plumbing	"
17	" 24	12 Liberty street	"	"
18	Oct. 8	346 Linwood street	Defective plumbing and defective drainage	Vacated Dec. 24.

No.	Date.	Location.	Cause.	Result.
19	Oct. 22	224 Seventy-eighth street	Defective drainage	Complied Nov. 17.
20	" 29	Rockaway and Riverdale avenues	Public nuisance	Work progressing
21	" 29	444 Watkins avenue	"	"
22	" 29	Rockaway avenue, south of New Lots road	"	"
23	" 29	Rockaway avenue, south of New Lots road	"	"
24	" 29	North side Hegeman avenue, east of Louisiana avenue	"	"
25	" 29	North side Hegeman avenue, east of Louisiana avenue	"	"
26	" 29	Snediker avenue, near Hegeman street	"	"
27	" 29	South side New Lots road, east of Rockaway avenue	"	"
28	" 29	South side New Lots road, east of Rockaway avenue	"	"
29	" 29	Snediker avenue, near Hegeman street	"	"
30	" 29	Powell street, near Riverdale avenue	"	"
31	" 29	Warwick street and New Lots road	"	"
32	Nov 12	211 Moore street	"	"
33	" 12	860 Flushing avenue	"	"
34	" 12	117 Debevoise street	"	"
35	" 12	156 Seigel street	"	"
36	" 12	12 Bayard street	"	"
37	" 12	30 Monteith street	"	"
38	" 12	McKibben street, east of Bushwick avenue	"	"
39	" 12	South side McKibben street, east of Bushwick avenue	"	"
40	" 12	South side McKibben street, east of Bushwick avenue	"	"
41	" 12	204 Seigel street	"	"
42	" 12	New York avenue, near Church avenue	"	"
43	" 12	862 Flushing avenue	"	"
44	" 12	864 Flushing avenue	"	"
45	" 12	866 Flushing avenue	"	"
46	Dec. 10	Rockaway avenue, Canarsie	"	"
47	" 10	Linwood avenue, near Wortman avenue	"	"
48	" 10	Fifty-sixth street, between Eighth and Ninth avenues	"	"
49	" 10	105 Debevoise street	"	"
50	" 24	27 Glenmore avenue	"	"
51	" 24	11 Centre street	Defective drainage	"
52	" 31	359 Fifty-eighth street	Public nuisance	"

Borough of The Bronx.

No.	Date.	Location.	Cause.	Result.
1	Apr. 30	164 Commonwealth avenue.....	Defective drainage.....................	Complied May 15.
2	May 28	1772 Bathgate avenue..........	Public nuisance.......................	" Nov. 14.
3	June 11	896 East 138th street...........	"	Vacated June 11.
4	" 11	Northwest corner Bronx and Pelham Parkway, Williamsbridge road	"	Complied Sept. 19.
5	" 25	West side Villa avenue, fourth house south Potter place ..	"	Vacated June 25.
6	July 16	730 East 203d street.......	"	Complied Oct. 30.
7	Aug. 27	1750 Monroe avenue............	"	" " 28.
8	Sept. 10	1005 Crotona Park, North......	Defective drainage	" " 3.
9	" 10	1007 Crotona Park, North	"	" " 3.
10	" 17	755 East 202d street............	"	" Dec. 10.
11	" 17	992 Forest avenue..............	Public nuisance........................	" Oct. 8.
12	" 17	994 Forest avenue..............	"	" " 8.
13	" 17	996 Forest avenue..............	"	" " 8.
14	" 17	998 Forest avenue..............	"	" " 8.
15	" 24	Albany avenue, south of Fort Independence road........	Defective drainage....................	Vacated Sept. 24.
16	Oct. 1	1075 Elsmere place.............	Nuisance................	Complied Oct. 22.
17	" 8	West side Main street, first house south of Prospect street, City Island........	Defective drainage	Vacated Oct. 10.
18	" 8	686 St. Ann's avenue	Defective plumbing and defective drainage	Complied Nov. 22.
19	Nov. 5	1243 Ogden avenue	Defective plumbing...................	" Dec. 8.
20	" 5	1245 Ogden avenue............	"	" " 8.
21	" 5	1247 Ogden avenue.............	"	" " 8.
22	" 19	South side Union avenue, second house East of Fifth street	Defective drainage....................	" " 1.
23	" 19	East side Crotona Park, East, first house south of 173d street...	"	Vacated Nov 19.
24	" 19	652 Robbins avenue............	Defective plumbing and defective drainage...........................	" " 19. Complied Dec. 15.
25	" 19	654 Robbins avenue............	Defective plumbing and defective drainage	" " 12.
26	" 19	2064 Crotona avenue.	Defective drainage	Vacated Nov. 19.
27	" 19	Southeast corner 147th street and Robbins avenue	Public nuisance........................	" " 19.
28	" 28	2066 Crotona avenue...........	Defective drainage	" " 28.
29	" 28	2389 Hoffman street...........	Defective plumbing and defective drainage	" " 28.
30	" 28	East side of Adams place, first house north of 182d street.	Defective drainage.....................	" " 28.
31	Dec. 2	363 Commonwealth avenue.....	"	Work progressing.
32	" 10	884 East 138th street...........	Public nuisance........................	Vacated Dec. 10.
33	" 10	Junction of 137th street, Lincoln and Third avenues ...	"	" " 10.
34	" 31	North side 187th street, first house west of Crotona avenue	Defective drainage	Work progressing.

Borough of Queens.

No.	Date.	Location.	Cause.	Result.
1	Jan. 22	Astoria avenue, Maspeth.......	Public nuisance........................	Complied Apr. 7.
2	Feb. 13	West side Hammels avenue, first house north of Ocean avenue, Rockaway Beach..	Defective plumbing and defective drainage	" July 16.
3	" 13	Astoria avenue. Maspeth.......	Public nuisance	" Apr. 7.
4	" 13	East side De Bevoise avenue, between Hoyt and Woolsey avenues.	"	" Mar. 14.
5	" 19	54 Seventh street, Long Island City..................	Defective plumbing and defective drainage	" July 15.
6	Mar. 19	Astoria avenue, Maspeth.......	Public nuisance......	" Apr. 7.
7	Apr. 2	Betts avenue, Maspeth.	"	" May 19.
8	" 2	Betts avenue, Maspeth........	"	" " 19.
9	" 9	Garrison street, near Flushing avenue, Metropolitan..	"	" Apr. 23.
10	June 25	Eldert and Bayview avenues, Rockaway Beach..........	Defective plumbing and defective drainage	" July 16.
11	" 25	Maurice avenue, near Astoria avenue, Maspeth..........	Public nuisance	" Oct. 24.
12	" 25	Maurice avenue, near Astoria avenue, Maspeth..........	"	" July 10.
13	" 25	Maspeth avenue, Maspeth.	"	" " 10.
14	July 25	Maspeth avenue, Maspeth	"	" " 10.
15	June 25	Maspeth avenue, Maspeth	"	" " 10.
16	" 25	Maspeth avenue, Maspeth	"	" " 10.
17	" 25	Maspeth avenue, Maspeth	"	" " 10.
18	June 25	Maspeth avenue, Maspeth.....	"	" Aug. 5.
19	" 25	Columbia avenue, near Electric Railroad............	"	" July 10.
20	" 25	East end of Jay avenue, Maspeth..........	"	" " 16.
21	July 2	Astoria avenue near Maurice, Maspeth..................	"	" Aug. 5.
22	" 2	Astoria avenue, Maspeth.......	"	" " 5.
23	" 2	Astoria avenue, Maspeth.......	"	" " 26.
24	" 16	17 Borden avenue, Long Island City......................	Defective plumbing and defective drainage..........................	" " 8.
25	" 16	Pier avenue north of Boulevard, Rockaway Beach....	Defective plumbing and defective drainage.....	" Dec. 22.
26	" 16	Boulevard near Pier avenue, Rockaway Beach........	Defective plumbing and defective drainage	" Aug. 8.
27	" 16	Guy street near Carlton avenue, Far Rockaway.......	Defective plumbing and defective drainage	" " 8.
28	" 16	Carlton and Central avenue, Far Rockaway...........	Defective plumbing and defective drainage.........................	" Sept 29.
29	" 16	Henderson Estate, second house on John street, near Carlton avenue, Far Rockaway.....................	Defective plumbing and defective drainage	" Aug. 8.
30	" 23	257 Pleasure avenue, Astoria...	Public nuisance.......................	" " 22.
31	" 23	1161 Van Alst avenue, Astoria.	"	" July 31.
32	" 23	935 Crescent street, Astoria....	"	" Aug. 9.
33	" 23	41 Nassau avenue, Long Island City................	"	" " 21.
34	" 23	217 Park place, Astoria........	"	" July 31.
35	" 23	Cooper avenue, between Fresh Pond road and Cypress avenue, Evergreen........	"	" " 31.

No.	Date.	Location.	Cause.	Result.
36	July 23	Cooper avenue, between Fresh Pond road and Cypress avenue, Evergreen........	Public nuisance......................	Complied Sept. 10.
37	" 23	355 Fourteenth avenue, Astoria.	"	" July 31.
38	" 23	133 Newtown road, Astoria....	"	" Aug. 8.
39	" 23	82 Fifteenth avenue, Astoria...	"	" July 31.
40	" 23	83 Fifteenth avenue, Astoria...	"	" " 31.
41	" 30	Woodward avenue, Troutman street, East Williamsburg.	Defective plumbing and defective drainage	" Aug. 15.
42	Aug. 6	Old Flushing avenue, near railroad tracks............	Public nuisance......................	" Sept. 10.
43	" 6	31 Dutchkills street, Long Island City...............	Nuisance...........................	" Aug. 18.
44	" 6	19th street and Whitestone road, College Point.......	Public nuisance.....	" Sept. 11.
45	" 6	Home street, near Myrtle avenue, Corona...........	"	" Aug. 18.
46	" 13	Forest avenue, East Williamsburgh....................	"	" Sept. 9.
47	" 13	275 Grove street, Evergreen ...	"	" " 11.
48	" 13	46 Snediker avenue, Union Course................. .	Defective plumbing and defective drainage..........................	" Oct. 11.
49	" 13	Bayswater Hotel, Far Rockaway....................	Defective plumbing and defective drainage	" Sept. 23.
50	" 27	72 Spruce street, Morris Park..	Want of repair........................	" " 25.
51	" 27	68 Spruce street, Morris Park..	Defective drainage.....................	" " 16.
52	" 27	Whitestone avenue and 4th street, Whitestone........	Public nuisance.......................	" " 24.
53	" 27	50 Skillman street, Long Island City..............	"	" " 11.
54	" 27	Ninth street and Eleventh avenue, Whitestone.......	"	" Oct. 16.
55	" 27	East side Jamaica avenue, south from Queens avenue, Flushing................	Defective plumbing and defective drainage..........................	" Aug. 30.
56	" 27	Jamaica avenue and Welling street, Richmond Hill....	Defective drainage....................	" Sept. 12.
57	" 27	509 Boulevard, Rockaway Beach....................	Want of repair.........................	" " 22.
58	" 27	3 Mitchell street, Jamaica......	Defective drainage.............	" " 11.
59	" 27	301 St. Nicholas avenue, Ridgewood....	"	" Oct. 13.
60	" 27	Springfield road, Queens.....	Defective plumbing and defective drainage...........................	Work progressing.
61	Sept. 3	254 Flushing avenue.........	Defective plumbing and defective drainage..........................	Complied Sept. 8.
62	" 10	199 Myrtle avenue, Flushing.	Defective plumbing and defective drainage...........	" Nov. 11.
63	" 10	32 Locust street, Flushing....	Defective plumbing and defective drainage.........................	" Oct. 28.
64	Oct. 1	East of Old Flushing avenue, 30 feet west of Long Island Railroad, Newtown.......	Public nuisance......................	" " 15.
65	" 1	East of Old Flushing avenue, 30 feet west of Long Island Railroad, Newtown.......	"	" " 15.
66	" 3	63 Locust street, Flushing....	Defective plumbing and defective drainage.........................	" Dec. 8
67	Nov. 12	455 Fourteenth avenue, Long Island City........	Public nuisance......................	Work progressing.
68	" 12	367 Pleasure avenue, Astoria..	"	"
69	" 12	Johnson avenue, near Juniper avenue, Maspeth..........	"	Complied Nov. 21
70	" 12	48 Main street, Long Island City	Defective plumbing and defective drainage	Work progressing.
71	" 19	Wick street, one block north of Williamsburg road, Richmond Hill	Public nuisance......................	"

No.	Date.	Location.	Cause.	Result.
72	Nov. 28	Maspeth avenue, Maspeth	Public nuisance	Complied Dec. 29.
73	" 28	Maspeth avenue near railroad, Maspeth	"	Work progressing.
74	" 28	Maspeth avenue near railroad building, Maspeth	"	"
75	" 28	Maurice avenue, Maspeth	"	"
76	" 28	Metropolitan avenue and Trotting Course lane, Middle Village	"	"
77	" 28	Dry Harbor road, Middle Village	"	"
78	" 28	Corner Borden and Hunter's Point avenues, Long Island City	Defective plumbing and defective drainage	"
79	" 28	47 Greenpoint avenue, Long Island City	Defective plumbing and defective drainage	"
80	" 28	63 Greenpoint avenue, Long Island City	Defective drainage	"
81	" 28	91 Greenpoint avenue, Long Island City	Defective plumbing and defective drainage	"
82	" 28	119 Greenpoint avenue, Long Island City...	Defective plumbing and defective drainage	"
83	" 28	117 Greenpoint avenue, Long Island City	Defective plumbing and defective drainage	"
84	" 28	125 Greenpoint avenue, Long Island City	Defective plumbing and defective drainage	"
85	Dec. 2	140 Myrtle avenue, Flushing...	Defective drainage	"
86	" 2	134 Myrtle avenue, Flushing...	"	"
87	" 2	37 Leavitt avenue, Flushing....	"	"
88	" 10	Furman avenue, Metropolitan..	Public nuisance	"
89	" 10	Old Flushing road, between Grand street and Flushing avenue, Metropolitan	"	"
90	" 10	Flushing avenue, near Metropolitan avenue, Metropolitan	"	"
91	" 10	Garretson avenue, between Flushing avenue and Grand street, Metropolitan......	"	"
92	" 10	70 Milton street, Metropolitan.	"	"
93	" 10	Flushing, Woodward and Metropolitan avenues, Metropolitan	"	"
94	" 10	Old Flushing road, between Grand street and Flushing avenue, Metropolitan.....	"	"
95	" 10	Old Flushing road, between Grand street and Flushing avenue, Metropolitan	"	"
96	" 10	Flushing avenue, near Metropolitan avenue, Metropolitan.......	"	"
97	" 10	Metropolitan avenue, near Emma street, Metropolitan	"	"
98	" 10	Pacific street, near Collins avenue, Metropolitan.....	"	"
99	" 10	Garrison street, Metropolitan..	"	"
100	" 10	Furman avenue, between Grand street and Flushing avenue, Metropolitan.....	"	"
101	" 24	Garretson avenue, Metropolitan	"	"
102	" 24	Old Flushing road, between Grand street and Flushing avenue, Maspeth..........	"	"
103	" 24	Claremont avenue, north Elmenier avenue, Maspeth..	"	"
104	" 24	Columbia avenue, Maspeth.....	"	"
105	" 24	Clinton avenue, near Maiden lane, Maspeth.............	"	"

No.	Date.	Location.	Cause.	Result.
106	Dec. 24	Cor. Elm and Forest avenues, Ridgewood Heights.......	Public nuisance........................	Work progressing.
107	" 24	North side Betts avenue, Maspeth.....................	"	"
108	" 24	58 Main street, Flushing.....	Defective plumbing and defective drainage.........................	"
109	" 24	37 Flushing place, Flushing..	Defective plumbing and defective drainage.........................	"
110	" 24	North side Betts avenue, Maspeth.....................	Public nuisance........................	"
111	" 24	186 Ditmars avenue, Long Island City................	"	"
112	" 24	Moffett street, near Casper avenue, Evergreen..........	"	"
113	" 31	Forest avenue, opposite Grove street, Metropolitan.......	"	"
114	" 31	1441 Metropolitan avenue, Metropolitan.............	"	"
115	" 31	24 Butler street, Metropolitan..	"	"
116	" 31	41 Pringle street, Metropolitan	"	"
117	" 31	North side Vienna avenue, near Jasmine street, Metropolitan.................	"	"
118	" 31	Linden street, near Fresh Pond road, East Williamsburg.....................	"	"
119	" 31	Mt. Olivet avenue, near Broad street, Williamsburg	"	"
120	" 31	Cooper avenue, near Cypress avenue, Evergreen........	"	"

Borough of Richmond.

No.	Date.	Location.	Cause.	Result.
1	May 14	Darcey's Farm, south side Watchogue road, Prohibition Park..................	Defective plumbing.........	Complied May 20.
2	" 21	100 Bay street, Second Ward...	Nuisance	" July 17.
3	" 21	102 Bay street, Second Ward...	"	" " 17.
4	July 30	37 Second street, New Brighton	Defective plumbing and defective drainage	Vacated Aug. 2.
5	Aug. 6	South line Quarantine. Station 400 feet from foot Nautilus street	Public nuisance........................	Work progressing.
6	Sept. 10	256 Jersey street, First Ward	Defective plumbing and defective drainage.	"
7	" 10	Richmond terrace, near Franklin avenue...	Defective plumbing and defective drainage	Vacated Sept. 14.
8	" 24	54 Gorden street............	Defective plumbing and defective drainage.........................	" " 24.

Summary.

Number of houses ordered vacated after giving notice...........		281
Orders complied with before vacation....................................	143	
Work in progress	99	
Houses vacated after notice................................	33	
Referred to Tenement House Department	6	
		281
Of those vacated, orders since complied with..............................	9	
Of those vacated, nothing done...	24	
		33

WORK PERFORMED BY THE DIVISION OF INSPECTIONS.

WORK PERFORMED BY THE SANITARY INSPECTORS.

Total number of inspections and reinspections	141,058

Classified as to Character of Premises.

Number of tenement-houses	25,429
" shore inspections	6,137
" lodging-houses	1,092
" private dwellings	9 120
" mercantile establishments	13,312
" manufactories and workshops	3,225
" stables	2,107
" sunken and vacant lots	2,344
" miscellaneous	20,975
Total	83,741
Number of complaints forwarded for Board orders	25,485
" negative reports forwarded	26,486
" reinspections on orders	57,317

MERCANTILE ESTABLISHMENTS.

Number of citizens' complaints received	441
" citizens' complaints returned for orders	237
" citizens' complaints returned as negative	233
" original complaints forwarded for orders	774
Number of children interviewed applying for certificates	15,471
" employment certificates granted	25,690
" employment certificates refused	4,192
" duplicate certificates issued	1,444

The number of dead animals and the quantity of offal, garbage, etc., removed from the shore front by the Shore Inspectors was:

Dogs	653	Fish, No. of	829
Cats	423	Offal, bbls. of	651
Rats	707	Garbage, pieces of	55
Goats	24	Meats, " "	1,228
Sheep	114	Bedding, " "	245
Hogs	27	Clothing, " "	659
Calves	3	Mattresses, No. of	465
Horses	3	Human bodies	8
Fowls	358		
Total	2,312		

Work Performed by the Sanitary Police.

Number of inspections and reinspections	162,468

Classified as to Character of Premises.

Number of tenement-houses	24,665
" lodging-houses	2,224
" private dwellings	8,141
" mercantile establishments	2,662
" manufactories and workshops	2,032
" stables	22,175
" manure dumps	6,759
" sunken and vacant lots	8,610
" miscellaneous	53,705
Total	130,973

Number of complaints forwarded for Board orders	12,141
" complaints made and referred to Inspectors	1,387
" negative reports forwarded	8,864
" visits to stop work, close stores, and premises under observation on account of contagious diseases	2.790
" ash receptacles removed from outside stoop-line	4,032

Number of reinspections on orders	31,495

MERCANTILE ESTABLISHMENTS.

Number of citizens' complaints received	7
" citizens' complaints returned for orders	2
" citizens' complaints returned as negative	5

Nember of arrests	631
" persons held on bail	469
" persons discharged	144

Inspections Classified as to Cause of Complaint.

Nature of Complaints and Violations.	Complaints Made.	Nuisances Abated by Personal Effort.	Total.
Air-shafts filthy, not covered or connected with house sewer	529	211	740
Animals, no permits	665	13	678
Areas filthy and dangerous	431	378	809
Ash-boxes in violation of Sanitary Code	1,202	1,288	2,490

Nature of Complaints and Violations.	Complaints Made.	Nuisances Abated by Personal Effort.	Total.
Balusters and stairs dangerous	582	17	599
Cellars filthy	1,004	382	1,386
Cellars occupied as a place of dwelling or lodging	31	....	31
Cellars not water tight	76	....	76
Cesspools	232	1	233
Dogs in violation of Sanitary Code	37	....	37
Drains obstructed or defective	116	1	117
Eaves—gutters defective or dangerous	21	....	21
Fences dangerous	84	....	84
Fire-escapes filthy or obstructed	3	133	136
Hydrants out of repair	5	1	6
Halls not lighted	509	2	511
Leaders defective, obstructed or dangerous	88	3	91
Manure-vaults in violation of Sanitary Code, or no permit	1,602	2	1,604
Mercantile complaints	20	....	20
No appliances to receive and distribute water on every floor of tenement	3	....	3
Premises not connected with street sewer	127	2	129
Rags stored in tenement-house, no permit	10	....	10
Roofs leaking or filthy	650	53	703
Receiving-basins full or offensive	45	1	46
Schools kept in tenement-house, no permit	1	....	1
Stable yards filthy, not paved, graded or sewer connected	707	308	1,015
Stable in tenement-house	5	....	5
Soil-pipes obstructed, defective or not ventilated	101	1	102
Sinks filthy, defective or not trapped	194	7	201
Sidewalks filthy, dangerous or not flagged	114	220	334
Streets or gutters filthy or obstructed	115	28	143
Tenement-houses overcrowded	49	....	49
Vacant lots filthy, dangerous, not fenced or sewer connected	949	81	1,030
Water-closets out of repair or filthy	1,080	82	1,162
Water-tanks filthy	84	1	85
Walls and ceilings filthy or out of repair	1,240	1	1,241
Waste-pipes obstructed, defective or not ventilated	164	....	164
Yards filthy, not properly graded or sewer connected	1,392	969	2,361
Miscellaneous	2,994	2,925	5,919
Totals	17,261	7,111	24,372

Work Performed by the Inspectors of Foods and Offensive Trades.

Number of inspections and reinspections	693,183
" inspections	689,839
" citizens' complaints returned for Board orders	709
" citizens' complaints returned as negative	1,084
" reinspections on orders	3,344
" specimens of milk examined	69,193
" specimens of milk collected for analysis	4,656
" quarts of adulterated milk destroyed	1,535
" inspections by veterinarians	2,626
" cows examined	20,146
" cows tagged	126
" cows condemmed	4
" analyses	529
" permits issued	12,043
" arrests	726
" persons held on bail	645
" persons discharged	136
" pounds of milk, fruit, food, meat and fish condemned and seized	12,293,761

WORK PERFORMED BY THE DIVISION OF CONTAGIOUS DISEASES.

Number of visits to cases of contagious diseases	152,894
" cases visited for special diagnosis	8,365
" cases treated with diphtheria antitoxin	449
" persons immunized with diphtheria antitoxin	705
" school notices sent	24,783
" complaints forwarded for Board orders	188
Number of visits to tenement-houses	111,[illegible]57
" visits to hotels	639
" visits to schools and institutions	5,654
" visits to private houses	17,318
" visits, miscellaneous	7,905
Total number of visits	142,873
Number of primary vaccinations	85,800
" revaccinations	620,256
" vaccinations in schools	104,224
Total number of certificates of vaccination issued	37,580
Number of visits to infected houses	9,358
" visits to sick children	1,143
" prescriptions filled	538

Number of animals examined		31,032
"	post-mortems on animals	232
"	glandered horses condemned	832
"	persons removed to Contagious Disease Hospital	4,448
"	dead bodies removed to Morgue	63
"	houses visited for disinfection	26,796
"	special disinfections	27
"	infected rooms disinfected	53,600
"	times ambulances, etc., disinfected	2,592
"	pieces infected goods disinfected	65,826
"	pieces infected goods destroyed	12,994
"	veterinarian inspections	7,116
	Total inspections	176,812

Number of Communicable Diseases Reported.

Boroughs.	Diphtheria.	Scarlet Fever.	Measles	Tuberculosis.	Typhoid Fever.	Parotiditis	Croup.	Cerebro-Spinal Meningitis.	Chicken-pox.	Whooping Cough.	Small-pox.	Erysipelas.	Rotheln.	Total.
Manhattan	9,679	6,895	11,645	9,130	2,524	58	..	9	2,165	206	755	26	..	43,092
Brooklyn	4,236	2,529	5,506	2,838	961	..	..	..	527	..	503	..	..	18,100
The Bronx	734	829	1,915	592	105	80	17	1	297	53	162	..	..	4,785
Queens	443	364	705	254	202	1	24	..	161	20	57	..	..	2,232
Richmond	182	277	479	100	79	9	4	..	119	34	39	2	1	1,325
Total	15,274	11,894	20,251	12,914	3,871	148	45	10	3,269	313	1,516	28	1	69,534

Work Performed by the Medical School Inspectors.

Schools.	Total Daily Average Attendance.	School Days.	Number of Schools Visited.	Number of Visits to Schools.
Public Schools	428,302	190	540	57,955
Parochial Schools	57,337	190	99	15,224
Industrial Schools, American Female Guardian Society	3,803	171	12	1,582
Industrial Schools, Children's Aid Society	8,000	171	19	2,804
Schools in Tenement-houses	124	10	6	9
Kindergarten Schools	3,781	187	42	4,645
Total	501,344	190	718	82,229

Schools.	Number Examined.	Number Excluded.
Public Schools	4,526,174	48,513
Parochial Schools	443,764	3,371
Industrial Schools, American Female Guardian Society	20,991	489
Industrial Schools, Children's Aid Society	47,068	1,197
Schools in Tenement-houses	13	......
Kindergarten Schools	25,756	333
Total	5,063 766	53,903

Table Showing Diseases for Which Children Were Excluded.

Schools.	Measles.	Diphtheria.	Scarlet Fever.	Croup.	Whooping Cough.	Mumps.	Contagious Eye Diseases.	Parasitic Diseases of Head.	Parasitic Diseases of Body.	Chicken-pox.	Skin Diseases.	Miscellaneous.	Total Excluded.
Public Schools	*92	*128	*58	..	..	..	..	..	..	*423	..	..	*701
	141	204	96	1	423	462	17,993	23,512	85	512	2,678	2,406	48,513
Parochial Schools	*3	*10	*4	..	..	..	..	..	..	*24	..	..	*41
	7	11	4	..	11	4	1,625	1,341	..	26	227	115	3,371
Industrial Schools, American Female Guardian Society		*1	*1	..	..	..	..	..	..	*14	..	..	*16
	1	1	3	..	3	..	228	175	..	18	32	28	489
Industrial Schools, Children's Aid Society	*6	*3	*2	..	..	..	..	..	..	*19	..	..	*30
	9	6	4	..	7	..	442	510	..	22	65	132	1,197
Kindergarten Schools	..	*1	..	..	..	..	..	..	..	*11	..	..	*12
	1	1	..	..	8	..	120	128	..	15	28	32	333
Total	*101	*143	*65	..	..	..	..	..	..	*491	..	..	*800
	159	223	107	1	452	466	20,408	25,666	85	593	3,030	2,713	53,903

*Cases of true Measles, Diphtheria, Scarlet Fever and Chicken-pox.

WORK PERFORMED BY THE DIVISION OF BACTERIOLOGY.

SUMMARY.

Number of inspections	21,101
" autopsies	10
" bacteriological diagnoses of suspected diphtheria	16,653
Cases found to be true diphtheria	7,757
Cases found not to be diphtheria	6,837
Cases bacteriological diagnosis indecisive	2,059

Number of bacteriological examinations of healthy throats in infected families	620
" later bacteriological examinations of diphtheria (convalescents)	14,483
" cultures taken by Medical School Inspectors	892
" specimens of urine examined for typhoid fever reaction (Diazo)	402
" specimens of blood examined for malarial organisms	89
" malarial organisms found	8
" malarial organisms not found	81
" bacteriological examinations of sputum from cases of suspected tuberculosis.	7,587
Tubercle bacilli found	3,000
Tubercle bacilli not found	4,587
" inoculations of animals with toxins	309
" animals bled for antitoxic serums	103
Amount of diphtheria antitoxic serum produced, in cubic centimeters	157,075
" tetanus antitoxic serum produced, in cubic centimeters	5,053
" tuberculin produced	350
Number of samples of toxins tested	96
" samples of antitoxic serums tested	156
" specimens of blood and serum examined for typhoid fever reaction (Widal test)	3,369
" specimens showing positive reaction	1,179
" specimens showing negative reaction	2,190
" specimens of vaccine virus tested bacteriologically	1,057
" animals vaccinated	228
" animals collected from	228
" grammes of vaccine virus collected	8530.80
" cubic centimeters of liquid vaccine virus prepared	31,573
" clinical tests of vaccine virus made	1,157
" spades charged with humanized virus	6,845
" capillary tubes of vaccine virus prepared	188,925
" small vials of vaccine virus prepared	8,917
" large vials of vaccine virus prepared	17,560
" visits to collect diphtheria culture tubes, samples of sputum, etc	13,824
" original complaints	1,319

WORK PERFORMED BY THE DIVISION OF CHEMISTRY.

Total number of reports forwarded and filed	6,153
Total number of analyses	5,752

Classified as to Character of Analyses.

Number of alcohols	1
" anchovies	1
" apples	1
" ashes	10

Number of baking powders	23
" beef capsules	1
" bitter almond oil	1
" bread	6
" broth	1
" burlap	1
" butters	2
" buttermilks	1
" cake	4
" candies	21
" castor oil	1
" catsups	12
" cereals	2
" camomile tea	1
" cheese	3
" cherries	1
" chewing gum	2
" chloral hydrate	2
" ciders	9
" clam chowders	1
" clam extracts	5
" coal	2
" cocoas	3
" coffees	2
" coke	1
" coloring matter	1
" corns, canned	7
" corned beef	2
" cotton seed oil	1
" crackers	1
" creams, adulterated	18
" " unadulterated	166
" " evaporated	1
" cream tartars	44
" cream thickener	1
" dust	1
" eggs, dried, etc	4
" enameled ware	1
" experimental analyses	299
" extract of beef	3
" fish	2
" fish cakes	1
" fish liquor	1

Number of flour	2
" formaldehyde	4
" frankfurters and sauerkraut	1
" fruit juices	1
" grape juices	1
" hair dyes	2
" hair restorers	1
" ham, canned	1
" horse balls	1
" ice creams, etc	15
" jelly	1
" jelly powder	1
" koko black	1
" leaf	1
" linseed oil	1
" liquids	1
" lobster, canned	1
" malt tonics	1
" meal	1
" meats	3
" medicines	20
" milks, adulterated	2085
" milks, unadulterated	1871
" milks, evaporated, adulterated	1
" milks, evaporated, unadulterated	14
" milks, preserved, adulterated	2
" milks, preserved, unadulterated	55
" milks, special	4
" milk foods	3
" milk modified	4
" oils	1
" opium pastes	28
" orange sugar	1
" paper	1
" paste	1
" peas, canned	25
" phenacetines	208
" pills	1
" pork	1
" potted tongue	1
" powders	3
" preservatives	3
" preserves	2

Number of	roast beef, canned	1
"	salmon, canned	3
"	salve	1
"	sandwiches	1
"	sardines	3
"	sausages	23
"	sediment	1
"	sewage, bacteriological examination	6
"	shredded wheat biscuit	1
"	smoked beef	2
"	soaps	7
"	soda-waters	1
"	soups	2
"	soused mackerel	1
"	stomach and contents	2
"	string beans, canned	8
"	sugar	1
"	sweetener, artificial	1
"	syrups	1
"	tomatoes, canned	29
"	turpentines	4
"	urines	1
"	veiling	2
"	vinegars	3
"	wall papers	2
"	wall scrapings	1
"	water, bacteriological examination	6
"	water, carbonic	22
"	water, cellar	54
"	water, croton, complete sanitary and mineral analysis	1
"	water, mineral	24
"	water, sanitary analyses	456
"	whiskey	11
"	white lead	8
"	wines	10
"	milks, bacteriological examination	1
	Total number of analyses	5,752

Number of	lactometers tested	183
"	thermometers tested	218
"	days at Court	85

The number of dead animals removed from the streets and the quantity of offal, etc., removed from the markets and slaughter-houses by the contractor was:

Horses	17,894
Colts	25
Mules	32
Donkeys	2
Bulls	3
Steers	3
Cows	208
Calves	1,998
Goats	62
Hogs	156
Sheep	826
Cats and dogs	113,955
Dogs from public pound	12,990
Total animals	148,154

Veal, quarters of	1,537
Beef, quarters of	260
Fish, barrels of	9,658
Livers, barrels of	30
Poultry, barrels of	1,209
Ox-tails, barrels of	25
Offal, barrels of	3,928
Cheese, boxes of	2
Meat, boxes of	27
Game, boxes of	22
Hides	79
Fish, cases of	751

REPORT OF PATIENTS TREATED AT RECEPTION HOSPITAL,

BOROUGH OF MANHATTAN.

General Statement.

1902.	Males.	Females.	Total.	Native.	Foreign.	Total.	Accompanying.
Remaining in Hospital Jan. 1, 1902....	2	4	6	2	4	6	....
Admitted	1,380	1,008	2,388	1,400	988	2,388	361
Total....................	1,382	1,012	2,394	1,402	992	2,394	361
Discharged..........................	81	60	141	78	63	141	30
Transferred..........................	1,251	908	2,159	1,255	904	2,159	331
Died	43	41	84	63	21	84	....
Total....................	1,375	1,009	2,384	1,396	988	2,384	361
Remaining in Hospital Dec. 31, 1902..	7	3	10	6	4	10	....

REMAINING JANUARY 1, 1902.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	1	..	..	..	1	1	..	..	..	1
Scarlet fever	..	..	1	..	..	..	..	1	1	1
Measles and pertussis	1	..	..	..	1	1	..	..	..	1
Measles	..	..	1	..	..	..	1	..	1	1
Small-pox	..	..	2	..	..	..	1	1	2	2
Total	2	..	4	..	2	2	2	2	4	6

ADMITTED.

	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Native Males.	Native Females.	Native Total.	Foreign Males.	Foreign Females.	Foreign Total.	Total.
Diphtheria	27	26	4	26	20	46	4	7	11	57
Scarlet fever	254	362	145	290	280	570	87	104	191	761
Measles	309	127	164	112	117	229	197	174	371	600
Small-pox	60	40	592	260	102	362	241	89	330	692
Varicella	7	3	8	6	4	10	7	1	8	18
Pertussis	7	1	..	8	..	8	..	..	..	8
Diphtheria and scarlet fever	27	29	7	22	29	51	4	8	12	63
Diphtheria and measles	34	4	..	15	15	30	5	3	8	38
Diphtheria and varicella	4	1	..	3	1	4	..	1	1	5
Diphtheria and pertussis	5	1	..	4	2	6	..	..	..	6
Scarlet fever and measles	2	..	..	2	..	2	..	..	..	2
Scarlet fever and varicella	1	..	..	1	..	1	..	..	..	1
Scarlet fever and pertussis	2	..	..	2	..	2	..	..	..	2
Measles and pertussis	1	..	..	1	..	1	..	..	..	1
Rotheln	2	..	2	..	2	2	1	1	2	4
Parotitis	..	..	1	..	..	..	..	1	1	1
Diphtheria and parotitis	1	..	..	1	..	1	..	..	..	1
Total	743	594	923	753	572	1325	546	389	935	2260
For observation	35	35	58	48	27	75	33	20	53	128
Accompanying	84	61	216	3	15	18	76	267	343	361

DISCHARGED.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	7	14	4	10	8	18	1	6	7	25
Scarlet fever	2	3	5	5	1	6	3	1	4	10
Measles	1	1	3	1	1	2	2	1	3	5
Small-pox	..	..	9	2	2	4	2	3	5	9
Varicella	5	3	7	3	4	7	7	1	8	15
Pertussis	5	1	..	6	..	6	..	..	..	6
Diphtheria and measles	1	1	..	..	..	..	1	1	2	2
Diphtheria and varicella	1	1	..	1	..	1	..	1	1	2
Diphtheria and pertussis	1	1	..	1	1	2	..	..	..	2
Scarlet fever and pertussis	1	..	..	1	..	1	..	..	..	1
Measles and pertussis	2	..	..	1	1	2	..	..	..	2
Rotheln	1	..	1	..	1	1	..	1	1	2
Parotitis	..	..	1	..	..	..	..	1	1	1
Total	27	25	30	31	19	50	16	16	32	82
For observation	13	8	38	16	12	28	18	13	31	59
Accompanying	8	9	13	3	9	12	7	11	18	3[illegible]

TRANSFERRED.

	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Native Males.	Native Females.	Native Total.	Foreign Males.	Foreign Females.	Foreign Total.	Total.
Diphtheria	11	7	..	8	7	15	2	1	3	18
Scarlet fever	233	346	136	273	266	539	78	98	176	715
Measles	301	126	159	109	113	222	194	170	364	586
Small-pox	59	41	580	256	100	356	240	84	324	680
Varicella	1	..	..	1	..	1	..	..	..	1
Diphtheria and scarlet fever	24	28	7	21	26	47	4	8	12	59
Diphtheria and measles	24	2	..	13	11	24	1	1	2	26
Diphtheria and varicella	2	..	..	1	1	2	..	..	..	2
Scarlet fever and measles	1	..	..	1	..	1	..	..	..	1
Scarlet fever and varicella	1	..	..	1	..	1	..	..	..	1
Rotheln	1	..	1	..	1	1	1	..	1	2
Diphtheria and parotitis	1	..	..	1	..	1	..	..	..	1
Total	659	550	883	685	525	1,210	520	362	882	2092
For observation	7	10	50	31	14	45	15	7	22	67
Accompanying	75	53	203	..	6	6	69	256	325	331

Died.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	11	4	..	8	6	14	1	..	1	15
Scarlet fever	19	13	5	12	13	25	6	6	12	37
Measles	5	..	1	1	3	4	1	1	2	6
Small-pox	1	..	4	2	..	2	..	3	3	5
Varicella	2	..	..	2	..	2	..	..	..	2
Diphtheria and scarlet fever	3	1	..	1	3	4	..	.	..	4
Diphtheria and measles	8	1	..	2	4	6	2	1	3	9
Diphtheria and varicella	1	..	..	1	..	1	..	..	..	1
Diphtheria and pertussis	3	..	..	2	1	3	..	..	..	3
Scarlet fever and measles	1	..	..	1	..	1	..	..	..	1
Scarlet fever and pertussis	1	..	..	1	..	1	..	..	..	1
Total	55	19	10	33	30	63	10	11	21	84

Remaining December 31, 1902.

Measles	2	..	2	1	..	1	1	2	3	4
Pertussis	2	..	..	2	..	2	..	..	..	2
Diphtheria and measles	1	..	..	..	..	..	1	..	1	1
Diphtheria and pertussis	1	..	..	1	..	1	..	..	..	1
Total	6	..	2	4	..	4	2	2	4	8
For observation	1	..	1	1	1	2	..	..	..	2

Recapitulation.

	Remaining Jan. 31, 1902,		Admitted.		Discharged		Transferred.		Died.		Remaining Dec. 31, 1902.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Diphtheria	..	1	30	27	11	14	10	8	9	6	..	..
Scarlet fever	..	1	377	384	8	2	351	364	18	19	..	..
Measles	1	..	309	291	3	2	303	283	2	4	2	2
Small-pox	1	1	501	191	4	5	496	184	2	3	..	..
Varicella	..	..	13	5	10	5	1	..	2	..	..	..
Pertussis	..	..	8	..	6	..	..	..	..	..	2	..
Diphtheria and scarlet fever	..	..	26	37	..	..	25	34	1	3	..	..
Diphtheria and measles	..	..	10	18	1	1	14	12	4	5	1	..
Diphtheria and varicella	..	..	3	2	1	1	1	1	1	..	..	..
Diphtheria and pertussis	..	..	4	2	1	1	..	..	2	1	1	..
Scarlet fever and measles	..	..	2	..	..	..	1	..	1	..	..	..
Scarlet fever and varicella	..	..	1	..	..	..	1	..	..	..	..	..
Scarlet fever and pertussis	..	..	2	..	1	..	..	..	1	..	..	..
Measles and pertussis	..	1	1	..	1	1	..	..	..	..	..	..
Rotheln	..	..	1	3	..	2	1	1	..	..	..	..
Parotitis	..	..	..	1	..	1	..	..	..	..	..	..
Diphtheria and parotitis	..	..	1	..	..	..	1	..	..	..	..	..
Total	2	4	1,299	961	47	35	1,205	887	43	41	6	2
For observation	..	..	81	47	34	25	46	21	..	..	1	1
Accompanying	..	..	79	282	10	20	69	262	..	..	..	..

REPORT OF PATIENTS TREATED AT WILLARD PARKER HOSPITAL.

BOROUGH OF MANHATTAN.

General Statement.

1902.	Males.	Females.	Total.	Native.	Foreign.	Total.	Accompanying.
Remaining in Hospital Jan. 1, 1902..	24	16	40	36	4	40	..
Admitted	566	506	1,072	881	191	1,072	39
Total	590	522	1,112	917	195	1,112	39
Discharged	381	386	767	598	169	767	39
Transferred	16	11	27	24	3	27	..
Died	167	104	271	256	15	271	..
Total	564	501	1,065	878	187	1,065	39
Remaining in Hospital Dec. 31, 1902..	26	21	47	39	8	47	..

Remaining January 1, 1902.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	26	11	3	24	12	36	..	4	4	40

Admitted.

Diphtheria	576	268	228	467	414	881	99	92	191	1072
Accompanying	1	..	38	..	23	23	..	16	16	39

Discharged.

Diphtheria	327	229	211	299	299	598	82	87	169	767
Accompanying	1	..	38	..	23	23	..	16	16	39

Transferred.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	21	5	1	15	9	24	1	2	3	27

Died.

Diphtheria	229	31	11	156	100	256	11	4	15	271

Remaining December 31, 1902.

Diphtheria	25	14	8	21	18	39	5	3	8	47

Recapitulation.

	Remaining Jan. 1, 1902.		Admitted.		Discharged.		Transferred.		Died.		Remaining Dec. 31, 1902.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Diphtheria	24	16	565	506	381	386	16	11	167	104	26	21
Accompanying	..	..	..	39	..	39	..	..	..	..	..	..

REPORT OF THE PATIENTS TREATED AT RIVERSIDE HOSPITAL.

BOROUGH OF THE BRONX.

General Statement.

1902.	Males.	Females.	Total.	Native.	Foreign.	Total.	Accompanying.
Remaining in Hospital Jan. 1, 1902...	122	85	207	97	110	207	40
Admitted...........................	1,491	1,088	2,579	1,536	1,043	2,579	296
Total.....................	1,613	1,173	2,786	1,633	1,153	2,786	336
Discharged.........................	1,309	935	2,244	1,257	987	2,244	328
Died..............................	276	191	467	329	138	467	..
Total.....................	1,585	1,126	2,711	1,586	1125	2,711	328
Remaining in Hospital Dec. 31, 1902.	28	47	75	47	28	75	8

Remaining January 1, 1902.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Scarlet fever..................................	12	19	7	22	6	28	3	7	10	38
Measles..	58	31	7	11	13	24	46	26	72	90
Small-pox	5	3	26	11	9	20	10	4	14	34
Diphtheria and scarlet fever..................	5	9	1	7	5	12	2	1	3	15
Diphtheria and measles........................	2	..	..	1	1	2	..	..	..	2
Scarlet fever and measles.....................	8	5	1	4	4	8	1	5	6	14
Measles and varicella..........................	5	3	..	1	2	3	3	2	5	8
Total..............................	95	70	42	57	40	97	65	45	110	207
Accompanying...................................	..	1	39	..	2	2	..	38	38	40

ADMITTED.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Scarlet fever	221	345	142	266	268	534	79	95	174	708
Pneumonia	1	..	..	..	..	..	1	..	1	1
Measles	347	143	171	118	123	241	230	190	420	661
Small-pox	110	70	790	386	187	573	290	107	397	970
Varicella	1	..	..	..	1	1	..	..	..	1
Small-pox and scarlet fever	..	1	1	..	1	1	..	1	1	2
Small-pox and diphtheria	..	..	1	..	1	1	..	..	..	1
Diphtheria and scarlet fever	64	53	10	54	54	108	5	14	19	127
Diphtheria and measles	42	5	..	20	17	37	9	1	10	47
Diphtheria and mumps	1	..	..	1	..	1	..	..	..	1
Small-pox and pertussis	1	1	..	1	1	2	..	..	..	2
Scarlet fever and measles	24	12	1	9	12	21	8	8	16	37
Scarlet fever and varicella	3	6	..	7	2	9	..	..	..	9
Scarlet fever and pertussis	2	..	..	1	1	2	..	..	..	2
Scarlet fever, measles and diphtheria	4	..	..	2	1	3	..	1	1	4
Measles and pertussis	1	..	..	..	1	1	..	..	..	1
Measles and varicella	3	2	..	..	1	1	4	..	4	5
Total	825	638	1116	865	671	1536	626	417	1043	2579
Accompanying	30	44	222	2	17	19	34	243	277	296

Discharged.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Scarlet fever	164	324	135	235	239	474	68	81	149	623
Measles	320	169	170	112	101	213	253	193	446	659
Small-pox	59	56	687	310	141	451	255	96	351	802
Varicella	1	..	..	..	1	1	..	..	..	1
Diphtheria and scarlet fever	29	48	9	34	32	66	6	14	20	86
Diphtheria and measles	8	2	..	4	5	9	1	..	1	10
Diphtheria and mumps	1	..	..	1	..	1	..	..	..	1
Small-pox and diphtheria	..	..	1	..	..	..	..	1	1	1
Scarlet fever and measles	22	12	2	14	13	27	1	8	9	36
Scarlet fever and varicella	3	6	..	7	2	9	..	..	..	9
Scarlet fever and pertussis	1	..	..	..	..	..	..	1	1	1
Measles and pertussis	1	..	..	..	1	1	..	..	..	1
Measles and varicella	8	5	..	1	3	4	7	2	9	13
Scarlet fever, measles and diphtheria	1	..	..	..	1	1	..	..	..	1
Total	618	622	1004	718	539	1257	591	396	987	2244
Accompanying	32	42	254	1	18	19	33	276	309	328

Died.

Scarlet fever	51	18	11	33	30	63	10	7	17	80
Pneumonia	1	..	..	..	..	..	1	..	1	1
Measles	74	4	3	19	30	49	17	15	32	81
Small-pox	53	14	129	82	50	132	44	20	64	196
Scarlet fever, measles and diphtheria	3	..	..	2	..	2	..	1	1	3
Diphtheria and scarlet fever	37	11	1	28	15	43	4	2	6	49
Diphtheria and measles	35	3	..	17	13	30	8	..	8	38
Scarlet fever and measles	9	5	..	3	2	5	6	3	9	14
Scarlet fever and pertussis	1	..	..	1	..	1	..	..	..	1
Small-pox and pertussis	1	1	..	1	1	2	..	..	..	2
Small-pox and scarlet fever	..	1	1	..	2	2	..	..	..	2
Total	265	57	145	136	143	329	90	48	138	467

Remaining in Hospital December 31, 1902.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Scarlet fever	10	20	13	14	19	33	4	6	10	43
Measles	14	1	2	1	5	6	5	6	11	17
Small-pox	2	2	2	2	..	2	..	4	4	6
Diphtheria and scarlet fever	5	2	..	1	5	6	..	1	1	7
Diphtheria and measles	1	..	..	..	..	..	..	1	1	1
Scarlet fever and measles	1	..	..	..	..	..	1	..	1	1
Total	33	25	17	18	29	47	10	18	28	75
Accompanying	..	..	8	..	..	..	..	1	7	8

Recapitulation.

	Remaining Jan. 1, 1902.		Admitted.		Discharged.		Transferred.		Died.		Remaining Dec 31, 1902.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Scarlet fever	25	13	345	363	303	320	..	..	43	37	18	25
Pneumonia	..	..	1	..	..	..	..	..	1	..	..	..
Measles	57	39	348	313	365	294	..	..	36	45	6	11
Small-pox	21	13	676	294	565	237	..	..	126	70	2	4
Varicella	..	..	..	1	..	1	..	..	..	..	..	..
Measles and pertussis	..	..	..	1	..	1	..	..	..	..	..	..
Measles and varicella	4	4	4	1	8	5	..	..	..	..	..	..
Diphtheria and scarlet fever	9	6	59	68	40	46	..	..	32	17	1	6
Diphtheria and measles	1	1	29	18	5	5	..	..	25	13	..	1
Diphtheria and mumps	..	..	1	..	1	..	..	..	..	..	..	..
Scarlet fever, measles and diphtheria	..	..	2	2	..	1	..	..	2	1	..	..
Scarlet fever and measles	5	9	17	20	15	21	..	..	9	5	1	..
Scarlet fever and varicella	..	..	7	2	7	2	..	..	..	..	..	..
Scarlet fever and pertussis	..	..	1	1	..	1	..	..	1	..	..	..
Small-pox and scarlet fever	..	..	..	2	..	..	..	..	..	2	..	..
Small-pox and diphtheria	..	..	..	1	..	1	..	..	..	..	..	..
Small-pox and pertussis	..	..	1	1	..	..	..	..	1	1	..	..
Total	122	85	1,491	1,088	1,309	935	..	..	276	191	28	47
Accompanying	..	40	36	260	34	294	..	..	..	..	1	7

REPORT OF PATIENTS TREATED AT KINGSTON AVENUE HOSPITAL.

BOROUGH OF BROOKLYN.

General Statement.

1902.	Males.	Females.	Total.	Native.	Foreign.	Total.	Accompanying.
Remaining in Hospital January 1, 1902	33	15	48	30	18	48	..
Admitted	613	560	1,173	805	368	1,173	99
Total	646	575	1,221	835	386	1,221	99
Discharged	491	426	917	619	298	917	86
Transferred	5	..	5	2	3	5	..
Died	101	79	180	149	31	180	..
Total	597	505	1,102	770	332	1,102	86
Remaining in Hospital December 31, 1902	49	70	119	65	54	119	13

Remaining in Hospital January 1, 1902.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	1	1	4	2	2	4	1	1	2	6
Scarlet fever	3	18	3	12	..	12	7	5	12	24
Measles	1	..	1	1	..	1	..	1	1	2
Diphtheria and scarlet fever	1	6	..	5	1	6	1	..	1	7
Varicella	1	2	..	1	2	3	..	..	..	3
Scarlet fever and measles	1	..	..	1	..	1	..	..	..	1
Total	8	27	8	22	5	27	9	7	16	43
For observation	..	3	2	1	2	3	1	1	2	5

ADMITTED.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total
Diphtheria	99	67	40	66	109	175	13	18	31	206
Scarlet fever	61	95	31	69	93	162	12	13	25	187
Measles	113	35	34	36	21	57	66	59	125	182
Small-pox	108	70	295	187	147	334	108	31	139	473
Varicella	8	2	1	1	..	1	4	6	10	11
Pertussis	4	1	..	3	2	5	..	..	..	5
Diphtheria and scarlet fever	23	18	1	13	23	36	4	2	6	42
Diphtheria and measles	15	4	3	4	4	8	8	6	14	22
Erysipelas	..	..	3	1	..	1	2	..	2	3
Diphtheria and pertussis	1	..	..	1	..	1	..	..	..	1
Scarlet fever and measles	16	2	1	4	6	10	3	6	9	19
Scarlet fever and varicella	1	1	..	1	1	2	..	..	..	2
Scarlet fever and typhoid fever	..	..	1	..	..	..	..	1	1	1
Small-pox and scarlet fever	..	1	1	..	2	2	..	..	..	2
Small-pox and measles	..	..	1	1	..	1	..	..	..	1
Scarlet fever, diphtheria and measles	2	..	..	1	1	2	..	..	..	2
Scarlet fever, diphtheria and varicella	..	1	..	..	1	1	..	..	..	1
Total	451	297	412	388	410	798	220	142	362	1160
For observation	..	3	10	3	4	7	2	4	6	13
Accompanying	..	..	..	..	..	..	..	..	..	99

Discharged.

	Age. Under 5 Years.	Age. 5 to 10 Years.	Age. Over 10 Years.	Native. Males.	Native. Females.	Native. Total.	Foreign. Males.	Foreign. Females.	Foreign. Total.	Total.
Diphtheria	53	58	40	46	76	122	13	16	29	151
Scarlet fever	37	82	31	59	57	116	17	17	34	150
Measles	69	28	33	30	18	48	41	41	82	130
Small-pox	74	65	244	147	118	265	90	28	118	383
Varicella	6	3	1	2	2	4	2	4	6	10
Pertussis	3	1	..	3	1	4	..	..	..	4
Diphtheria and scarlet fever	15	20	1	13	18	31	4	1	5	36
Diphtheria and measles	7	4	3	4	2	6	4	4	8	14
Erysipelas	..	..	3	1	..	1	2	..	2	3
Scarlet fever and measles	11	1	..	4	3	7	1	4	5	12
Scarlet fever and varicella	..	1	..	..	1	1	..	..	..	1
Scarlet fever and typhoid fever	..	..	1	..	..	..	..	1	1	1
Small-pox and scarlet fever	..	1	1	..	2	2	..	..	..	2
Scarlet fever, diphtheria and varicella	..	1	..	..	1	1	..	..	..	1
Scarlet fever, diphtheria and measles	1	..	..	1	..	1	..	..	..	1
Total	276	265	358	310	299	609	174	116	290	899
For observation	..	6	12	4	6	10	3	5	8	18
Accompanying	..	..	..	..	..	..	..	..	..	86

Transferred.

Small-pox	..	..	5	2	..	2	3	..	3	5

Died.

	Age.			Native.			Foreign.			
	Under 5 Years.	5 to 16 Years.	Over 16 Years.	Males.	Females.	Total.	Males.	Females.	Total.	Total.
Diphtheria	34	7	4	18	25	43	1	1	2	45
Scarlet fever	15	4	1	11	9	20	..	..	..	20
Measles	16	..	..	7	3	10	4	2	6	16
Small-pox	34	4	46	38	28	66	15	3	18	84
Diphtheria and scarlet fever	7	2	..	4	3	7	1	1	2	9
Diphtheria and measles	3	..	..	..	2	2	..	1	1	3
Scarlet fever and measles	..	..	1	..	..	..	..	1	1	1
Small-pox and measles	..	..	1	1	..	1	..	..	..	1
Varicella	1	..	..	..	..	..	1	..	1	1
Total	110	17	53	79	70	149	22	9	31	180

Remaining in Hospital December 31, 1902.

Diphtheria	13	3	..	4	10	14	..	2	2	16
Scarlet fever	12	27	2	11	27	38	2	1	3	41
Measles	29	7	2	..	..	..	21	17	38	38
Small-pox	..	1	..	..	1	1	..	..	..	1
Varicella	2	1	..	..	..	..	1	2	3	3
Pertussis	1	..	..	..	1	1	..	..	..	1
Diphtheria and scarlet fever	2	2	..	1	3	4	..	..	..	4
Diphtheria and measles	5	..	..	..	..	..	4	1	5	5
Diphtheria and pertussis	1	..	..	1	..	1	..	..	..	1
Scarlet fever and measles	6	1	..	1	3	4	2	1	3	7
Scarlet fever and varicella	1	..	..	1	..	1	..	..	..	1
Scarlet fever, diphtheria and measles	1	..	..	..	1	1	..	..	..	1
Total	73	42	4	19	46	65	30	24	54	119
Accompanying	..	..	..	..	..	..	..	..	..	13

Recapitulation.

	Remaining Jan. 1, 1902.		Admitted.		Discharged		Transferred.		Died.		Remaining, Dec. 31, 1902.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Diphtheria	3	3	79	127	59	92	..	..	19	26	4	12
Scarlet fever	19	5	81	106	76	74	..	..	11	9	13	28
Measles	1	1	102	80	71	59	..	..	11	5	21	17
Small-pox	..	..	295	178	237	146	5	..	53	31	..	1
Varicella	1	2	5	6	4	6	..	..	1	..	1	2
Pertussis	..	..	3	2	3	1	..	..	..	..	..	1
Erysipelas	..	..	3	..	3	..	..	..	..	..	..	..
Diphtheria and scarlet fever	6	1	17	25	17	19	..	..	5	4	1	3
Diphtheria and measles	..	..	12	10	8	6	..	..	..	3	4	1
Diphtheria and pertussis	..	..	1	..	..	..	..	..	..	..	1	..
Scarlet fever and varicella	..	..	1	1	..	1	..	..	..	..	1	..
Scarlet fever and measles	1	..	7	12	5	7	..	..	..	1	3	4
Scarlet fever and typhoid fever	..	..	..	1	..	1	..	..	..	..	..	..
Scarlet fever, diphtheria and measles	..	..	1	1	1	..	..	..	..	..	..	1
Scarlet fever, diphtheria and varicella	..	..	..	1	..	1	..	..	..	..	..	..
Small-pox and scarlet fever	..	..	..	2	..	2	..	..	..	..	..	..
Small-pox and measles	..	..	1	..	..	..	..	..	1	..	..	..
Total	31	12	608	552	484	415	5	..	101	79	49	70
For observation	2	3	5	8	7	11	..	..	..	..	..	..
Accompanying	..	..	..	99	..	86	..	..	..	..	..	13

The individual reports of the Assistant Sanitary Superintendent are herewith forwarded.

Respectfully submitted,

CHAS. F. ROBERTS, M. D.,
Sanitary Superintendent.

Department of Health—City of New York,
Borough of Manhattan.

To the Sanitary Superintendent:

Sir—I respectfully forward the following report of work performed in the Borough of Manhattan during the year 1902:

Division of Inspections.

On January 15, 1902, the Division for the Inspection of Foods and Offensive Trades and the Division of Sanitary Inspections were consolidated and reorganized, and the division is now under the direction of Chief Inspector Harry E. Bramley.

The Borough was then divided into districts, and an Inspector assigned to each district, who is responsible for its sanitary condition.

Until September 1, 1902, tenement houses were under the supervision of the Department of Health, but on that date all orders and records were turned over to the Tenement House Department, and the number of Inspectors reduced.

SLAUGHTER HOUSES.

The slaughter houses for cattle, small stock and chickens are under close observation, and the proprietors have been compelled to put their establishments in sanitary condition.

In addition to investigating all complaints, a thorough inspection is being made of all churches, theatres and public buildings in the borough, and, where necessary, orders have been issued.

CARBONATED WATERS.

Investigation of the conditions under which carbonated waters were being manufactured showed the necessity of having the matter under the jurisdiction of the Department of Health, and the Sanitary Code was amended by Section 202, which section is now being enforced.

> Sec. 202. It shall be the duty of every manufacturer, importer, or other person, who manufactures or imports in the City of New York any artificial or natural mineral, spring, or other water for drinking purposes, to file under oath with the Department of Health, the name of such water, and the exact location from which it is obtained, together with the chemical and bacteriological analysis thereof; and when manufactured the exact formula used in its production, giving qualitatively and quantitatively each and every item entering into its composition. No person shall manufacture or bottle mineral, carbonated or table waters in the City of New York without a permit from the Department of Health

INSPECTION OF RAPID TRANSIT SUBWAY.

During the summer a large number of complaints was received in regard to nuisances arising from the dumping of offensive material into the excavations of the Rapid Transit Subway; of the numerous pools of stagnant water collected at various points along the line, and the escape of sewage from the broken and disconnected sewers in the cuts. A Sanitary Inspector and a police officer were detailed to make a thorough inspection of the Subway, and secure the abatement of all nuisances.

INSPECTION OF THE CHINESE QUARTER.

In view of the large number of cases of bubonic plague occurring in San Francisco, it was deemed advisable to make a thorough investigation of the conditions prevailing in the Chinese quarter. Three sanitary inspectors, under the direction of a medical sanitary inspector, were detailed to perform this work. They were instructed to make a thorough examination of the sanitary condition of all buildings; to report all cases of sickness; of overcrowding, and where cellars were occupied as dwellings, or chickens kept without a permit.

In case of death of a Chinaman a thorough investigation is made before a burial permit is granted.

MILK.

Special attention is paid to the inspection of milk received in this borough, also to the general supply of milk. This necessitates tracing it along the various railroads to the point of shipment. A large number of samples of milk have been examined to ascertain the number of bacteria contained, and when the number is high, notice is sent to the farmer calling his attention to the fact. In addition to this, investigation is made to ascertain the cause and endeavor to remedy the condition; also to discover whether the milk was sufficiently iced from the time it left the farmer until its arrival in this city.

The milk stores in the borough are also kept under close observation, and many permits have been revoked in cases where the milk has not been properly iced, or the surroundings are such as to endanger the purity of the milk.

MEAT, FISH, FRUIT AND FOOD.

The meat, fish, fruit and food supply of the borough are under careful supervision.

MERCANTILE ESTABLISHMENTS.

An inspection has been made of every mercantile establishment in the borough, and another is now in progress.

Division of Contagious Diseases.

On January 15, 1902, the Division of Contagious Diseases and Medical Inspection were consolidated, and the division is now under the direction of Chief Inspector Alonzo Blauvelt, M. D.

On August 22, 1902, Walter Bensel, M. D., was appointed Assistant Chief Inspector, with direct charge of the Medical Inspectors detailed to schools and vaccination.

VACCINATION.

Owing to the prevalence of smallpox in the city, a large force of vaccinators was appointed in January, 1902. The force was divided as follows:

1. Vaccinators on duty in squads.
2. District Vaccinators.
3. Vaccinators on special duty in stores, hotels, etc.
4. Vaccinators in charge of smallpox houses.

Every tenement house in the borough was visited, and vaccination offered and urged upon all the occupants.

The various city departments were visited, and all employees vaccinated.

Notices were sent by the Commissioner of Health to the proprietor of every factory and mercantile establishment in the borough, urging vaccination, and stating that physicians would be sent at any hour, day or night, to vaccinate their employees. In this way thousands of vaccinations were obtained.

Houses in which a case of smallpox occurred were visited at night by a vaccinator; a complete census was taken of the occupants of the house; vaccination offered and urged, and the inmates kept under surveillance for three weeks after the case was removed.

Within twenty-four hours after a case of smallpox was discovered vaccination was offered and urged upon every person residing within two blocks of said house.

In March, 1902, owing to the large number of cases of smallpox occurring in lodging houses, the Board of Health passed a resolution requiring every keeper of a lodging house to refuse admittance to any applicant, for more than one night, who could not show a certificate of a recent successful vaccination.

SUMMER CORPS.

In June, 1902, the Summer Corps was appointed, and, in addition to visiting tenement houses and providing medical attention to those who were unable to employ a physician, inspection was made of conditions under which milk was sold in the grocery stores; dispensaries were established at the recreation piers; smallpox houses were kept under observation, and vaccination performed when required.

INSPECTION OF SCHOOLS.

When the schools opened in September, the number of medical inspectors assigned to schools was reduced, and inspectors were required to give their services to the Department between 8 A. M. and 4 P. M. They are obliged to visit the schools to which they are assigned each school day before 10 o'clock, and examine each child who has been isolated by the teacher as a possible source of contagion, and exclude from school any one afflicted with or showing symptoms of an infectious or contagious disease.

Once a week the inspector makes a round of all classrooms and examines the eyelids, throat, hair and skin of each pupil, individually.

Special attention is paid to excluding from school all children suffering from trachoma. On account of the large number of cases excluded from the schools, the dispensaries were unable to treat all who applied. Therefore, on December 17, 1902, Dr. J. W. Brannan, President of Bellevue and allied hospitals, fitted up a portion of the old Gouverneur Hospital for the treatment of trachoma. The physicians are furnished by the Department of Health.

DIVISION OF CHEMISTRY.

The Chemical Laboratory having been taken from the Division of Inspections, the Division of Chemistry was established March 5, 1902, and the scope of the work has been greatly increased. The division is now under the direction of Joseph A. Deghuee, Ph. D.

The laboratory work may be divided as follows:

Daily and periodical examinations, as in the case of milk and water.

Examination of samples collected by the various inspectors of the Division of Inspections, either as the result of complaints of citizens; for special investigations, or at the request of the chemist.

Examination of milk and cream samples left for analysis by milk dealers.

Examination of samples submitted by the Clerk of Accounts and Supplies.

Samples examined for other departments of the City Government.

Special investigations.

Experimental work.

RESEARCH LABORATORY.

(Under the direction of Dr. William H. Park, Assistant Director.)

It having been demonstrated by Shiga in Japan that epidemic dysentery was due to a special bacillus, and also that cases treated by the specific serum did better than those not receiving such treatment, Dr. William H. Park decided to take up the study of dysentery, as well as the production of a preventive serum.

The cases which occurred this summer just north of New York City were due to the dysentery bacillus. This fact not only made it more necessary to take up the study of the disease, because of the liability of the city being exposed to an epidemic, but the cases furnished material for such study.

In spite of the fact that there has been little real dysentery in New York, it was thought wise to begin injection of horses, to produce a protective serum, fearing that in some way the City of New York might become infected next year. Careful study is also being made of the water supply of the villages that were infected last summer, to learn, if possible, the ways by which it was spread.

Vaccine Laboratory.

(Under the direction of Dr. John H. Huddleston, Assistant Director.)

The smallpox in the city made such great demands on the Vaccine Laboratory that it was necessary during the greater part of January and February, 1902, to continue work until 11 or 12 o'clock at night.

In addition to the routine work, Dr. J. H. Huddleston has been conducting experiments on the relation of tetanus to vaccine, and on the effect of filtering virus. It has been demonstrated that the tetanus germ occurs at times in the fæces of calves, and that there is every reason, therefore, for insisting on the greatest cleanliness in the collection and preparation of vaccine virus. It has been found that filters which separate the bacteria from virus also separate the vaccine organism, and that the filter, therefore, cannot be employed in the preparation of virus.

Diagnosis Laboratory.

(Under the direction of Dr. J. S. Billings, Jr., Assistant Director.)

Early in the year a system was established of telephoning to attending physicians results of primary cultures of diphtheria, also typhoid and malaria examinations, so that the physician learns the result of the examination before he leaves his office in the morning.

The laboratory service in the boroughs of Brooklyn, Queens and Richmond has been entirely reorganized.

A special corps of inspectors is detailed for the administration of antitoxin and intubation. They are on duty at all hours, both day and night, to answer calls.

The number of cases injected by the Department has been more than tripled, and the case mortality has been materially reduced from that of 1901.

These inspectors also inspect and have supervision of all cases of pulmonary tuberculosis; give instructions to those ill, and order disinfection and renovation of premises when needed.

Examinations of sputum, for the presence of tubercle bacilli, have increased over those of 1901; and also the examination of blood of cases of suspected typhoid fever, for the presence of the Widal reaction.

Examination of blood of cases of suspected malaria, for the presence of malarial parasites, has been made part of the routine work.

Inspectors have been appointed in each borough to investigate localities where mosquitoes are likely to be found, and to issue orders to abate nuisances.

Willard Parker and Reception Hospitals.

(Edw. G. Bryant, Resident Physician.)

Willard Parker and Reception Hospitals have been thoroughly renovated and put in first-class condition.

On account of insufficient accommodation for the employees at the hospital, the building at the corner of Avenue C and Sixteenth street has been rented, and will be converted into a dormitory for the female help. The rooms which have been vacated are being used to relieve the overcrowding of the male help.

Necessary repairs have been made at the disinfecting and ambulance station, and the entire building has been put in first-class conditon.

Respectfully submitted,

(Signed) F. H. DILLINGHAM, M. D.,

Assistant Sanitary Superintendent.

Department of Health—City of New York,
Borough of Brooklyn.

To the Sanitary Superintendent:

Sir—I forward herewith the report of work performed in the Borough of Brooklyn during the year 1902. Prior to January 15, 1902, there were four divisions in this borough: A Division of Sanitary Inspection; a Division of Contagious Disease; a Division of Inspection of Foods, Offensive Trades, Mercantile Establishments, etc., and a Division of Medical School Inspection. On January 15, 1902, the Division of Sanitary Inspection was consolidated with the Division of Foods and Offensive Trades and designated the Division of Inspections, and to the charge of this division Doctor Henry V. Walker was assigned, with the title of Chief Inspector. The Division of Contagious Disease and that of Medical School Inspection were at the same time consolidated under the designation of Division of Contagious Diseases, and to the charge of this new division Doctor F. A. Jewett was assigned, with the title of Chief Inspector.

Division of Inspections.

Up to August 1 the inspection of tenement houses was included in the work of this division; on that date all pending orders and complaints against tenement houses were forwarded to the Tenement House Department.

Cow Stables—On October 10 an inspector was assigned to the sanitary investigation of the dairy stables in the borough, of which there were 167, containing 23,029 cows. All of these, with the exception of 10, have been inspected. The conditions found were such as to require the abolition of 41 of these stables; of these 27 have already been declared public nuisances and the cows have been removed.

The water supply has been analyzed in about sixty wells, and twenty-five of them have been condemned and sealed so that the water can no longer be used.

SLAUGHTER HOUSES.

The location of slaughter houses in the borough is very unfortunate, none of them being located on the water front. Many of them are old buildings and in need of important sanitary improvements. Orders have been issued against them all for the correction of the nuisances therein found. The least of the nuisances connected with the Brooklyn slaughter houses is that their distance from the water front requires the driving through the streets of large numbers of cattle. In several instances steers have broken from the herd and put in jeopardy children on their way to school.

STABLES.

At the beginning of the year a systematic inspection of all horse stables in the borough was begun, and orders issued requiring sewer connections when these were not present, and a compliance with Section 120 relating to the discontinuance of the use of manure vaults and the removal of manure. Owing to the lack of facilities for the removal of manure in this borough this reform has not advanced as rapidly as I had hoped, but the matter is receiving careful attention.

SMOKE NUISANCES.

Owing to unusual conditions which prevailed in the coal market, the matter of prosecution of smoke nuisances has been in practical abeyance for some time. It is, however, now being again taken up and the ordinances will be enforced to as full an extent as is practical.

MILK.

Five inspectors are assigned to the inspection of milk on sale in the borough. Owing to the position which the magistrates take as to the obligation of this Department to carry out the State Agricultural Law relating to the taking of samples, the presence of witnesses, etc., it is necessary to have two inspectors work together. This, of course, diminishes the efficiency of the force.

MERCANTILE ESTABLISHMENTS.

During the year systematic inspection of mercantile establishments has been made and orders issued in all instances in which any of the provisions of the law relating to these establishments were violated. In addition to this, the routine work of the Department as to the issuing of mercantile certificates has been carried on.

FOOD INSPECTION.

The inspection of foods is carried on much as in the past, a meat inspector being stationed at each slaughter house in order that the carcass of every animal killed may be examined before it is permitted to be placed on sale.

Procedure Relative to Enforcement of Orders.

Up to about August 15 the method of procedure in the enforcement of orders was followed with what appeared to be excellent results. This method was at that time changed in order to place the control of orders nominally in the hands of the Corporation Counsel more directly in the control of the Law Department. This method was not found to give satisfactory results, and was accordingly, about November 15, abandoned. The result of the practical cessation of proceedings for the enforcement of orders from August 15 to November 15 has led to an accumulation of orders not complied with which it will require some time to dispose of.

Division of Contagious Diseases.

SMALL-POX.

The number of cases of smallpox in the month of December, 1901, was nearly four times as large as in the month of November, 1901, and from that time on until March, was on the increase; in the month of March it reached its maximum, and has been gradually falling until the month of December, during which we have had but two cases thus far. For the abatement of this epidemic a thorough canvassing of the borough by the vaccinators has been carried on, including a house-to-house inspection; a thorough examination has been made of the pupils in the public and parochial schools, in which four thousand children have been found who had never been vaccinated, and forty-one thousand whose former vaccination had run out; besides these measures the vaccination of employees in all manufacturing and mercantile establishments throughout the borough has been performed.

Borough Office.

The borough office is now kept open continuously throughout the twenty-four hours, including Sundays. A vaccinator is on duty from 9 A. M. to 8 P. M. to vaccinate all those who may apply; during the rest of the time from 8 P. M. to 9 A. M., a medical inspector is in charge to answer all telephone calls, and to furnish antitoxin, and to perform such other services in connection with the work of the borough as he may be called upon to do.

TYPHOID FEVER.

This disease has been more prevalent than in 1901. A special inspector has been assigned to the investigation of the cases of the disease, the result of which shows that while a great many of the cases undoubtedly received their infection beyond the City limits, others contracted the disease within the City. An investigation into the water, the ice and food supply has been carried on, but up to the present time there has been nothing striking discovered which may be regarded as a general source of infection.

DIPHTHERIA.

This disease has been also very prevalent since the opening of the schools. The practice still prevails in some of the schools of distributing pencils indiscriminately among the scholars, so that a child suffering from diphtheria in its early stages, and still attending school, may to-day use a pencil which will be given to another child to-morrow. The almost universal practice among children of putting pencils in the mouth completes the work of infection.

Daily lists of contagious diseases are sent to every public and parochial school in the borough. Envelopes are now being printed for sending these lists to every Sunday school, as well.

Medical School Inspection.

The inspection of schools which was done prior to the opening of the schools in September of this year was in many instances merely nominal, and, in my judgment, one of the most important steps in the way of sanitary reform was taken by the Board when it reorganized in September the work of medical school inspection. Formerly a large number of inspectors, not far from fifty, made routine visits to the schools, spending but a short time in each school. At the present time this force has been reduced to nineteen, with a Medical Inspector, Doctor Forbes J. Munson, in charge. Each inspector has from six to fourteen schools which he visits, making a thorough general inspection of one school each day, devoting the entire school day, from 9 A. M. to 3 P. M., to this work. It is gratifying to note that the principals in most of the schools have co-operated with the inspectors in every way possible in the endeavor to make the inspection a success. Although statistics are not called for in this report, I cannot forbear mentioning that there have been excluded from the schools by these inspectors since September 18, 1902, the following cases:

Diphtheria	5
Measles	14
Chicken pox	40
Contagious and infectious eye diseases	1,979
Diseases of the skin	879
Whooping-cough	74
Mumps	336
Parasitic diseases of the head and body	2,920

The large number of schools in this borough, 137 public and 46 parochial, necessitates, in my judgment, an increase in the number of medical school inspectors, in order to cover the entire borough. The number of schools assigned to each inspector is altogether too large; there should be at least fifteen more inspectors for this purpose.

DISINFECTION.

In September, additional disinfectors and laborers were appointed, and horses and wagons purchased for the work of disinfection, which prior to this time had been very unsatisfactory, and very incomplete.

The supervision of this work was assigned to Doctor Henry A. Higley.

The system in operation involves the removal of all non-washable goods within the infected area, in premises in which cases of diphtheria, scarlet fever, small-pox and tuberculosis have occurred. This is held to include all carpets, rugs, mattresses, pillows, bolsters, blankets, comfortables, portieres, table covers, etc., and clothing which has been exposed to infection. The medical inspector is the sole judge of the extent of the area of infection, and is held responsible for correct notification to the Department concerning the specified goods to be removed therefrom.

The above-noted removal of goods is compulsory in the diseases stated for all tenement-houses—that is to say, if the removal of such is refused by the owners, it is enforced by the Department, through the aid of the police. In private houses no such enforcement is practiced, but no permit for return to school is granted until such goods have been removed. The only exception to the last regulation is that the Assistant Sanitary Superintendent, the Chief of the Medical Division, or the Medical Inspector in Charge of Disinfection may, if he shall deem it wise, accept the disinfection performed under the direction of the attending physician in lieu of that performed by the Department; whenever, however, either of the above officers so accept a disinfection he becomes *personally* responsible therefor and any consequences which may follow.

In all varieties of contagious disease, except those above noted, disinfection and removal of goods are only performed by the Department upon the request of the family involved. Where the goods are removed as above specified the same takes place before the house disinfection is begun. The goods are placed within large canvas bags (securely closed) within the infected area, and removed in wagons to the disinfecting station, where they are disinfected and returned to the owner as soon as possible, without having been removed from the bags in which they were originally placed.

Following the removal of the infected goods the house disinfectors arrive at the infected premises and carry out the house disinfection.

METHOD OF DISINFECTION.

The non-washable infected goods which are removed are submitted to live steam at 220° F. for twenty minutes. The washable infected goods are placed in a 1-2000 aqueous solution of hydrarg. bichlor. at the infected premises and are allowed to remain therein for four hours. All rooms, halls, etc., in the infected area are disinfected with formaldehyde, six ounces of formalin being evaporated for every 1,000 cubic feet of space. All doors, windows, etc., are thoroughly pasted and a four-hour contact obtained.

In the case of school rooms, dormitories, etc., all floors, walls and desks are thoroughly washed down with a 1-2000 aqueous solution of hydrarg. bichlor. before formaldehyde disinfection is done.

SUMMER CORPS.

In addition to the usual duties of the Summer Corps, namely, the attendance and prescribing for indigent sick children, the inspectors made thermometric tests of the milk offered for sale in the borough, and whenever milk was found below fifty degrees Fahrenheit, notices were served upon the milk dealers to correct this violation of the Sanitary ordinance.

In addition to this, Doctor Ager, one of the inspectors of the Department, was assigned to special work in the investigation of the causes of infant mortality during the summer months. His report has been forwarded to you.

Mosquito Work.

In order to diminish the amount of malarial infection, inspectors were assigned to visit every part of the borough, and to locate and report upon the ponds, however small, which they found. Complaints were made in every instance, and orders have been served upon those responsible calling for the draining of these ponds where necessary and the filling of them with fresh earth.

Respectfully submitted,

(Signed) JOSEPH H. RAYMOND, M. D.,
Assistant Sanitary Superintendent.

DEPARTMENT OF HEALTH—CITY OF NEW YORK,
BOROUGH OF THE BRONX.

To the Sanitary Superintendent:

SIR—I have the honor to submit herewith the annual report of work performed during the year 1902.

It will be noticed that a decrease in the number of inspections and reinspections has occurred this year as compared with 1901, but this can be accounted for in the fact that nine inspectors were employed last year in performing medical and sanitary work as compared with five inspectors in 1902. However, the actual amount of work performed has increased considerably, as the following list will show, thus proving beyond doubt that the work has been carefully and actually performed:

	1901.	1902.
Number of inspections and reinspections	69,366	59,194
Inspections of mercantile establishments	478	2,221
Number of Inspectors' complaints	1,287	1,316
Inspectors' complaints made on C. C	1,415	2,210
Total number of permits issued	858	923

Despite the fact that fewer citizens' complaints were received this year than last, the number of orders issued have been greater, indicating that more original inspections were made and that the districts were more carefully looked after:

	1901.	1902.
Number of citizens' complaints received	3,880	3,613
Number of orders issued	2,573	2.746

The amount of work accomplished this year in the examination of foods, etc., while not quite as great as 1901, compares very favorably, in view of the fact that six inspectors were employed during 1901 performing this work, while this year but two have been employed.

The work accomplished by the Milk Inspectors exceeds to a great extent the amount performed by the same force during 1901. Special attention was given this branch of the Department work, with the result that arrests were frequent for violations of Section 63 of the Sanitary Code.

	1901.	1902.
Pounds of food condemned and destroyed	94,861	76,985
Number of arrests, section 63	1	13
Fines collected	......	$280

It is gratifying to see the decrease in the number of small-pox cases this year. From present appearances it may be hoped that the Bronx will be free from pest during 1903.

	1901.	1902.
Number of cases of small-pox	263	162
Number of vaccinations performed	43,026	40,524

This is the first year that cases of tuberculosis have been given any attention in the Borough of The Bronx. All cases reported have been inspected, the rooms ordered renovated, the apartments fumigated and infected goods removed:

	1901.	1902.
Cases of tuberculosis reported	744	592

During 1901 all infected goods were removed by the Manhattan employees, while during 1902 the work was performed by this borough.

	1901.	1902.
Pieces of infected goods removed	....	1,997

The amount of work performed in the medical inspection of schools speaks for itself. The new system of appointments, whereby each inspector is employed the whole day, is much more satisfactory, and the inspectors show more interest. Formerly this work was neglected almost entirely.

	1901.	1902.
Visits to schools	7,192	5,988
Children examined	2,690	238,413
Children excluded from schools	295	2,094

The Veterinarians have been busily engaged in examining diseased horses and inspecting cow stables in the borough. There have been more glandered horses destroyed by the Department this year than last, and the decrease in the number of heads of cattle examined is due to the fact that the old system of injecting the cattle with tuberculin has ceased.

	1901.	1902.
Heads of cattle examined	1,606	1,542
Glandered horses destroyed	79	105

During the summer months an Assistant Bacteriologist was constantly engaged in locating ponds of stagnant water and other breeding places of mosquitoes. Such places were treated with petroleum and orders issued to fill in or grade same. The beneficial results obtained from this work will be apparent this coming summer.

Respectfully submitted,

(Signed) EDWARD F. HURD, M. D.,
Assistant Sanitary Superintendent.

Department of Health—City of New York,
Borough of Queens.

To the Sanitary Superintendent:

Sir—I have the honor to submit the following general report of sanitary work performed in the Borough of Queens for the year 1902:

Sanitary Inspections.

The working force consists of six sanitary inspectors, one food inspector, five school inspectors, two vaccinators, one diagnostician, one veterinarian and two disinfectors.

The work of sanitary inspection shows an increase of more than 100 per cent. over 1901; inspections and reinspections are more promptly made and returns received in every instance within forty-eight hours.

The number of inspections and reinspections made was 20,018, as follows:

Sanitary inspections and reinspections	6,993
Visits to contagious diseases	1,607
Visits to contagious diseases for disinfection	873
Inspections of schools	2,662
Inspections and reinspections by Veterinarian	1,375
Inspections and reinspections by Milk Inspector	1,422
Inspections by Fruit and Food Inspector	2,430
Inspections and reinspections by Sanitary Officers	2,656
Total	20,018

Citizens' complaints received	1,135
Inspectors' complaints received	949
Number of orders issued	1,927
Number of orders of vacation issued against premises for non-compliance with orders	28
Number of orders referred to Tenement House Department	185
Number of orders outstanding	300
Amount of food condemned and destroyed, pounds	783

Contagious Diseases.

There have been 2,232 cases of contagious diseases reported for year 1902, as follows:

Diphtheria	443
Scarlet Fever	364
Measles	706

Tuberculosis	254
Typhoid Fever	202
Parotiditis	1
Croup	24
Chicken-pox	161
Whooping Cough	20
Small-pox	57
Total	2,232

Number of cases removed to Contagious Disease Hospital	74

This is an increase over 1901 of

Diphtheria	57
Measles	435
Typhoid Fever	121
Chicken-pox	79
Whooping Cough	20
Tuberculosis	130

And a decrease of

Scarlet Fever	44
Small-pox	33

This increase in Measles was in the earlier part of the year, and at this time I know of only two cases in the borough.

The greater number of Typhoid Fever cases occurred during the late summer and the early fall months; Chicken-pox was prevalent a good portion of last winter, with remission during the summer, and is prevalent now.

In the recent outbreak of Typhoid Fever at Bayside, the source of infection was traced directly, with the aid of Doctors Soper and Dunseith, and later by investigations of Dr. Klein, to the dairy farm of Charles H. Tilton at Bayside, who supplied milk to all the families affected. Numerous orders have been made on Tilton, and he has finally been forced to move to another locality.

The increase in cases of Tuberculosis reported is about one hundred per cent.; this does not indicate any increase in the disease, but means that after repeated warnings physicians are now reporting their cases.

Cow Stables.

Cow stables which furnish dairy supplies, and of which there are about three to four hundred in the borough, at the beginning of this year were in a filthy and unsanitary condition; these have been vigorously dealt with. Inspections of all stables have been made as frequently as we were able, and orders issued in accordance with the sanitary regulations recently issued by the Board.

In 83 cases where orders were not complied with, orders declaring these places a public nuisance were issued by the Board, and the orders were then complied with, or the cows sent to the pound, or the owners driven out of business. At the present time there is marked improvement, and with constant supervision I expect still greater improvement.

There have been 422 inspections by the Sanitary Inspectors, 795 inspections by Veterinarian and 580 reinspections by Veterinarian, making a total of 1,797 inspections on cow stables.

There were 1,422 inspections and reinspections made by the Milk Inspector during the year, and 974 specimens of milk examined by Milk Inspector; 95 specimens of milk collected and sent to the Laboratory for examination, and 520 quarts of milk destroyed.

Ponds.

Through the work of Dr. William A. Payne, of the bacteriological department, much has been accomplished toward getting rid of unsanitary and mosquito breeding ponds; many have been filled in, others drained, and owners of these ponds, on whom notice was served, express a desire to remove the unsanitary condition. In my opinion, at least fifty per cent. of them will have been put in good sanitary condition by the beginning of spring. Oil was used to a considerable extent during the past summer on mosquito breeding ponds with apparently good results.

School Inspections.

The new method of school inspection is a great improvement. There are seventy-seven schools in the borough, and about thirty thousand pupils. The plan of inspection is for each medical inspector, including diagnostician, to visit two schools each morning, inquire as to the health of pupils and make any exclusions that are necessary. The regular school inspector makes a thorough inspection of each pupil in the schools visited by him, completing as many of these as possible so as to finish the work by noon of each day. Under the present apportionment, I find that all the schools and about twenty thousand pupils are thoroughly inspected each week. All inspections are finished by 12 o'clock of each day except in those schools having half-day session; in these cases afternoon inspections are necessary.

The plan pursued this year of sending a daily list of contagious diseases to each school and a weekly list to Sunday schools has given very satisfactory results.

The total number of children examined for year is.......................... 254,551
The number of children excluded from school is............................ 640

Disinfecting Station.

In May the Board established an ambulance and disinfecting station at Jamaica, which has proved of great benefit, as by this means we have been able to remove cases of contagious diseases promptly, in almost every case the removal being made the same day that the case was reported, and infected goods the day following the disinfection of house.

Disinfections and removal of infected goods are conducted in accordance with the rules and regulations recently issued by the President.

The number of disinfections performed is.................................. 1,392

Culture Collections.

The daily collection of cultures for bacteriological examination and establishment of culture stations at various points, which was inaugurated last winter, is of great value. Physicians in the borough do not take advantage of this means of diagnosis as they should, but as this is a matter entirely of education, when the benefits are more thoroughly understood, I believe that every case applicable will be submitted to bacteriological examination.

Antitoxin.

The demand for antitoxin at this office, not including culture stations, has increased over two hundred per cent. While this increase is cause for congratulation, the results are far from being what they ought to be. The mortality by diphtheria for year 1902 is 21 per cent, almost double what it would have been if antitoxin had been used, and when the easy method of procuring this remedy is taken into consideration, together with the fact that this Department will furnish a physician to administer it, it seems almost criminal for any physician to refuse to use it.

Vaccinations.

A thorough inspection of all the schools and a house-to-house canvass in the thickly populated sections was made, and 16,564 vaccinations were performed, exclusive of office vaccinations, where a vaccinator is on duty constantly.

Arrests.

Thirty-six arrests were made for violation of the Sanitary Code, including smoke nuisances, adulterated milk, maintaining slaughter houses, improper collection of garbage; convictions were obtained in the majority of these cases, and fines imposed and collected amounting to $1,625.

Respectfully submitted,

(Signed) SAMUEL HENDRICKSON, M. D.,
Assistant Sanitary Superintendent.

Department of Health—City of New York,
Borough of Richmond.

To the Sanitary Superintendent:

Sir—I have the honor to submit my annual report of the work in this Department in the Borough of Richmond for the year 1902.

In making this report, I regret very much that I am not able to give you a more detailed statement, due to the fact that I was not appointed Assistant Sanitary Superintendent until June 22, 1902, to fill the vacancy caused by the death of Dr. Theodore Walser, which occurred on the 23d day of May, 1902, which has been previously reported to you.

I was assigned by the President to act as Assistant Sanitary Superintendent during his illness of two months, and appointed Assistant Sanitary Superintendent on June 22, 1902, consequently I am not perfectly familiar with the work performed prior to my temporary assignment as Acting Assistant Sanitary Superintendent.

When I assumed charge of the office I found the work going on in a most creditable and satisfactory manner, and that few changes were necessary. The clerical work of the office was under the charge of Mr. Charles E. Hoyer, Assistant Chief Clerk, and was carried on to my perfect satisfaction. The clerks in this Department have been conscientious and competent in the discharge of their respective duties.

There was at one time great difficulty and confusion in the sanitary inspections, due to the large territory to be cared for, and the lack of facilities to enable the inspectors to accomplish the work assigned to them. At your suggestion, I have subdivided the borough, assigning a certain area to each sanitary inspector, and holding them responsible for their respective districts. This system has enabled them to cover the entire borough, and has very materially lessened the citizens' complaints, and enforced a strict sanitary supervision. The results of this system have been most satisfactory.

There have been but few orders issued to comply with the Sanitary Code regulations which have not been complied with. There are at present twenty-five cases in the Corporation Counsel's office and ten cases pending in the courts. The activity of the Corporation Counsel's office in bringing these cases to suit has been of great benefit to this Department.

The inspection of the dairies, under the charge of Dr. Nichols, Veterinarian of this Department, has been very thorough, and the order recently received has been put into effect, and I believe that with a few exceptions the dairies are in a first-class condition. Dr. Nichols should be commended for the faithful and painstaking manner in which he has performed his duties.

During the summer months, special care and supervision of the milk supply was taken to enforce the rules as to temperature and facilities for the preservation of the milk. The two milk inspectors assigned to this borough have to cover very large and extended districts,.and notwithstanding this fact, I am of the opinion that every producer and dealer in this borough have been inspected at least once a week. There were six cases of adulteration with formaldehyde. Summonses were issued for the arrest of the offenders, but, upon the advice of the Corporation Counsel, the cases were not pressed in court, due to the fact that the milk was purchased in the State of New Jersey, and that the dealer was innocent as to the condition of the milk. Not a single case of contamination or adulteration was found against a producer in this borough.

The rules and system of the Department have been thoroughly carried out in regard to the disinfection of houses where contagious and infectious diseases have existed, and the work of the Department in this respect has been greatly appreciated by the profession as well as the laity. We are now disinfecting all the houses with formaldehyde, and most of the private houses where contagious diseases have occurred have also been disinfected by request.

Recently it has been necessary to close one of the public schools, due to an epidemic of measles. The school was closed for one week, disinfected and fumigated, which has materially stamped out the disease in this locality.

On January 9, 1902, the first case of smallpox made its appearance in the borough, having its origin by contact with a driver of a brewery wagon distributing beer in one of the infected towns in the State of New Jersey. This case developed in a child five years of age, who was immediately transferred to North Brother's Island. During the following two months thirty-six cases developed, all of them being widely distributed over the borough, some occurring in Tottenville, a town on the extreme end of the island, which necessitated their being transported by the ambulance a distance of eighteen miles, where they were transferred to the boat and taken to North Brother's Island, traveling in all about thirty-four miles.

The houses in which these cases developed were quarantined, the inmates who had not previously been rendered immune by vaccination were vaccinated, the houses thoroughly scrubbed, fumigated, and disinfected; clothing, bedding and all movable material were transported to Quarantine Station, and, through the courtesy of Dr. Alvah H. Doty, Health Officer of the Port of New York, were disinfected and returned. We instituted house-to-house vaccination in the localities in which the disease developed, and I am pleased to report that there was not a secondary case occurring in the affected locality.

Vaccination in the public and parochial schools has been most thorough, and I am informed by the vaccinators that there is not a child attending these schools who has not been vaccinated recently or in the time limit.

Inspections of the schools are now systemized so as to enable the inspector to visit the schools in his district every day. Exclusions have been far in excess of the previous years, due, I think, to the strict supervision of the inspectors. The Medical School Inspectors assigned to the school districts, comprising a certain number of schools, are also held responsible for the contagious diseases reported in their districts. Stations for the purchase of antitoxin, and where culture tubes can be obtained at any time, have been of great service to the profession, and the free distribution of antitoxin to the poor has been the means of lessening the mortality from diphtheria.

During the past few weeks there have been many cases of glanders. These cases are usually disposed of at once, by destruction of the animal, the Department disinfecting and fumigating the stable. I have also had the watering troughs cleaned, disinfected and emptied upon the advice of the veterinarian, and the water turned off and not allowed to run for one week.

During the year the Department has been supplied with three horses, and the necessary ambulance, disinfecting wagon and runabout for use of the inspectors in the outlying districts, enabling the Department to perform its work with greater rapidity and satisfaction.

The order compelling houses to be connected with the public sewer and to discontinue the use of cesspools and privy vaults is being enforced, and we are rapidly doing away with the objectionable and unsanitary conditions.

We have under construction at present a modern disinfecting station, equipped with the most perfect sterilizer, and which will be in operation very shortly.

During the epidemic of smallpox in the early part of this year, had it not been for the kindness of Dr. Alvah H. Doty it would have been impossible for us to have sterilized the goods taken from the houses infected. This is a need, long felt, in this borough, and should another epidemic develop we have the means of stamping out the disease at once, and in other cases where disinfection is required we will remove all goods from infected houses to the sterilizing station, to be sterilized and returned.

Our present quarters are inadequate for the working force, to the gradual enlargement of the scope of work, and it has been necessary for us to obtain quarters of greater dimensions. We succeeded in leasing the first floor of the building situated on Water street, Stapleton, located in the most central and desirable portion of the island, enabling citizens in the outlying portions of the borough to reach the office on the payment of a single fare. We will occupy these offices in a very short time.

We have had a thorough topographical survey made of the watershed of the Staten Island Water Supply Company, and the conditions are decidedly unsanitary, cesspools, privy vaults, stables, etc., draining into Palmer's Run, which feeds the lowlands, upon which the pumps are located. This water is undoubtedly contaminated, and not suitable for domestic purposes.

Many orders have been issued, and more will be shortly, requiring the abatement of this nuisance, which will very materially benefit this water supply. The condition of affairs existing in this water supply demands the earnest attention of this Department.

Respectfully submitted,

(Signed) JOHN T. SPRAGUE, M. D.,
Assistant Sanitary Superintendent.

DEPARTMENT OF HEALTH—CITY OF NEW YORK.
RIVERSIDE HOSPITAL.

To the Sanitary Superintendent:

SIR—I have the honor to submit the following report of work done and permanent improvements made during the year 1902:

The brick buildings, both Ward and Administrative, have been painted inside and out, the masonry painted, slate roofs and plumbing repaired.

The cellars have been cleared of all rubbish and condemned articles, the plastering repaired and walls whitewashed. A new cement floor has been laid in the cellar of Pavilion I. The defective pillars in the piazza of Pavilion I. have been replaced by new ones.

Pavilions II., III., IV., V., VI., VII., XI. and XII. have been painted inside and out, the roofs, woodwork and plastering repaired, old plumbing, bath-tubs and toilet fixtures replaced with new, and solid sustaining walls built between the foundation piers.

In Pavilions III. and VI. the floor space has been altered to make an additonal toilet and bath-room, and a dining-room for convalescent patients.

The toilet rooms in Pavilions XI. and XII. have been refinished with soapstone bases and " Keene cement " walls.

Four toilet and bath rooms have been added to each of the Pavilions VIII., IX. and X., and solid foundation walls placed under these buildings.

The ward furniture and beds in all buildings have been painted.

The mattresses have been removed from all ward buildings, and blankets substituted.

A new roof has been placed on the Ice-house, the building altered for the permanent storage of ice, and a compartment partitioned off for cold storage purposes.

A new roof has been placed on "Ducker A"; the roof and woodwork of the Carpenter Shop have been repaired, and the building painted.

Two new improved laundry machines have been placed in the Laundry, and the other laundry machinery repaired.

The Steam Disinfecting Plant has been repaired and put in operation, and the adjoining room fitted with wire racks for the storage of disinfected clothing.

New roads have been cut out around the new Pavilions VIII., IX. and X., and the adjoining ground graded up to a uniform level.

The entire steam plant has been overhauled and repaired, pipes recovered, and new tubes placed in Boiler No. 1.

A large hot-water tank has been erected in the Boiler Room, which supplies hot water to all buildings.

A telephone switchboard has been placed in the Central Office with twenty-two telephones connecting all Ward and Administrative buildings.

The ambulances and delivery wagons have been repaired and painted.

The steamer "Franklin Edson" has been overhauled, new copper sheathing placed on hull, the woodwork and machinery repaired.

The launch "Duchess" has been repaired and fitted with a new ten-horse-power electric motor. A new launch has been purchased by the Department.

The steamboat dock has been repaired and a shed erected to afford shelter to patients while being transferred from boat to ambulance.

A new steamboat dock has been erected to facilitate the unloading of coal and freight.

A new waiting room has been erected on the dock at the foot of East One Hundred and Thirty-eighth street.

I respectfully recommend that the following improvements be made during the year 1903:

That new plumbing be placed in Pavilion I.

That the plumbing in the Office Building and Kitchen Building be repaired.

That the masonry of Kitchen Building be pointed and outside of building be painted.

That the gutters, leaders, roof and woodwork of Kitchen Building be repaired.

That Pavilions VIII., IX. and X. be painted outside.

That radiators be placed in the halls of Pavilions VIII. and IX.

That concrete floors be placed in the cellars of Kitchen and Administration Buildings.

That new pavements be placed in Boiler Room and Coal House.

That present cinder paths be replaced by asphalt pavement.

That the sea wall be extended from the stable to the government line, and the present sea wall be repointed.

That a boat-house be built on the new pier for the sheltering and docking of the launches.

Respectfully,

(Signed) E. M. BEERY, M. D.,
Resident Physician.

Department of Health—Sanitary Bureau,
Division of Inspections, Borough of Manhattan,
Southwest Corner 55th Street and 6th Avenue.
New York, January 2, 1903.

To the Assistant Sanitary Superintendent :

Sir—I have the honor to present herewith a report of the work of the Division of Inspections for the year 1902.

At the beginning of the year the Division of Sanitary Inspections and the Division of Offensive Trades and Food Inspection were consolidated under one head. The advantages arising from this arrangement were two-fold. In the first place, under the old system it frequently happened that the complaints to be investigated were of such a character as to make it questionable whether they should be referred to a Sanitary or an Offensive Trades Inspector, and, if referred to one class, and he, in his judgment, considered them as belonging to the other, the complaints were returned to the office for re-distribution. This method occasioned delay in accomplishing the desired result, viz., the prompt abatement of the nuisance.

In the second place, two inspectors were covering the same territory, and doing work that in many respects was very similar. The result was that in numerous instances duplicate orders were issued for the abatement of the same nuisance, and two inspectors would be employed in investigating and reporting upon it. In each case of this kind the time of one of the inspectors was wasted, and might be advantageously used in other directions.

The consolidation of these two divisions has not only abolished these objectionable features, but has also resulted in widening the field of usefulness of the individual inspector by bringing him in contact with new features of the work of the Department. Sanitary inspectors are interested in the conditions surrounding the storage and sale of food products, and food inspectors do not confine their investigations to these products alone, but observe and report upon any unsanitary condition that may prevail. Thus a general interest is manifested by all classes of inspectors, the disposition to report conditions needing attention by the department being encouraged by the fact that all are associated under one head.

Up to September 1 the work of the tenement-house inspection was wholly under the supervision of this Department, and the duty of making these inspections devolved upon the Division of Inspections. The force had been very decidedly reduced in numbers in January last, but the reorganization referred to had so increased its efficiency that the numerous complaints from tenement buildings, and also from other sources, were handled expeditiously, and the work was carried on uninterruptedly

On September 1, with the transfer of the Tenement-house Inspection to the Tenement-house Department, a further reduction of force was made; notwithstanding this, the regular routine work was well kept up, and several new lines have been undertaken. Some of these will be indicated in the detailed statement which follows

Sanitary Inspections.

The work of sanitary inspection extends to all buildings and premises other than tenement-house property.

Filthy conditions due to neglect, want of repair, defective plumbing and drainage, and lack of proper light and ventilation, are all embraced in this class of work. Investigations made necessary by nuisances arising from these sources consume a vast amount of time and labor. When it is remembered that over 80,000 inspections of this character were made during the year, it will be seen that the successful prosecution of this part of the work has an important bearing on the healthfulness of the community.

LODGING HOUSES.

In no other class of dwellings are unsanitary conditions more apt to obtain than in those buildings occupied as lodging-houses. In these places there are large congregations of individuals made up from a floating population, whose mode of living has led to carelessness in person and habits. Seeking temporary shelter in the lodging-houses these persons are only restrained in their disposition to carry their habits with them by such regulations as may govern the establishment they enter. That these establishments would not of themselves require a very high standard in this respect has been abundantly proved in the past. It is necessary, therefore, that this Department exercise a strict surveillance over such places, and require them to be at all times kept in a cleanly and healthful condition.

There are just 100 lodging-houses in this borough conducted under permits from this Department. Of these 100, 92 are for men only, and 5 for women only, and 3 for boys only. The greatest number of lodgers allowed in one house is 505, and the smallest number 23, both of which are for males. The total number of lodgers in the men's lodging-houses amounts to 16,368; the total in the women's lodging-houses is 497, and the total in the lodging-houses for boys is 365, making the total lodging house population in this borough 17,212.

Recognizing the necessity of providing and maintaining the best possible conditions in these surroundings, a thorough and complete inspection of each was made early in the year, and the requisite orders were issued requiring such repairs and changes as would bring about the desired results.

In a number of instances extensive alterations were made, and all were so renovated as to comply with the orders imposed. The conditions thus brought about have been maintained by regular and systematic visitation.

PUBLIC MARKETS.

The buildings in which the public markets are located are, in most instances, old structures erected at a time when but little attention was paid to sanitary requirements. In some instances an imperfect drainage system was provided, and in others there was none at all.

An inspection of these market buildings revealed the fact that they were, for the most part, in a very unsanitary condition. A number of the buildings were dilapidated, and in an uncleanly condition, the drainage from ice-boxes, fish stands and floor washings were found to discharge into drains through untrapped waste-pipes (thus having a direct connection with the sewer) or, upon the ground space beneath the floor. Filthy and unventilated water-closets, defective drains and open connections were found. So bad were the conditions existing, in at least four instances, that either the needed repairs should be made at once or the building condemned and vacated. Reports setting forth these facts have been forwarded to the President of the Borough.

POLICE STATION HOUSES

An inspection was made in September of the police station houses, to ascertain the sanitary condition of the detention cells. At three of the station houses examined there were no detention cells; in two, the cells were found to be in good condition, but in the remainder more or less repairs were needed. Walls and ceilings required cleaning; the toilet accommodations were neglected and filthy, and the light and ventilation were, as a rule, poor, and in some instances entirely inadequate.

These facts have been embodied in a report and referred to the Commissioner of Police for his attention.

CHURCHES AND THEATRES.

During the summer an inspection was made of the churches and theatres in this borough. It was found necessary to issue a large number of orders requiring repairs in the plumbing, and the establishment of a better system of ventilation in each class of buildings. In both the churches and the theatres, especially in the older buildings, the toilets are situated in basements and cellars, and the apartments had no communication with the external air. As a rule these toilets do not receive proper attention, and through neglect become offensive.

It was also ascertained that the dressing-rooms in the theatres, and in some cases the class-rooms for the Sunday Schools in the churches were illy ventilated, and where these rooms were in close proximity to the toilets, as sometimes happened, the conditions produced were anything but of a healthful character.

These conditions have been remedied so far as discovered, and all the orders issued have been complied with.

INSPECTION OF THE CHINESE QUARTER.

As a result of the appearance of the bubonic plague in San Francisco, it was thought advisable to make a thorough investigation of the conditions existing in the Chinese Quarter in this city. Sanitary Inspectors were sent to this section recently with instructions to make a house to house visitation, examine thoroughly the sanitary conditions, report all cases of sickness, overcrowding of premises, and the occupation of cellars as dwelling places.

In the case of the death of a Chinaman, the burial permit has been withheld until the cause of his death was investigated.

These efforts resulted in the discovery of an unsanitary condition in a large number of the buildings thus examined. Orders were at once issued requiring the abatement of the nuisances reported, and the necessary changes have been made to correct the evils which had existed.

RAPID TRANSIT SUBWAY.

Another line of work which demanded our attention this year was that in connection with the Rapid Transit Subway.

A series of complaints were received at this office of the nuisances arising from the dumping of offensive material into the excavations, the pools of stagnant water collected at various points along the line, the escape of sewage from broken and disconnected sewers discharging into the cuts, and of the use of the tunnel for toilet purposes by workmen because of insufficient privy accommodations.

In order to remedy these conditions a Sanitary Inspector and a Police Officer were detailed along the subway to secure the abatement of the nuisances complained of.

The most unclean portions of the subway were in the manufacturing and tenement districts below Houston street, and in the Bronx. Tons of refuse were carted away. So far as possible those responsible for dumping of the refuse were compelled to aid in the work of cleaning. Earth closets were placed along the subway for its entire length for the use of the workmen.

About 900 feet of spiral iron pipe for temporary sewers were placed, and all house drains connected therewith. Pools of water were either drained or pumped out by power pumps and the depressions kept dry. All obstructions to the drainage of water, such as timbers or piles of unused wood, were removed.

Constant supervision was kept over the temporary sewers and their branch connections as they were frequently broken by the shorers or by blasts.

Night inspections were made to see that no avoidable noises were made by the night work.

Disinfectants and deodorizers were much in favor while the inspection was in its initial stages, but gradually as the subway was cleaned, and sanitary regulations enforced, there was less and less need for them.

Citizens' complaints in considerable number were investigated, and those citizens who signed their names were seen. All the work was accomplished by verbal orders to the contractors without a formal order being made.

Slaughter Houses.

The fresh meat supply of New York City is derived from two general sources, first: that from animals slaughtered in the West and shipped to New York in refrigerator cars, and, second: that from animals slaughtered in the city itself. The total number of cattle slaughtered in the Borough of Manhattan during the year amounted to 2,740,080, divided as follows:

Beeves	320,880
Sheep and lambs	1,284,000
Calves	247,200
Hogs	888,000

The local slaughtering industry has not only been able to compete with the Western shippers of meats, but has grown yearly until it is now a business of great magnitude, employing a great number of men.

A few years ago our local abattoirs were much scattered, and none of the present large plants existed here. Many butchers killed cattle for their own stores, and no distinct slaughtering districts existed. The business, because of the unsanitary methods employed, became a nuisance to the community as the city limits extended and population increased. As a result it was gradually driven from these neighborhoods, and official limits were fixed, outside of which the industry could not be carried on.

About 1868 the various abattoirs of East Houston street, Stanton and First streets, moved to the then outlying districts, viz.: First avenue to East river; Forty-second to Forty-eighth street, while the West Side abattoirs located along the North river between Thirty-eighth and Forty-first streets, where for some years previous had existed a number of hog abattoirs.

At present there are two general districts in existence, viz.: First avenue to East river, between Forty-third and Forty-sixth streets on the East Side, and on the West Side from Thirty-ninth to Fortieth streets; Eleventh avenue and the North river.

There has been a gradual concentration of the business, resulting from year to year in the adoption of more modern sanitary methods, and also in the abolition of a number of the old slaughter-houses. For instance: One of the largest modern abattoirs on the East Side replaced about a dozen of old wooden structures and from twelve hog abattoirs existing some years ago there are now but three in the whole borough. So at this time the entire local slaughtering is done—on the East Side—in seven abattoirs housing nineteen firms; and on the West Side, in twelve abattoirs housing sixteen firms.

During the year many and extensive alterations have been required and made in the various slaughter-houses, and a very great improvement in the conditions brought about.

When it is considered that labor, rent, etc., are cheaper in the West, and that a large saving in the cost on freight is made by shipping the dressed meats here, the question naturally arises, how is it profitable, and why is it necessary to maintain these industries in New York City? Two reasons may be assigned, the first and minor one being that many butchers prefer locally slaughtered meats and hence support the local institutions. The second, and really important reason, is a religious one.

There is in this city a large and growing population of Hebrews of the orthodox faith and practice who will eat only "Kosher" or religiously clean meat. Meat to be "Kosher" must be slaughtered under local rabinical supervision, and must not be more than three days killed when used. These restrictions prevent competition by the Western slaughterer and are the backbone of the local industry. If the demand for "Kosher" meat were withdrawn, or, if some means could be devised to import it from nearby sources, the slaughtering business, together with its attendant industries, in this city would have no excuse for further existence, and, indeed, it is doubtful if they could be carried on profitably.

The nuisances which arise from these places are caused principally and almost wholly by the treatment of the by-products, and not in connection with the slaughtering of the animals.

The rendering of these products by modern methods is to connect the tanks and dryers with condensers, and from thence to discharge the odors under furnace fires. Rooms where tankage and fertilizer are worked or dried are tightly inclosed, and the room-odors removed by exhaust fans, through pipes leading to condensers, and finally passed over boiling tar, or discharged, as in the case of the tanks and dryers, under the furnace fires. It may be interesting to note the processes employed in the treatment of these products, and at the same time to show the importance of requiring proper safeguards to prevent the business becoming a nuisance.

The following is a report made by Inspector George A. Woods, who was instructed to investigate the subject:

Animal Fat, Its Treatment and Products.

An important adjunct of the modern abattoir is its rendering plant. Here the fat of the slaughtered animal is converted into many useful and valuable products. Here the retail butcher finds a ready market for the "waste" or trimmings of his shop.

Until recent years, almost the sole purpose of melting fat was to produce stearine and tallow, to be used in the manufacture of candles and soap. The commercial value of oleine as a food product was unknown.

Rudolph Wagner, in 1872, described oleic acid as a by-product of stearine candle manufacture "useful for lubricating wool and for softening leather."

In 1875 the Commercial Manufacturing Company, located at Forty-eighth street and North river, New York City, commenced the treatment of fat in such a manner as to successfully separate the oleine and stearine, and, in 1876, they began at this factory the manufacture of oleomargarine. They were the pioneer producers of this compound in the United States. Much of their early product became spoiled. Thousands of packages which had been exported to France were returned to them rancid and useless as a food product, probably for the lack of a proper preservative.

Difficulties were overcome, a perfect product was made, and the company thrived until extensive competition and adverse food laws caused them to cease business.

From a by-product, oleo oil is to-day the most valuable output of the rendering plant, and the business of producing it has become an industry of great magnitude in the United States.

The component parts of fat are oleine, stearine, their cellular tissue and water, and it is to alter this combination into forms which are serviceable that fat is "treated" or rendered.

All animal fat, when fresh and untainted, is capable of being manufactured into edible products, and it is so manufactured, unless its condition or quality makes such use impossible or unprofitable, in which event it is converted into non-edible products.

It will be of interest to follow the process of conversion employed in a fat-rendering plant.

First, let us examine the crude material as received at the factory and define its grade.

DEFINITIONS.

Fats are commercially classed, and, in the order of their value, as (1) "long" fat, (2) "suet" fat, (3) "selected shop-fat," (4) "shop-fat," and (5) grease fat.

"Long Fat" is the fat which surrounds the intestines of the slaughtered animal. It is rich in the best grade of oil.

"Suet" fat is the fat attached to and surrounding the kidneys of the animal.

"Selected Shop-Fat," as its name implies, is the selected or better portions of "shop-fat."

"Shop-Fat" consists of the material trimmed from meat in the butcher shop minus the "suet" fat.

Grease fat is the lowest grade of fat rendered, and is any animal matter which will produce grease, such as slaughter-house waste and trimmings, drippings from the kitchens of hotels and restaurants, etc.

PRODUCTS.

From the above-described crude materials the rendering plant creates the following products of commercial value:

(1) Three grades of oleo oil known as No. "1," No. "2," and No. "3."

(2) Two grades of stearine known as No. "1" and No. "2."

(3) Two grades of tallow known as "edible tallow" and "tallow."

(4) Grease.

(5) Scrap.

The better grades of fat are used for the manufacture of oleo oil and stearine, the baser grades being converted into tallow and grease.

I will endeavor to describe the process of manufacturing the above-named products as minutely as possible.

No. 1 Oleo Oil and Stearine.

No. 1, Oleo Oil—"Long" fat alone is used for this product. When trimmed of extraneous material the fat is put in a tank filled with water, which is kept at a low temperature by means of cold "brine" pipes passing through it. In this manner the fat is cleansed, hardened and its animal heat removed. After remaining in this water for twenty-four hours the fat is conveyed to a "hasher." This "hasher" is furnished with a series of knives which chop and hash the fat into a plastic mass, in which condition it is discharged into the "upper" or No. 1 kettle.

This kettle is semi-spherical in shape, open at the top and surrounded by a steam jacket. From its centre is erected an agitator, consisting of a vertical spindle having several arms attached, which keeps the mass in motion during the melting process, insuring an even heat to all parts.

This kettle is kept at a temperature of 160 degrees Fahrenheit for three hours.

During the melting process a quantity of ground sea salt ($3\frac{1}{4}$ per cent. of the total mass) is added from time to time to the contents of the kettle. The object of this is two-fold: first to clear the melted solution by causing the suspended sediment to settle to the bottom, and, second, that portion of the salt which dissolves acts as a preservative in the finished oleo oil.

At the expiration of the three hours' heating the following conditions are found: A residue consisting of a form of tallow, sediment and water has formed, leaving the oleine and stearine in solution. This solution is "stock oil."

To clearly illustrate the results of the first melting we will resort to a few figures.

Originally we placed in the kettle 1,760 pounds of fat which had soaked up (in the first cooling process) 240 pounds of water. Therefore, before melting, the contents of the kettle equaled 2,000 pounds.

After melting we find:

Stock oil	72 per cent., or	1,440 pounds.
Residue—		
Water	26 per cent., or	520 pounds.
Tallow and sediment	2 per cent., or	40 pounds.
	100 per cent., or	2,000 pounds.

By means of a movable pipe applied to the surface of the solution, the stock oil is drawn into the "lower" or No. 2 kettle.

Great care is taken that no water enters this pipe as its presence would be fatal to the subsequent granulation of the stock oil.

The oil having been drawn off, the residue of tallow, sediment and water is conveyed directly to the "tallow digester" for further treatment.

Thus we find in the lower kettle the 72 per cent. or 1,440 pounds of stock oil. This lower kettle is similar to the upper kettle except that it has no agitator. The purpose of the treatment in the lower or second kettle is to allow any possible additional sediment or water to separate from the solution.

The "stock oil" remains in kettle No. 2 for three hours, a temperature of 140 degrees Fahrenheit being maintained. At the end of this period it is piped off from the kettle, by the same method as before described, into large open vats called coolers, or seeding trucks. Here, as the stock oil cools, a process of granulation called "seeding" ensues, until at the end of 48 hours the solidification of the mass is complete.

Stearine—The solidified stock oil is now wrapped in many small squares of canvas, which are placed in a press of enormous power. Under this pressure the oleo oil is squeezed out of the mass, leaving the stearine within the canvas packages.

The oleo oil is now run into barrels and is ready for shipment. The cakes of stearine are removed from the canvas packages, broken up and pounded compactly into large casks ready for the market. The canvas squares, having retained in their meshes some of the material pressed, are soaked in hot water. Such oil as they contain rises to the surface, is skimmed off and placed in the tallow digester.

We find that from the 1,440 pounds of stock oil introduced into the "seeding truck" we have secured the following results :

"No. 1" Oleo Oil	77 per cent. or	1,108.8 pounds.
"Stearine"	21 per cent. or	302.4 pounds.
Absorbed by bags and recovered as tallow	2 per cent. or	28.8 pounds.
	100 per cent. or	1,440 pounds.

SUMMARY.

"*Long fat* (unsoaked) introduced in first kettle equals .... 1,760 pounds.

Finally produces :

"No. 1" Oleo Oil	63 per cent. or	1,108.8 pounds.
Stearine	17.18 per cent. or	302.4 pounds.
Tallow	2.27 per cent. or	40 pounds.
Absorbed by canvas bags	1.64 per cent. or	28.8 pounds.
Loss of original constituent water	15.91 per cent. or	2.80 pounds.
	100 per cent. or	1,760 pounds.

This completes the process of manufacturing "No. 1" Oleo Oil and "No. 1" Stearine.

"*No. 2" Oleo Oil*—"No. 2" Oleo Oil is made from the grade of fat described as "suet fat" by the same process as "No. 1" Oleo Oil. It being received at the factory free from its animal heat, the original cooling process is much less than in the case of "long fat." Otherwise the process of manufacture is identical.

After melting in the kettles we find:

Stock Oil	80 per cent. or	1,600 pounds
Residue—		
Water	16 per cent. or	320 pounds.
Tallow and sediment	4 per cent. or	80 pounds.
	100 per cent. or	2,000 pounds

The 1,600 pounds of stock oil after granulation and pressing, will give us:

"No. 2" Oleo Oil	77 per cent. or	1 232 pounds.
"No. 2" Stearine	21 per cent. or	336 pounds.
Absorbed by bags in pressing	2 per cent. or	32 pounds
	100 per cent. or	1,600 pounds

SUMMARY.

"Suet fat" (unsoaked) introduced in first kettle equals .... 1,760 pounds.

Finally produces:

"No. 2" Oleo Oil	70 per cent. or	1,232 pounds.
Stearine	19.09 per cent. or	336 pounds.
Tallow	4.55 per cent. or	80 pounds.
Absorbed by canvas bags	1.81 per cent. or	32 pounds.
Loss of original constituent water	4.55 per cent. or	80 pounds
	100 per cent. or	1,760 pounds.

It will be seen that "suet" produces more oil than "long" fat, but it is inferior in grade to "No 1" oil; it differs in taste and in ultimate uses

The stearine of "suet" fat is on a par with, and sells as "No. 1" stearine, except in very warm weather, when, owing to its inferior taste, it is sold as "No 2" stearine at a slight reduction in price.

"No. 3" Oleo Oil—"No. 3" Oleo Oil is made from "selected shop fat" and is largely a winter product. In warm weather shop fat is apt to contain some rancid portions, making it useless as an oil producer in that the taint cannot be eradicated and is discernible in the finished oil, making it unsalable.

The selected shop fat is dumped into large vats containing cold water. Any bones or meat in the mixture sink to the bottom of the vats and are later conveyed to the tallow digester to be rendered. The cold having both hardened and cleaned it, the floating mass is taken to the "hasher" and follows the same process used in the manufacture of the "No. 1" and "No. 2" oils.

Before melting we find the contents of the first kettle equal:

	1,760 pounds of actual fat.
	240 pounds absorbed water.
Total	2,000 pounds.

After melting in the kettle we find:

Stock oil...	65 per cent., or	1,300 pounds.
Residue—		
Water	25 per cent., or	500 pounds.
Tallow and sediment..........................	10 per cent., or	200 pounds.
	100 per cent., or	2,000 pounds.

SUMMARY.

Selected shop fat (unsoaked) introduced in first kettle equals.......... 1,760 pounds.

Finally produces:

"No. 3" oleo oil..................................	56.87 per cent., or	1,001 pounds.
Stearine	15.51 per cent., or	273 pounds.
Tallow	11.36 per cent., or	200 pounds.
Absorbed by bags in pressing....................	1.48 per cent., or	26 pounds.
Loss of original constituent water...............	14.78 per cent., or	260 pounds.
	100 per cent., or	1,760 pounds.

Edible Tallow—"Edible Tallow" is manufactured from selected shop fat in the same manner as "No. 3" oleo oil, but with this difference: After being melted in the kettle and separated from its sediment and water, the solution is run into the "seeding trucks," and, when granulation is completed, it is at once packed in barrels for shipment. No pressing has been done, and, therefore, the oleine and stearine are still in combination.

Tallow—Tallow is made from ordinary shop-fat without previous cleaning or cooling. This fat is put in a closed, cylindrical-shaped iron tank called a "digester," and cooked by live steam at a pressure of 45 pounds for eight hours.

The percentage of tallow yielded will be commensurate with the richness of the material rendered. It may be said that a 35 per cent. yield of tallow is a fair average. In factories where tallow only is made, and the better grades of fat have not been picked out, the yield will average considerably more than 35 per cent.

When the melting process is completed, the tallow is piped off from the digester into metal cooling vats, and, when solidified, is ready for packing and shipment. The remaining contents of the digester—called "tankage"—are treated to produce "scrap." Fourteen thousand pounds of shop fat put into the "digester" give the following yield:

Tallow	35 per cent.,	or 5,000 pounds.
Residue	65 per cent.,	or 9,000 pounds.
	100 per cent.,	or 14,000 pounds.

Of this residue we lose by evaporation 78 per cent., so we have—

Lost by evaporation	78 per cent.,	or 7,020 pounds.
Unpressed tankage (sediment)	22 per cent.,	or 1,980 pounds.
	100 per cent.,	or 9,000 pounds.

A species of "Bleached Tallow" is made by melting the tallow, adding "Fuller's Earth" and forcing the solution through a canvas strainer, known as a "filter press." The resultant is a pure white product.

Scrap—"Scrap" is made by pressing and drying the sediment or "tankage" remaining in the tallow digester. This tankage is put in presses (called "tallow presses") and subjected to a high pressure. Of the 1,980 pounds of "tankage" put into the "tallow press" we get—

Tallow (pressed out)	7.57 per cent.,	or 150 pounds.
Water (pressed out)	17.68 per cent.,	or 350 pounds.
Undried scrap	74.75 per cent.,	or 1,480 pounds.
	100 per cent.,	or 1,980 pounds

This undried scrap is now placed in a "dryer." The dryer is a tight iron drum, cylindrical in form, and containing a rotary agitator. It is heated by means of a steam jacket. The mass is subjected to a high temperature for three hours, at the end of which time the finished scrap is removed from the dryer. The following results have been obtained:

Placed in dryer—undried scrap		1,480 pounds.
Evaporated moisture	66.7 per cent., or	987 pounds.
Dried scrap	33.3 per cent., or	493 pounds.
	100 per cent., or	1,480 pounds.

Grease—Grease is manufactured from the poorest grades of animal refuse. The same method is used as in the manufacture of tallow.

Uses—Oleo oils are used mainly in the manufacture of artificial butters, for which purpose large quantities of it are exported, or sent to those portions of the United States where the manufacture of artificial butter is not prohibited by law. In parts of Turkey the oil is used in its natural state as a substitute for butter.

Stearine is used principally in the manufacture of commercial lard. True lard, which is the tallow derived from melting the fat of swine, has stearine added to it as an adulterant, and to "stiffen" the product, this making it less liable to deteriorate when shipped to hot climates.

Stearine is largely used in the manufacture of "Compound Lard," which is composed of stearine, cotton-seed oil, edible tallow and lard.

Some stearine is used in the manufacturing of candles.

Edible tallow is used principally in the manufacture of "compound lard."

Tallow is used in the manufacture of soap, and some in candle manufacturing.

Grease is used in the manufacture of lower grades of lubricants and soaps, also for soft soaps, and some in the making of candles.

Scrap is sold to manufacturers of fertilizers who mix it with other materials, such as rock phosphate, fish oils, products, etc., to make the commercial fertilizers.

Prices—The New York City prices of the foregoing bases and products were, on October 23, 1902, as follows:

Long fat (untrimmed)	$0 07	per lb
Suet fat	08	per lb.
Selected shop-fat	03⅛	per lb.
Shop-fat	03	per lb.

No. 1 Oleo oil	$0 11½	per lb.
No. 2 Oleo oil	09¾	per lb.
No. 3 Oleo oil	08¼	per lb.
No. 1 Stearine	15	per lb.
No. 2 Stearine	13¾	per lb.
Edible tallow	08½	per lb.
Tallow	06½	per lb.
Grease	05	per lb.

Poultry Slaughter-Houses.

Slaughter-houses for cattle and small stock, and the attendant industries, the disposal of waste-fat and offal, are located in two comparatively small districts on the east and west sides of the borough.

The poultry slaughter-houses are scattered more or less over the east side, from Rutgers street to One Hundred and Twentieth street, with but one on the west side.

These establishments exist largely because a portion of the citizens of the city require that their poultry shall be freshly killed, in fact, in many instances they actually select the particular fowl they desire from a coop, watch the butcher cut the bird's throat, then take the still warm body and pluck it before leaving the slaughter-house.

This demand has increased with the immigration from Europe of the followers of the Jewish faith. This has necessitated increased supervision of these premises by the inspectors of the Department.

The business of slaughtering poultry has grown from very small proportions. Permits to carry on a business of that kind were formerly granted, if the floor was tight and the absorbed blood and feathers removed daily. Most all premises for such a business were from choice located near the water front, the cheapness of rent having undoubtedly its influence as well. Gradually, however, as tenement-houses encroached upon ground formerly given over to factory sites, coal yards, etc., established places, as well as proposed new places, came within tenement-house neighborhoods, and a great need for absolute sanitary conditions was manifest.

While this gradual improvement was going on as to location the business of the poultry slaughter-houses also increased, but the owners of these places did not improve their sanitary conditions correspondingly. Where formerly but a few hundred chickens a week were killed, it is now no uncommon occurrence to find from 25,000 to 30,000 pieces of fowl housed under one roof and sold in one day, and, where formerly only a few hundred dollars were invested there is now $150,000 invested in a single concern.

It was pointed out to owners of poultry slaughter-houses that improvements were in order, but they had become so accustomed to the old methods of doing business that they believed nothing should be required in the way of improvements, and so various and specious were their arguments that no better conditions could be maintained at their places of business, that any suggestions of any changes with a view toward improving their sanitary condition were unheeded.

It, therefore, became the duty of this Department to determine and work out a general plan which would answer in every case, and it is believed and generally acknowledged that these suggested improvements which are, and have been carried out, are a great step toward improving the sanitary condition of poultry slaughter-houses, and are briefly described as follows:

The cages which were formerly built of wood with a bottom of the same material, were soon saturated with fecal matter from the poultry and became offensive, for, no matter how much cleaning they might have received they would soon become foul again.

The improvement, therefore, consisted in covering a new wooden floor with galvanized iron, flashed upon three sides to the height of six inches with the same metal in such a way as to make each cage a separate one; this floor was then beveled off in front so that all liquid material from food, and washings from cages, would flow into a gutter provided along the front of a row of cages. These gutters were then connected by leaders which discharged upon a depressed strainer covering a sewer inlet properly trapped; in this way all liquids which were formerly allowed to flow upon the floor were taken care of, and the floor of the slaughter house kept dry.

That there might not be any chance of moisture remaining on the floor proper, all floors were required, if at all broken and defective, to be repaired or renewed, care being taken to have them drain in such a manner as to have the washings reach the sewer inlets easily. Each room was required to have one or more sewer inlets to make it possible to properly flush the same, and under no circumstances was the wash-water allowed to flow from one room to another.

The next matter which required attention was the killing-bed or space, used for the bleeding of the poultry. It was found that slaughterers violated the rule to kill only in such parts of the rooms in which material was provided to absorb the blood which flowed from the cut fowl, that they allowed the blood to flow into the sewer or among the feathers of the fowls, making them exceedingly filthy.

Owners of poultry slaughter-houses are now required to partition off a proper space for a killing-room, sheathe the same on all four sides with some non-absorbent material, concrete the floor of the room and connect it separately with the sewer, providing a proper trap for that purpose.

For the proper absorption of the blood a trough is provided about eighteen inches deep, tinned both inside and out with metal, in which sawdust is placed to absorb the blood. Each day after the killing hours are over this mixture of sawdust and blood is removed in tight covered barrels, the metal-lined box scrubbed, and the waste water allowed to flow through an opening which ordinarily is closed with a plug, into an open gutter underneath the box, also separately trapped and connected with the sewer.

New cages must either be built of iron or so covered with galvanized iron and painted as to allow of easy and ready cleaning. The object being to have the front of the cages washed down each day with a large brush such as is used for cleaning windows; the gutters flushed, and all sawdust, food-rests, and other material forced down and separated in the depressed sewer inlet by the strainer. The floor proper can then be readily flushed separately, as it will not be covered with offensive material from the cages.

With a little care and attention, poultry slaughter-houses can, therefore, be conducted without creating a nuisance, and the inspection will be made easier, as means are provided to clean and to keep clean, cages, killing-pens, absorption-box and floors without trouble.

Rules and regulations for the proper conduct of the business so as to maintain a good sanitary condition were formulated and printed on large cards, of which the following is a copy:

1st. "The floors of the premises wherever fowls are kept, stored, sold or slaughtered must be swept and then flushed with liberal quantities of water, and disinfected at the close of each day."

2d. "The ceilings and walls which are not painted nor sheathed with metal must be whitewashed once each month or oftener, if required."

3d. "The fronts, sides, and the inner sides of doors of cages must be painted with some non-absorbent paint once a month."

4th. "The sawdust used for the absorption of blood must be disinfected and removed from premises each day."

5th. "The sheathed sides of the killing-room, the absorption-box, and the gutters underneath must be scrubbed with a solution of soda or potash, and flushed with a liberal supply of water at the close of each day's work."

6th. "The fronts of cages must be washed with water and brush, and the gutters of same cleaned and flushed once a day."

7th. "The floors of cages must be scraped and freed from fœcal matter, sawdust, etc., thoroughly washed each and every time they have been occupied; if fowls are kept on storage in any of the cages, the fowls must be changed to another cage, and the one just emptied must be cleaned as described every third day."

8th. "No fowls are to be allowed at liberty on the premises."

9th. "No crates are allowed on the premises unless the same are stored in a tight room especially set aside for that purpose."

10th. "All sawdust, fœcal matter and other refuse must be removed from the premises each day."

11th. "No barrels, boxes, crates or other material not absolutely employed or used in the conducting or carrying on of the business of slaughtering poultry are allowed to be kept or stored on the premises."

Each chicken slaughter-house was furnished with a sufficient number of these cards so as to hang on the wall on each floor, and, the proprietors are therefore unable to profess ignorance of what is required by the Department.

The result of the adoption of these methods has been a very marked improvement in the sanitary condition of these places.

Smoke Nuisances.

During the past year the "Smoke Nuisance" has presented rather an unusual problem.

In the first few months of the year the investigation of complaints and suppression of this form of nuisance was running along smoothly, and, until the strike of the miners in the anthracite coal fields, causing an alarming shortage in the supply of hard coal, these complaints were amply taken care of by the district sanitary inspector.

Most of the large users of steam in this borough have bunker space for only a few days' run; furthermore, there are no yards for the storage of large quantities of coal. As a result, when the output of anthracite coal became restricted, the individual supplies gave out day by day, and consumers were forced into the dilemma of using the bituminous product or closing down, and as but a very small per cent. of New York City plants are fitted with smoke-preventing devices, this naturally very materially increased the number of smoke nuisances. As the complaints began to multiply, it was necessary to take some decided action; therefore, six Sanitary Inspectors and two Sanitary Police Officers were detailed to this especial work, and districts of suitable size were arranged. Their entire time was devoted to this work, the Inspectors issuing the necessary orders and the Police making arrests where the orders were not complied with.

The owners of plants adopted various means of abating the nuisance; many introduced smoke-preventing contrivances; a large number of small plants changed their power to gas-engines or else installed motors and purchased their electricity, and, in fact, even now continue to do so; others mixed their remaining hard coal supply with a varying amount of soft; still others who had an excess of boiler capacity were able to burn straight soft. Either of the above-mentioned methods will result in comparatively smokeless combustion, provided the boilers are not forced and the fireman uses extraordinary care in the handling of his fires. By constant supervision most of the greatest offenders were held in check, and while New

York was very far from being a smokeless city, no serious nuisances existed for an extended period.

Very early in the period of the strike the Manhattan Elevated commenced the use of soft coal on its locomotives. This was reported by one of the inspectors on the first day of its use, and an order was immediately issued. Fortunately the road had been engaged for some time in introducing electric traction on its system, and were about ready to commence its use. Motor trains were run on the East Side branches in gradually increased numbers. No effort was made, however, to comply with the order as to locomotives, and, finally, about the middle of June, legal pro-

PHOTOGRAPH TAKEN JUNE 18, 1902, BY SANITARY INSPECTOR W. G. HUDSON, M. D., AT EIGHTY-NINTH STREET AND THIRD AVENUE.

ceedings were commenced, as a result of which the officials of the company took active measures to stop the discharge of smoke from the locomotives, and while this discharge did not absolutely cease until late in the year it was minimized, and complaints from citizens became comparatively few.

Another class of smoke offender that gave the Department much trouble was the wood-workers, who use their refuse wood, shavings and sawdust for fuel. These plants, always hard to control, in the vast majority of cases abandoned all precautions, and added very materially to the smokiness of the City.

No effort was spared to prevent this absolutely unnecessary violation of the law, and many arrests were made, which almost invariably resulted in a conviction in the Court of Special Sessions.

Now, at the close of the year, more and more plants are obeying the Board's orders, and ceasing the discharge of smoke, and, I feel convinced that a steady insistence upon conformity with the law in this respect will shortly result in the elimination of this nuisance.

The following table indicates the number of inspections performed by the sanitary inspectors during the year 1902:

Number of tenement-houses	19,560
Number of lodging-houses	867
Number of private dwellings	1,973
Number of mercantile establishments	10,810
Number of manufactories and workshops	2,711
Number of stables	573
Number of sunken and vacant lots	572
Number of miscellaneous	12,605
Total	49,761
Number of reinspections on orders	39,942

Sanitary Police.

The Commissioner of Police details a number of policemen to the Department of Health for the purpose of enforcing the sections of the Sanitary Code. These are under a commanding officer. The force is known as the Sanitary Squad.

The number thus detailed to the Borough of Manhattan has varied throughout the year, ranging from 15 to 25 men. This force is a very valuable one in expediting the work of the Department. Nuisances of a certain character are more quickly abated through the efforts of an uniformed officer than would be the case with an inspector in civilian dress.

Unnecessary and unusual noises of a disturbing nature at night, the carting of offensive material through the streets in uncovered carts, night inspections for overcrowding, inspection of dumps, enforcing spitting ordinances, enforcing orders, visits to close stores and keeping premises under observation on account of contagious diseases. These and kindred matters constitute the field of their activity.

In the present year the squad has visited 88,498 premises, and made 304 arrests for violation of 15 different sections of the Sanitary Code.

PHOTOGRAPH TAKEN JUNE 12, 1902, BY SANITARY INSPECTOR W. G. HUDSON, M. D., AT SIXTY-SIXTH STREET AND COLUMBUS AVENUE.

Of these arrests there has been no final disposition of 47. There were 115 cases discharged, and 142 cases had fines imposed. The total amount of fines collected as a result of these arrests was $577. The following are the sections of the Code for the violation of which the arrests were made, and the number arrested for such violation:

		Number Arrested.
Section	21	1
"	26	2
"	44	1
"	47	32
"	48	10
"	63	7
"	76	1
"	79	24
"	108	1
"	109	14
"	119	2
"	120	18
"	123	2
"	134	131
"	194	1
"	385 Penal Code	1
	Total	304

Section 120 of the Sanitary Code requires all manure and stable refuse to be removed from stable premises daily, unless the same is properly pressed in bales, boxes or barrels.

In order to secure conformity with this rule a house-to-house inspection of all stables in the borough was made by the sanitary police during the summer months. In many instances it was found that there was a failure to obey the requirements of this section, and in every case the parties were notifid that prompt action in the removal of the manure from the stables would be necessary in order to avoid arrest. This action resulted in a general cleaning up. Frequent reinspections were made to see that this condition of affairs was maintained. 13,432 such inspections were made. The importance of this work will be realized when it is considered that more than 1,300 tons of manure is produced daily in this borough alone. This manure is carted from the stables to dumps located along the river-front on the east and west sides of this borough, and there loaded on scows, and from thence shipped to farms for fertilizing purposes. Permits were granted this year to use 313 carts for the removal of manure. It will be seen that the handling and disposition of this material is an extensive enterprise. In its early stages the contractor paid the stable owners a certain price for the manure, and in addition agreed to cart it away; later it was removed without either party paying anything, while at present it costs the stable owners from two to three dollars per horse per year to have the stable refuse disposed of.

The method of removing manure loosely in carts is not an altogether satisfactory one, for in the loading and carting through the streets, and the handling at the dumps, there is more or less of an offensive condition produced. The more sanitary method would be to press the manure into bales and then the nuisance ensuing from the causes referred to would be abated. The reasons urged against the plan are, first, increased cost of care and disposal; and second, that when baled it develops heat, and the manure is "burned" or "fire-fanged," rendering it valueless as a fertilizer. It seems to me that the additional expense would be only a first cost, and that the latter difficulty might be overcome by the prompt removal to and the opening of the bales at the place of final disposition.

The following table indicates the number of inspections performed by the Sanitary Police Inspectors during the year 1902:

Number of tenement-houses	16,686
Number of lodging-houses	991
Number of private dwellings	1,907
Number of mercantile establishments	2,002
Number of manufactories and workshops	1,268
Number of stables	13,432
Number of manure dumps	5,283
Number of sunken and vacant	1,240
Number of miscellaneous	28,685
Total	71,494
Number of reinspections on orders	17,004

Mercantile Establishments.

This Department is charged with the enforcement of the Child Labor Law in this city, so far as it relates to the mercantile establishment, and, in addition, issues employment certificates to children complying with the law who desire to work in factories. The object of this law is two-fold. In the first place, by requiring an educational standard, it induces school attendance in order that a certain standard may be reached. There is thus laid the foundation for the development of an intelligent citizenship. It is conceivable that many children who would otherwise never have had any educational advantages, being thus compelled to receive instruction in order to attain a certain degree of fitness, have acquired a desire for knowledge that has led them to seek equipment for larger spheres of usefulness.

In the second place, the physical well-being of the child is considered. Many parents are anxious to send their children to work in stores and factories, where they are compelled to remain at least ten (10) hours a day, before they are strong enough to stand the strain. Stunted growth and weakened constitutions are the result, and thus handicapped they enter the race for life.

The influence of this law is against just that very thing, by prohibiting children under fourteen years of age from working in stores or factories, and by requiring those between the ages of fourteen and sixteen to secure employment certificates before entering upon service in these places. These latter thus coming under the scrutiny of the authorities are not only required to have the educational qualifications, but must also be physically able to perform the work which they are intending to do.

There is one weak point in the present law, and that is the section requiring the issuance of what is known as "Vacation certificates." Under this section children of twelve years of age may work in stores, and children of fourteen in factories, during the vacation season. No school attendance is required, the only requisite being that they shall be physically capable of performing the work, and be able to read and write simple sentences in the English language. Large numbers of this class of children are in this way employed in various manufacturing and mercantile establishments throughout the city, and when the vacation term ends numbers of them continue on until discovered by the inspectors and are compelled to return to school. Besides this, the object of the vacation is frustrated. During the hottest time of the year such children are confined for long hours each day within doors, often amid crowded and unhealthful surroundings. It would be less injurious were they compelled to continue their school attendance than to be thus employed.

There is a movement on foot to secure an amendment of the law so as to eliminate this feature, which, if successful, will have a very beneficial effect.

In order to secure an employment certificate the child making the application must, in company with either of its parents, or, if the parents are not living, by some one having guardianship, appear at the office of this Department. A printed form of application is filled out by the child, and the parent or guardian makes affidavit as to the age and place of birth of the applicant, before a notary public, detailed to the office for that purpose. This form is then taken to the Principal of the school where the applicant attended subsequent to his thirteenth birthday. The Principal is required to certify to the fact that the child has attended school for one year previous to arriving at the age of fourteen, and, that he has been taught during that year reading, writing, spelling, English grammar, geography and arithmetic. The child then returns, with the form thus filled out, to the office of the Department.

The weight, height, color of hair and eyes and any distinguishing facial mark is noted.

All this information is contained in the one form and furnishes a complete history of the whole transaction. The applicant is then granted an employment certificate and the application is filed away.

During the year 14,482 employment certificates were granted, nearly 5,000 of which were vacation certificates.

Among the stores and factories the boys and girls who secure these certificates find work. The State Factory Inspector follows them to the workshops and our inspectors into the stores. Not only does the law require the working children to be of a certain age, physically able to perform the work they intend to do, and to have certain educational qualifications, but, also regulates the hours of labor, requires seats for female employees, and the provision of toilets and wash-room accommodations where a certain number are employed. To see that the law is observed in these respects requires the frequent visitation of our inspectors, and inspections of this kind are being constantly made.

During the year 12,812 inspections were made of mercantile establishments for the purpose of enforcing the law along these lines.

Number of children interviewed applying for certificates....................	22,086
Number of employment certificates granted................................	14,482
Number of employment certificates refused................................	3,024
Number of duplicate certificates issued....................................	576

Food Inspections.

Food inspection is divided roughly into four classes, viz.: Meat, Fish, Fruit and Milk.

There are inspectors assigned to these various classes of work, although, from its nature, the dividing line cannot be strictly drawn.

MILK.

This product is particularly adapted for use as a food by man, as it contains properties of a nutritious nature in more nearly the proper proportions to serve as a complete food than any other food material. Because of its food value, milk has come to be regarded as one of the necessities of life and its use is so general that it forms part of the diet of almost every household.

The fact that milk is thus extensively used renders the subject of its production and distribution one of interest and importance. The necessity for protecting it from all influences of a deleterious nature is recognized by every intelligent community. From its source until it reaches the consumer it must be surrounded by safeguards in order to preserve it in a wholesome condition.

The consumption of this article of food in New York City has become so enormous, the sources from which the supplies are obtained are scattered throughout so wide a territory, and the interests represented are so varied, that a proper supervision of the industry with the limited force at the command of this Department is well nigh impossible. Milk is shipped to New York City from nearly all parts of New York State, from northern Pennsylvania, from the western portions of Massachusetts and Connecticut, and from New Jersey. Creameries are established at the most convenient points in the vicinity of the various railroads, and to these creameries the farmers of the neighborhood bring their milk. From thence it is transported by rail to this city where it is received by the wholesalers; through them it reaches the retailer, and from thence to the consumer.

Now, in order that the milk should be in good condition when it reaches the hands of the consumer there must be suitable conditions maintained on the farm, and from that point until it reaches its final destination.

When it is considered that there are more than four hundred creameries, each a receiving depot for a large area, that from these centres nearly one and one-half million quarts of milk are shipped to this city daily, and, that this enormous volume passes through innumerable hands before it is consumed, it will be seen how wide is the field for supervision and investigation. If all who are engaged in this business recognized the importance of delivering the product in the best possible condition, and were honest in their endeavors to do so, the situation would be simplified; but, those who deal in the commodity are not all actuated by philanthropic motives. Large financial interests are represented and adequate returns must be realized from the investment, very frequently at the expense of the quality of the milk.

In dealing with the conditions growing out of this situation we have endeavored to use our available force to the best possible advantage.

During the summer a large number of milk stores in this borough have been visited, and the mode of storing the milk examined. During this inspection temperatures were taken, and any condition that might affect the wholesomeness of the milk was noted.

In many instances it was found that the milk was not properly iced, and its temperature high, and very frequently it was discovered that the surroundings were of such a character as to endanger the purity of the milk held for sale. This latter state of affairs was due either to the dirty condition of the store, or to the fact that the living-rooms of the proprietor and his family immediately adjoined and opened into same.

Orders were issued requiring the milk to be maintained at a proper temperature, and reinspections were made in each case to ascertain if there had been a compliance with this rule. The option was given the owners of these stores which communicated with living-rooms to either close the communicating doors and windows or discontinue the sale of milk. In the majority of cases the former alternative was accepted, although as a result of the measure numbers gave up the sale of milk, and others moved to more suitable quarters. The enforcement of the rule requiring the separation of the living rooms from the store in which the milk is sold met with considerable opposition, as among the 7,000 milk stores scattered throughout the borough the major part of them were not conforming with the requirement. In every case where it was found necessary to enforce this rule a communication was sent to the proprietor of the store explaining why such action was necessary, of which the following is a copy:

Dear Sir—The Department of Health has insisted that the room in which milk is sold should not communicate with one which is used for living or sleeping purposes, because:

1st—Milk readily absorbs odors from the surrounding atmosphere, and is thus rendered more or less unsuitable for use.

2d—Milk furnishes an admirable medium for the growth of many kinds of disease-producing germs, and through it may be readily transmitted such diseases as tuberculosis, typhoid fever, diphtheria, scarlet fever, cholera, influenza, dysentery, and probably some others. If any person sick of any one of these diseases is present in the sleeping or living room, unless the greatest care is exercised, and even, in spite of this, the germs producing these diseases may be conveyed through the atmosphere, or by the hands or clothing of those in contact with the sick person, to the milk, and thus the milk becomes contaminated.

It is for these two reasons that this regulation of the Department of Health has been enforced.

Very truly yours,

ERNST J. LEDERLE, Ph. D.,
President.

In order to prevent the communication between the store and living rooms being re-established, the inspector, with the consent of the owner of the store, placed a seal upon the door or window, thus preventing its use without breaking the seal.

The employment of these methods have produced excellent results, for, in so far as the ground has been covered, more favorable conditions are maintained. These regulations are not new ones, but they have been in existence for a number of years, but an enforced observance of them is perhaps somewhat new. Rules and regulations for the sale and care of milk are printed in pamphlet form by the Department, and are freely distributed, so that no one engaged in the milk business need be ignorant of what the requirements are. A copy of these rules and regulations is herewith presented.

Rules and Regulations of the Department of Health of the City of New York for the Sale and Care of Milk.

FREE EXAMINATION OF MILK SAMPLES.

Milk samples will be examined free of charge at the Chemical Laboratories of the Department of Health, Fifty-fifth street and Sixth avenue, Borough of Manhattan, and Nos. 38 and 40 Clinton street, Borough of Brooklyn.

Samples will be received any week day, except Saturday, between the hours of 9 A. M. and 4 P. M. Saturdays from 9 A. M. to 12 M.

At least one-half pint of milk must be delivered for examination. In taking a samples of milk for analysis, care must be used to mix the contents of the can thoroughly in order to be sure that the sample fairly represents the whole.

In the case of bottled milk it is preferable to deliver the unopened bottle. If a smaller sample is taken the same precautions must be observed in sampling as the case of milk taken from a can.

Sample bottles *must be clean* and milk must be fresh when delivered for examination.

Extract from Sanitary Code of Laws Governing the Sale of Milk.

Section 59. That no person shall have at any place where milk, butter or cheese is kept for sale, nor shall at any place, sell, deliver or offer, or have for sale, or keep for use, nor shall any person bring or send to said city any unwholesome, skimmed, watered or adulterated milk, or milk known as "swill milk," or milk from cows or other animals that for the most part have been kept in stables or that have been fed in whole or in part on swill, or milk from sick or diseased cows or other animals, or any butter or cheese made from any such milk, or any unwholesome butter or cheese.

Section 63. No milk which has been watered, adulterated, reduced or changed in any respect by the addition of water, or other substance, or by the removal of cream, shall be brought into, held, kept, or offered for sale at any place in The City of New York, nor shall any one keep, have or offer for sale in the said city any such milk.

The term "adulterated" when so used in this section means:

First—Milk containing more than eighty-eight per centum of water or fluids.

Second—Milk containing less than twelve per centum of milk solids.

Third—Milk containing less than three per centum of fats.

Fourth—Milk drawn from animals within fifteen days before or five days after parturition.

Fifth—Milk drawn from animals fed on distillery waste, or any substance in a state of fermentation or putrefaction, or on any unhealthy food.

Sixth—Milk drawn from cows kept in a crowded or unhealthy condition.

Seventh—Milk from which any part of the cream has been removed.

Eighth—Milk which has been adulterated with water or any other fluid, or to which has been added, or into which has been introduced, any foreign substance whatever.

Ninth—Milk, the temperature of which is higher than 50 degrees Fahrenheit.

Section 64. Any milk found to be adulterated, either by the addition of water or other substances, or by the removal of cream, or which has been brought into or is held or offered for sale in The City of New York, contrary to the provisions of Section 63 of the Sanitary Code, may be seized and destroyed by any inspector, or other officer of this Department authorized to inspect milk.

Section 65. No condensed milk which is adulterated shall be brought into, held, kept, or offered for sale at any place in The City of New York, nor shall any one have, keep or offer for sale in said city any such condensed milk. The words "condensed milk" mean pure milk from which any part of the water has been removed and to which sugars have been added. The term "adulterated," when used in this section, refers to condensed milk in which the amount of fat is less than twenty-five per cent. of the milk solids contained therein, or to which any foreign substance whatever has been added, excepting sugars, as in preserved milks.

Section 66. No milk shall be received, held, kept, offered for sale or delivered in The City of New York without a permit in writing from the Board of Health and subject to the conditions thereof.

Section 67. No cream that is adulterated shall be brought into, held, kept, or offered for sale in The City of New York, nor shall any one keep, have, or offer for sale in said city any such cream. The term "cream" means the fatty portions of pure milk which rise to the surface when the milk is left at rest, or which is separated by other means. The term "adulterated," when used in this section, refers to cream to which any foreign substance whatever has been added.

Rules and Regulations for the Care and Storage of Milk.

1. Milk must not be kept for sale or stored in any room used for sleeping or domestic purposes or opening into same.

2. Milk must not be transferred from cans to bottles or other vessels on streets or on ferries or at depots, except when transferred to vessel of purchaser at time of delivery.

3. Milk must not be sold in bottles except under the following rules:

Bottles must be washed clean with a hot water solution of soap, or soda or some other alkali and then with hot water before filling with milk.

Bottles must not be filled except at the dairy or creamery, and in the city only in rooms so situated as to prevent the contamination of the milk by dust or other impurities from the streets or elsewhere.

Bottles must not be washed or filled with milk in any rooms used for sleeping or domestic purposes or opening into same.

4. The vessels in which milk is kept for sale must be protected by means of a suitable covered receptacle and so placed in the store as to prevent dust from the street or other impurities falling into it.

5. Store permits must be posted in stores so that they can be easily seen at all times.

6. Wagon permits must be carried on the wagon at all times when engaged in the sale, transportation or delivery of milk.

7. The number of wagons and the number of permit, the latter to be preceded by the words "Department of Health Permit," must be painted on both sides of the wagon in letters two (2) inches in length and one-half (1-2) inch in width, and in some contrasting color to that of the wagon.

8. After the day's sales are over, the cans, bottles, measures, and other utensils used in the sale of milk must be thoroughly cleaned with lukewarm water, to which a small amount of soda has been added in proportion of one tablespoonful of washing soda to a gallon of water.

9. The overflow pipe from the ice-box in which the milk is kept must not be connected directly with the drain pipe or sewer, but must discharge into an open water-supplied, properly trapped, sewer-connected sink (see section 38 of the Sanitary Code).

10. The ice-box in which milk is kept must be cleaned by scrubbing out with a hot soda solution as in rule 3, at least twice a week.

11. In selling milk, the contents of the can should be thoroughly mixed before measuring out the amount desired. This will prevent unintentional skimming, and the last quart of milk sold from the can will contain as much cream as the first quart sold.

12. It sometimes happens that in cold weather the milk may be delivered to the dealer more or less frozen. If such is the case, the ice from the sides of the can should be detached and the contents gently heated until the ice is all melted. If there is much ice in the can it is absolutely necessary to do this before the milk is sold, otherwise the liquid part dipped out and sold at first will contain more of the solid parts of the milk and cream, while the ice remaining and consisting principally of water, will after a time melt and will result in the milk containing more water than pure milk should have, and may appear as if it had been adulterated with water.

13. Do not place ice in the milk if it is desired to cool it or keep it cold, as the ice will melt and the milk then appears to have been adulterated with water.

SUGGESTIONS FOR TESTING MILK.

By the Cream Gauge.

Fill the cream gauge one-half full with water, at a temperature of 120 degrees Fahrenheit, to which has been added a few drops of a strong solution of washing soda. Then, after stirring up the contents of the can thoroughly, fill the gauge to the top mark with the milk. Shake well and place in very cold water (say 40 degrees Fahrenheit). In about thirty minutes the cream will have risen and the percentage can be read off, remembering that the result observed must be multiplied by two, as one-half (½) water and one-half (½) milk was used. Example: 8 per cent. of cream was observed by this test: multiplying this by two would be 16 per cent., which would be the true amount of cream contained in the milk by this test. Good milk should show by this test 14 to 18 per cent. of cream.

By the Lactometer.

To test for water the lactometer can be used as follows: Stir the milk to be tested so that a fair sample can be taken. Warm or cool enough milk to 60 degrees Fahrenheit to fill the testing cylinder. Insert the lactometer in the milk in the testing cylinder, being careful not to wet that part of the stem above the milk, and observe where it floats. Pure milk will not fall below the 100-degree mark on the lactometer at 60 degrees temperature. It must be remembered that skimming the milk will make the lactometer float higher and the addition of water or cream may make it sink lower than 100 degrees; but if the appearance of the milk upon the lactometer is noted, no one can mistake watered milk for milk to which cream has been added, nor pure milk for milk from which the cream has been removed, as skim milk. In other words, if the lactometer floats below 100 degrees and the milk looks thin, water has been added. If it floats above 100 degrees and the milk looks thin, it may be skimmed, or skimmed and watered. But if it floats above 100 degrees and looks creamy and yellow, and sticks to the glass, you can be reasonably sure that it is pure. An average milk will indicate about 109 degrees on the lactometer at a temperature of 60 degrees Fahrenheit, and show about 14 per cent. of cream by the cream test given above.

By order of the Board of Health.

ERNEST J. LEDERLE, Ph. D., President.

EUGENE W. SCHEFFER, Secretary.

A short table giving the results of the enforcement of Rule 1 is appended.

To January 1, 1903.

Nmber of stores found violating Rule 1	1,329
Number of stores sealed	510
Number of stores which complied with rule by other means	450
Number of stores refusing seal	369

Of the latter 343 afterwards complied with the law, by one or the other means.

The jurisdiction of this Department does not, of course, extend beyond the City of New York, but, it was thought that a more comprehensive view of the situation might be obtained by investigating the conditions existing at some of the sources of supply, and that the effect of a representative from the Department of Health of this City appearing among the farmers and creameries might be influential in inducing the adoption of improved methods.

Inspector Charles H. Kilbourne was detailed to this work, and I herewith submit his report of the result of his investigation.

"*To the Chief Inspector :*

" Sir—I have the honor to submit the following report in relation to the milk supply of New York City, the sources from which it is drawn, the methods employed in handling it at the farms and creameries, and in shipping it on the railroads to the city.

" In such a rapidly growing community as New York there is constantly increasing demand for all the food products, and notably is this true in regard to the demand for milk. The amount of milk consumed in New York is somewhat less than a million and one-half quarts daily. There is a large quantity used in the manufacture of ice cream, and also in making condensed milk, which is not included in this amount. In order to supply this great demand it is necessary to bring milk from long distances, and, with this increased demand new sources of supply are being tapped, and many localities at one time devoted to the manufacture of butter and cheese, are now shipping milk in its crude state. The sources from which milk comes may be divided into several classes. First, there is that produced within the limits of the city itself. Aside from the few people who keep a cow or two for their own use, there are in The Bronx, in Brooklyn, and in the Boroughs of Queens and Richmond, a number of farmers who produce milk for the market. and who bring it direct from the farms to the consumer. There are also some few farmers on Long Island, beyond the city limits, who bring milk into the city by wagons, and then there are in New Jersey, on the outskirts of Jersey City, and notably in Secaucus, several men who produce milk and bring it direct to the market.

"The amount of this locally produced milk is constantly decreasing, and, by far the greater quantity is brought in by railroad and boat. Of this some producers sell their own milk in the city by a representative, and there are still a good many farmers who ship their milk direct to dealers in the city. This was, formerly, almost the universal method. The farmer had his own cans, hauled his milk to the train and loaded it onto the cars himself. The farmers of Westchester, Putnam and Dutchess counties do this quite extensively now, but by far the larger quantity is handled through the creamery system.

"Receiving stations are built near the railroads, and the farmer sells the milk at the station; the further handling and loading being done by men at the creamery. Photo K 36 shows a creamery with the cars on the side track waiting to be loaded.

PHOTOGRAPH K 36.

"These creameries, or receiving stations, are some of them co-operative concerns, the stock of which is owned by the farmers. Some of them are owned by men and companies living outside the City and selling the milk to dealers in the city, and a great many of them are owned and operated by dealers who have offices in the city and sell the milk direct to consumers.

"The milk business appears to be getting into fewer and fewer hands. Probably 80 or 90 per cent. of the milk sold in Greater New York is handled by one hundred and twenty-five dealers, and, of the 25,000 forty-quart cans of milk shipped from creameries daily, 15,000 cans are handled by six firms; one firm shipping over 5,000 cans.

"From data furnished by the dealers and creamery owners, I find that there are nearly four hundred creameries which ship milk to this market. Of these, nine

PHOTOGRAPH K 2.

firms operate ten or more each; four firms have over twenty each, one has over thirty, and one has forty-five.

"The milk is shipped to the City by the following railroads:

"The Delaware, Lackawanna and Western.

"The Erie, which also takes the milk from the Lehigh and Hudson railroads.

"The New York Central System, including the Rome, Watertown and Ogdensburg Division; the Harlem R. R. and the Putnam Railroad.

"The West Shore, hauling from Kingston the milk coming on the Ulster and Delaware, and the Walkill Valley Railroads.

"The New York, Ontario and Western.

"The Central Railroad of New Jersey.

"The New York, Susquehanna and Western.

"The Lehigh Valley.

"The New York, New Haven and Hartford, and the

"Delaware and Hudson, Central New England, Newburg and Dutchess and Connecticut, which are tributary to other roads.

"The Newburg boat also brings milk to this city.

"These roads take milk from large areas and from widely-scattered sections. New York State contributes more milk than all other States combined, but Northern New Jersey furnishes some, and there are a number of creameries in Northeastern

PHOTOGRAPH K 4.

Pennsylvania whose products come to New York. Western Connecticut ships considerable milk, and the Southern Berkshire section of Massachusetts ships also a small amount.

"In New York State the southern counties are large shippers. Dutchess, Putnam, Orange and Sullivan counties are great dairy sections. A great deal of milk also comes from the central portion of the State, and the northern section along the line of the Rome, Watertown & Ogdensburg Division of the New York Central Railroad is becoming a great contributor to the milk supply of the city. On this railroad there are located about fifty creameries, many of them recently built, and from

PHOTOGRAPH K 5.

this section milk is hauled the greatest distance of any coming to this market, some of it coming about four hundred miles, and from near the Canadian border.

"Another long haul of milk is from the Chenango Branch of the West Shore Railroad. This branch extends from Syracuse to Earlville, and some of the milk is hauled three hundred and fifty miles. The short haul milk comes on the line of the Harlem Railroad, and from Orange County. The nearest creamery is less than forty miles distant.

"It is a curious fact that milk coming long distances arrives to the consumer as fresh as that coming short distances. In either case the milk arriving in the City at midnight is that drawn from the cows on the night previous, and on the morning of the day of arrival. Reaching here at midnight it is delivered to the consumer the following morning. It is evident that all milk is twenty-four or thirty-six hours old when it reaches the market. The only exception is that in some creameries part of the morning's milk brought is kept at the creamery for shipment on the following day. This milk is, of course, forty-eight hours old when it reaches the consumer. The long haul milk is much longer in transit, leaving the station at about 8 o'clock A. M., while the short haul milk leaves the station at from 4 to 6 o'clock P. M. The milk from long distances is, in some cases, better cared for than that from nearby points. The milk must be rapidly cooled in order to ship it at the early hour necessary, and the cars must be thoroughly cooled in order to keep the milk in good condition for so long a time.

"The New York Central Railroad, the West Shore, the New York, Ontario and Western and the Erie Railroads are the greatest milk carriers.

"During the past summer, under authority from the New York State Board of Health, I made inspections of the various milk producing sections of this State, and,

PHOTOGRAPH K 6.

also to some extent in New Jersey and Pennsylvania, with a view to ascertaining the methods of producing and handling the milk and to find out what improvements could be made. I first, in company with an inspector from the New Jersey State Department of Health, made inspections of the premises referred to in Jersey City and Secaucus, where milk is produced and hauled in wagons to customers in New York City. Conditions here were found to be very bad in many cases. The Secaucus places were upon the Hackensack swamp. Cows were kept in poorly drained and ventilated stables; manure was piled against the sides of stables and the water used for washing utensils and for the cows was drawn from wells so near the stables that

PHOTOGRAPH K 81

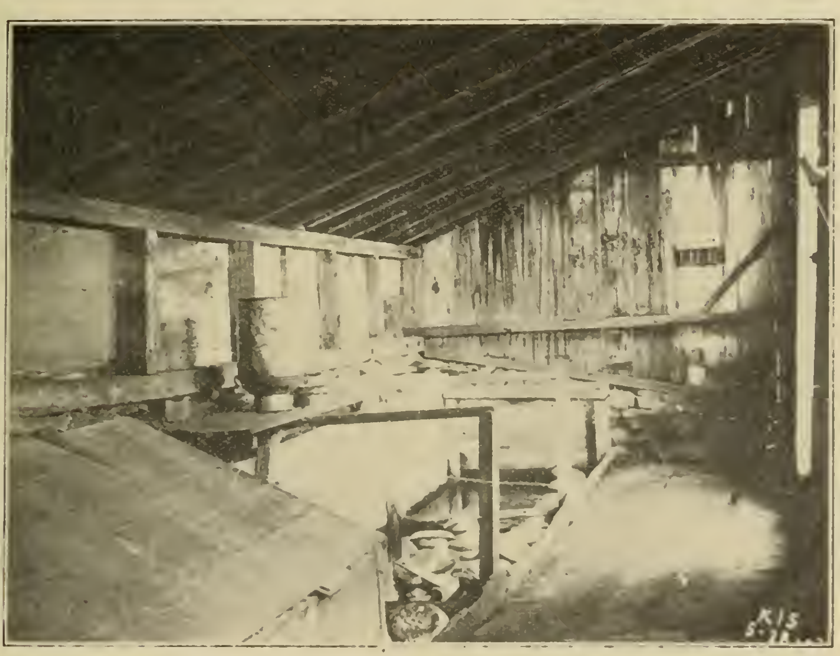
the water was found to be contaminated. The accompanying photograph, K 2, shows some of the worst conditions. In this the well from which water was drawn for all purposes is shown to be between the stable and the pile of manure at the side of the buildings.

"In photograph K 4 the pump at another farm is shown close to the stable; and in K 5 and 6 the conditions in another stable where the manure is piled against the stable, and the drainage is toward the well—not shown.

"In this case the cows were milked in the stable itself, in the midst of filthy surroundings.

"In my opinion milk so produced was unfit for use, and a report obtained from the New Jersey Board of Health being of similar import, the permits for the sale of milk from these premises were revoked, and, the sale continuing, arrests were made. For various reasons only one case was held for Special Sessions court. This case was taken by counsel for the defendant to the Court of Appeals on the ground that no right existed with the Board of Health to regulate the sale of milk by permits, and the case has not yet been settled.

"During the summer I went into those sections producing milk and shipping it on the Harlem Railroad, the New York Central, the West Shore, the Ulster and Delaware, the Chenango branch of the West Shore, the Ontario and Western, the Erie, the Delaware, Lackawanna and Western and the Lehigh Valley Railroads, visiting Westchester, Putnam, Dutchess, Orange, Tompkins, Oneida, Delaware, Schoharie, Chemung, Tioga and Madison Counties.



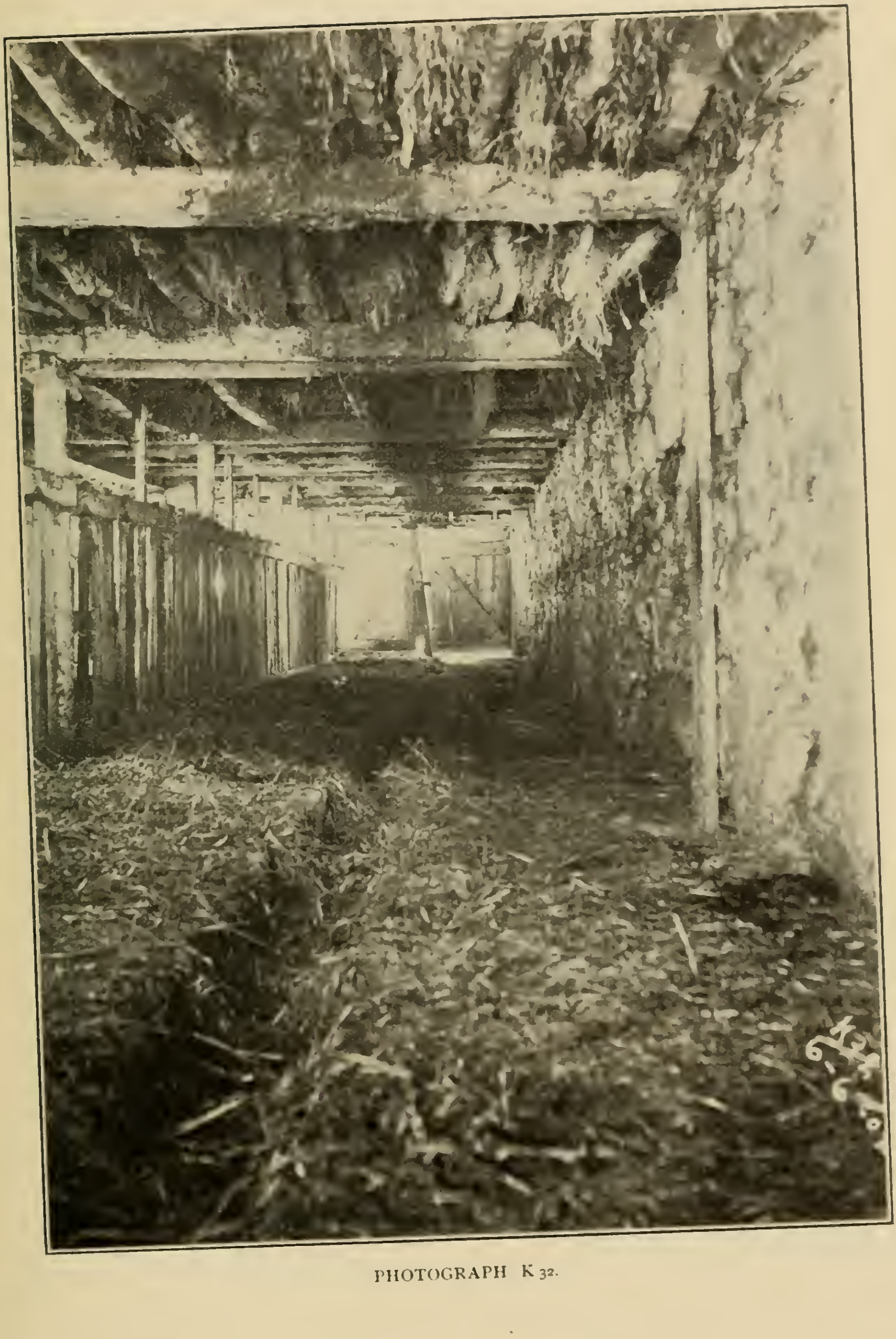
PHOTOGRAPH K 15.

"One of the worst features about the shipment of milk is the condition in which the cans are returned to the country from the city. Cans are not washed when empty in the city, not even being rinsed, consequently they remain with milk adhering to the sides, and frequently with a quantity of sour milk in them. Since empty cans are not gathered every day by the dealers, it frequently happens that cans are returned to the country which have been empty from four to five days, and they become very offensive. A few dirty cans and bottles are shown in Photograph K 81.

"The method of handling milk by the farmers is, that the cows are milked night and morning, the milk is strained through cloth or wire strainers, or both combined, into the cans, which are frequently set in the stable. Some more progressive farmers take the milk away from the stable for straining, and some have milk-houses where this is done. Unless it is to be hauled to the creamery both night and morning, as some creameries require it to be done, the night's milk is then set away for cooling at the farm.

PHOTOGRAPH K 56.

"The old method of cooling, still in use, is to set the cans in a spring, or a box through which spring water flows. The cover is left off or loosely placed upon the can, and frequently the milk is stirred while cooling. Few springs are cold enough to satisfactorily cool milk, and ice is now being used to a greater extent. The aerator is also used to some extent, in which the milk flows in fine streams over a water or ice-cooled surface. Photograph K 15 shows a spring-house with cans of milk set in the box for cooling.



PHOTOGRAPH K 32.

"When cans are washed at the farm they are usually set upon a rack out of doors to dry and air. Photograph K 56 shows a rack in use at Pawling.

"The cow stable in some sections I found to be kept in bad shape. In some the walls are never cleaned or whitewashed. Frequently I found the ceiling to consist of loose poles, over which hay is stored. In one instance I found the stone

PHOTOGRAPH K 34.

walls of the basement in which the cows were kept plastered with manure to keep out the cold. A few of the worst stables are shown in Photographs K 32 and K 34, found in Pawling. K 78 is a very dark and filthy stable in Georgetown, N. Y. Good stables are K 16 and 35, and an unusually good one is K 28.

"When the milk is hauled to the creamery but once a day, this is done in the morning, and the morning's milk is usually hauled warm, though some creameries require that it shall be partly cooled before hauling. Some creameries furnish the cans for the farmers, while others empty the milk from the farmers' cans into their own and ship the milk in their own cans. In nearly all cases the washing of cans is done at the creamery.

"Most creameries do this very well, frequently thoroughly heating the cans after washing over a jet of live steam. When the milk is brought to the creamery it is either measured or weighed by employees of the creamery. When weighed it is poured into a tank setting on scales. This is shown in Photograph K 59.

"This photograph shows a creamery in Stamford, N. Y. At all creameries the milk is set into tanks of ice and water for cooling, frequently in the cans in which it is brought. The method is becoming more common of mixing the milk from a number of producers in a large mixing-vat, and filling cans from this. A more uniform quality of milk is thus secured, any adulteration by one farmer being thus covered up. In photograph K 59 a creamery is shown in which the milk is cooled by being pumped from the mixing-vat into a trough, from which it flows over a series of pipes cooled with iced water. In a creamery at Homer, New York, I found the cooling done over two series of pipes, the lower series being cooled with

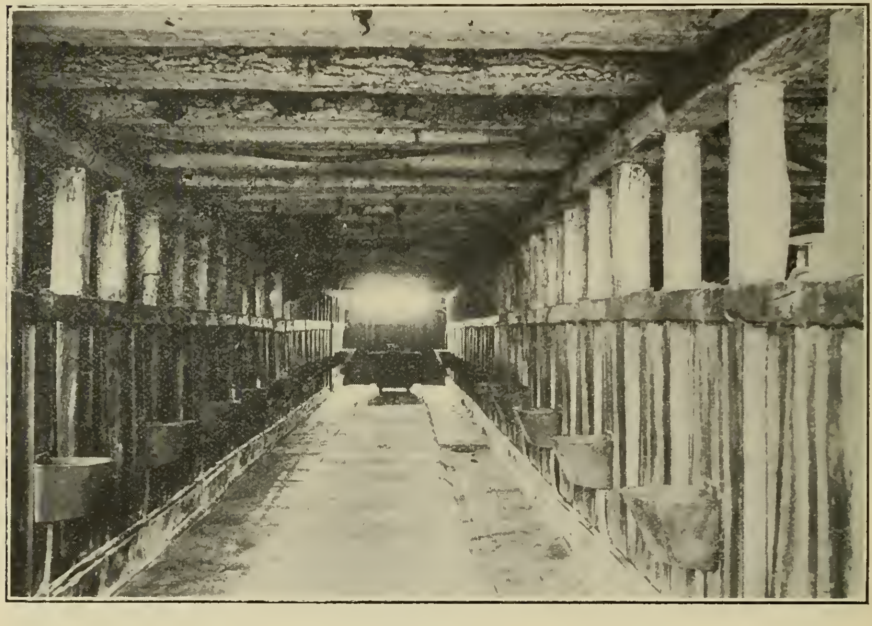
PHOTOGRAPH K 78.

brine. The milk was frequently frozen on the lower pipes. Another creamery freezes a portion of the milk, putting a piece of frozen milk in each can of milk shipped.

"The cars in which the milk is shipped are variously arranged for keeping the milk cold. In some the ice is placed upon the floor of the car, as shown in photograph K 37.

"This does not cool the milk as it should. In other cases ice-tanks are placed at the ends of the cars and filled with ice. This method will keep milk cold if placed in the car at a low temperature, but will not cool milk which has been loaded at a high temperature. Cans are best kept cool by placing ice in contact with them, as shown in photograph K 57b.

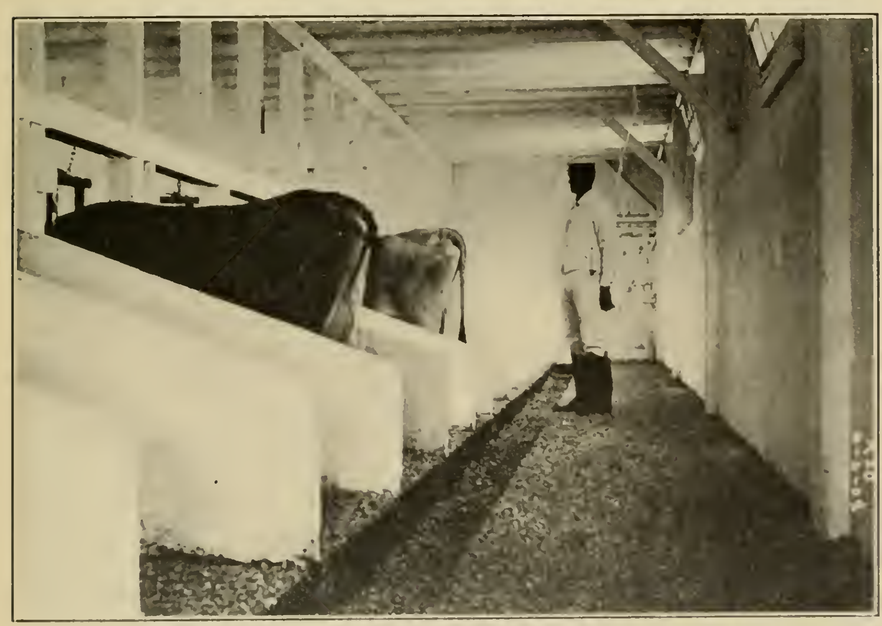
"A large part of the milk is now sold in bottles. K 84 shows a creamery with a bottling table and tank. A series of spouts from the tank fills a row of bottles at once. The bottles when filled are placed in boxes and covered with broken ice for shipment.



PHOTOGRAPH K 16.

"In my inspections I visited creameries and made tests of the milk brought by the farmers to ascertain the temperature and the quality. I then went to the farms and investigated the methods employed in caring for the milk. If the quality of the milk as brought to the creamery appeared to be poor, I made further tests at the farms. In several instances I found milk at the farms to be of much better quality than when it arrived at the creamery, indicating that it had been adulterated. In one case, where the farmer shipped direct to a representative in the city I found the milk at the farm much adulterated. Word was sent to the Department in the city, and samples were taken on the arrival, resulting in a conviction and a heavy fine.

PHOTOGRAPH K 35.



PHOTOGRAPH K 28.

"Samples of milk were frequently taken as it arrived in the city and examinations were made as to the number of bacteria contained; when the number proved to be over 1,000,000 per c.c., endeavors were made to discover the cause. In most cases I was able to assign a sufficient cause, either in improper cooling or in unclean methods of production and handling.

"The securing of clean and properly cared for milk in all stages of handling, from the dairy to the consumer, is as proper a field for action as the prevention of adulteration, and my investigations convinced me that a great deal of this work is needed among the producers. Dirty stables, improper milk-houses, careless milking,

PHOTOGRAPH K 59.

the use of contaminated water for washing the utensils, and insufficient cooling are very common, and may be the cause of injury to health.

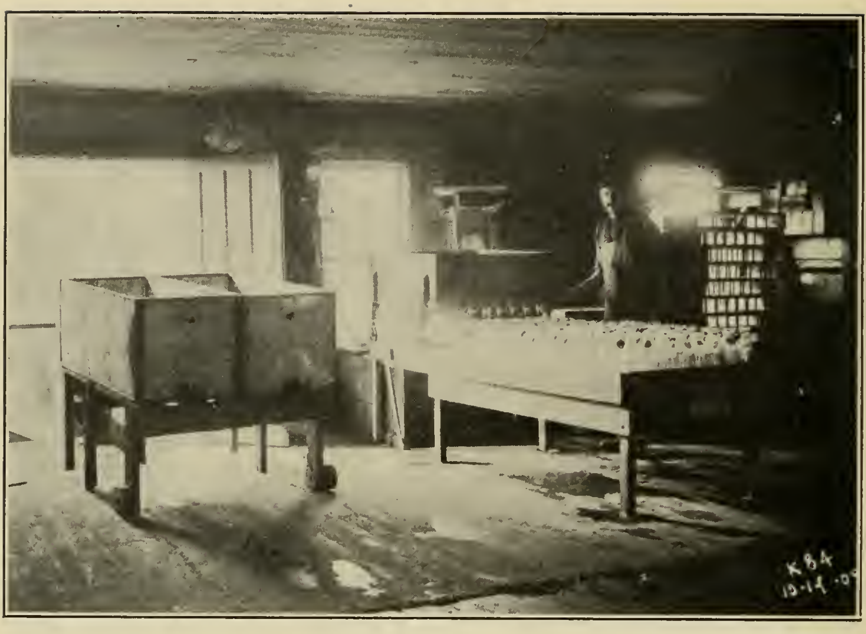
"During the past season some railroads have adopted better methods of cooling cars, and I have endeavored, by talking with producers and those handling milk, and by giving printed instructions relative to the care of same, to secure the adoption of better methods.

"Respectfully submited,

"(Signed) CHARLES H. KILBOURNE, Food Inspector."

PHOTOGRAPH K 37.

PHOTOGRAPH K 57b.



PHOTOGRAPH K 84.

The following is a sample of the literature distributed by Inspector Kilbourne among the farmers:

DEPARTMENT OF HEALTH—CITY OF NEW YORK.

CIRCULAR OF INFORMATION FOR FARMERS, RELATING TO THE COLLECTION AND CARE OF MILK.

The Department of Health of The City of New York has determined to adopt stringent measures against the introduction into New York of milk which contains an unnecessary and dangerous number of germs or bacteria.

The investigations of the Department have shown that under proper conditions and with reasonable care milk reaches the city in excellent condition, containing but a comparatively small number of germs. Where large numbers of germs are present in it, experience has shown that it is always the result of an unusual lack of cleanliness, some serious defect in the methods of collection, handling or care of the milk, or because it has been kept for several days.

This circular is issued by the Department for the information of farmers and dairymen, so that they may in their own interests observe those precautions which are necessary to preserve the milk in good condition and thus prevent its being condemned.

Directions.

1st. The greater the cleanliness observed in collecting milk, the smaller will be the number of germs which fall into it.

2d. The quicker the temperature of the milk is reduced and the lower it is kept, the slower will be the growth of bacteria in it.

3d. The quicker the milk is transported to the consumer, the less time there is for the multiplication of germs, and the better will be the condition of the milk when delivered.

A Detailed Consideration of the Factors Which Largely Influence the Condition of Milk.

1st. *The Stables*—The stables should be kept clean, so that the cattle will not become filthy. Dry fodder should not be fed at milking time and no sweeping should be done just before it, or the dust thus raised will fall into the milk. Where possible, a separate clean shed should be set apart for the milking. The stables should be dry and well ventilated.

2d. *The Water*—The water used for cleaning the pails, cans, and for all other purposes in connection with the milk, should be from a source at some distance from the house and stable, so that there will be no danger of pollution by sewage. If not of the best character, it should be boiled.

3d. *The Cows*—Most of the germs which are found in milk come from the cows. The cow's belly, udder and tail should be thoroughly cleaned before milking, to prevent dirt falling into the milk pail. Wiping the parts with a damp cloth just before milking prevents dust from being shaken off during milking. Milk should not be used from sick cows, or those whose udders are diseased.

4th. *The Milkmen*—No one suffering from a contagious disease or who has been in contact with others suffering from any contagious disease, such as consumption, typhoid fever, diphtheria, scarlet fever or measles, should come in contact with the cows or the milk, or the milk utensils. These diseases are often transmitted by the milk.

Before milking, the men should thoroughly wash their hands and dry them on a clean towel; this should be done after the cow's udder, tail and belly have been cleaned. The milking should always be done with dry hands. The hands should never be moistened with milk, as in this way dirty milk often drops into the pail.

5th. *The Milk Pails, Cans, etc.*—The milk utensils should be kept absolutely clean. After use they should be immediately cleaned with luke-warm water and then scalded with boiling water. This should not be done in the house or where there are sleeping apartments. They should be dried upside down in a clean place where there is no dust. Straining-sieves and cloths must be perfectly clean when used.

6th. *Cooling the Milk*—The milk should be cooled to 45 degrees F. or less, as quickly as possible. When the cans are placed in cold water for cooling, the water should be iced and should extend to the neck of the can, but no further lest water overflow into the milk. If, however, the milk in the can is at a level higher than the surrounding water it is not cooled for many hours. The cans should be left in the ice water for at least one hour, or until shipped. Many of the forms of apparatus designed to cool and aerate the milk are efficient.

Having been obtained in a cleanly manner and quickly cooled, milk should be kept cold until delivered at the creamery or train. A full can in summer will not remain cold, when exposed to the air, for more than one hour, and if it is to remain longer at the station, some arrangement for keeping it cool must be made. Milk should never be allowed to stand in the sun.

7th. *Transportation*—Milk should be shipped as quickly as possible after collection. Much injury results to the milk from 12 or 24 hour's delay in delivery. Old milk, while still sweet, often contains enormous numbers of germs, is unwholesome, and capable of causing serious sickness, especially in the summer. Over 6,000 deaths occurred in infants under five years of age in New York City during 1900, from diarhoeal diseases; these were very largely due to such milk. Old milk, or that containing large numbers of germs, will, so far as is possible, be excluded from New York City in the future.

Transmission of Contagious Diseases Through Milk.

No one who is suffering from consumption, typhoid fever, scarlet fever, measles, or diphtheria, or who is nursing any one suffering from one of these diseases, should have any connection with the milk or milking, or with the milk utensils. Outbreaks of contagious disease frequently result from infection of the milk.

Summary action will be taken by the Department of Health if any cases of contagious disease are traced to infection of milk through negligence on the part of the dairymen.

New York, May, 1901.

By order of

ERNST J. LEDERLE, Ph. D., Commissioner of Health.

Eugene W. Scheffer, Secretary pro tem.

In addition to the above the regular routine work of milk inspection has been kept up. A number of night raids have been made on the wholesalers, and several hundred samples taken, resulting in the detection of adulteration, and the subsequent conviction and fining of the offenders. Over 30,000 specimens of milk were examined, and 3,500 samples collected for analysis. The fines imposed during the year for adulteration of milk amount to $10,490, and over 1,000 quarts of milk have been destroyed as unfit for use.

Number of permits denied	182
Number of permits revoked	2,148
Total	2,330
Number of permits granted	2,422

FRUITS AND VEGETABLES.

This industry is divided into two general classes, viz.: The wholesale and the retail trade. The wholesale trade is, of course, confined within distinct and definite limits, while the retail trade is scattered throughout the city. A vast amount of good service is rendered by a careful scrutiny of these products as they are received at the wholesale markets, for here are the points of distribution, and many thousands of pounds of decayed and unwholesome fruit and vegetables, that otherwise would find their way into the retail market, are condemned and destroyed. The greater part of this business is in the Borough of Manhattan, and is along or contiguous to the North river, stretching south from the Manhattan Market at West Thirty-fourth street. Into this territory is imported fruits and vegetables in immense quantities from almost all parts of the world.

Two inspectors are detailed to the work of inspecting the wholesale markets, which include the commission houses, and all consignments of this character of goods are carefully inspected before they pass into the hands of the retailer.

A comprehensive statement of the extent of this part of the industry is contained in the report of Inspector Bayard C. Fuller, who is detailed to this class of work, which report is herewith submitted:

"*To the Chief Inspector :*

"Sir—I have the honor to submit the following report in relation to the inspection of fruits, vegetables and all food products other than liquid milk, fresh meat and fresh fish, together with the general condition of the various marts where such merchandise is sold and distributed. The word 'Fruits' hereinafter used will mean fruits both dried and green, and vegetables.

"All statements made in this report relating to quantity are authentic, and are gathered from the various mercantile exchanges and transportation companies.

Fruits—Green.

"Fruits are divided into two classes, deciduous and citrus. The first embraces every kind (other than berries) that grow at certain seasons and but once a year. The second refers to the orange, lemon and grape-fruit family which bear all year; the leaves from such trees do not perceptibly fall and are always green.

"*Where Grown*—Fruits shipped to this market are grown as far south as the tenth degree north latitude, which begins at Cartagena, United States of Colombia, and west to the Pacific coast, although the bulk not farther west than the eighty-fifth degree longitude, which runs through the centre of Michigan.

"The Mediterranean ports, such as Sicily, Italy and Spain, send large quantities, and Turkey and Persia contribute dried fruits, and in a few instances apples have been shipped from New Zealand, so, practically, fruit is shipped from nearly all parts of the world.

The Western industry has grown rapidly, and irrigation in Arizona has made that territory a vast shipping centre.

"It may be interesting to note that the fruit industry, classified with the dairy interests (the handling of which by the same merchants make them synonymous) is the third largest industry in the world.

"*How Transported*—Aside from the ordinary transportation facilities of nearby products, there are patent ventilators on ships coming from the tropics and refrigerator cars from the West, reducing the loss to a minimum. The only instance where speed is lacking in the shipping of fruits is in the carrying of "pines" in bulk, which come from Key West and the Bahamas in schooners, the time of passage averaging twelve days.

"*Points of Arrival*—The principal points of arrival are as follows: Clyde Line, Pier 45, North river; Pennsylvania Railroad, Pier 29, North river; Old Dominion, Pier 36, North river; Baltimore & Ohio Railroad, Pier 22, North river; Erie Railroad, Pier 20, North river; New York Central Railroad, Pier 16, North river; American Line, Pier 14, North river; Delaware, Lackawanna & Western Railroad, Pier 13, North river, and Ward's Line, Piers 16 and 17, East river. Also all of the steamship lines in a small way, and all express companies and river boats.

"The bulk of Mediterranean fruit lands in Brooklyn, between Fulton street and Forty-second street.

"*How Distributed*—The Savannah, Pennsylvania and Old Dominion companies open their docks for business at 3 o'clock A. M. These places are our great markets, where 70 per cent. of the product is sold. All jobbers and retail grocers go there to make their daily purchases.

"The heaviest days are Mondays, Wednesdays and Fridays. From these points, as a rule, the entire community is supplied. All of this is done at private sale.

"The next important method for distribution is by public auction: the principal places being Pier 20, North river, and the Erie Railroad, known as "The California Dock." All far Western fruit arrives there and is lined up from midnight to 8 o'clock A. M., when samples are opened and exposed to the buyers (no retailing). At 8 o'clock A. M. the fruit is sold upstairs in a large room especially constructed for the purpose. There are two auction companies, who alternate as to whom shall be first in the selling.

"All Mediterranean fruits are sold by auction. The goods are lined up the same as on the Erie, at the Brooklyn and Jersey City wharves. The buyers examine the lines which they wish to purchase, mark their catalogues, then return to New York, where they are sold by Brown & Seccomb and the Fruit Auction Company.

"The only other fruit sold by auction is about 80 per cent. of the "pines," and 10 per cent. of the bananas. They are auctioned at No. 10 Jay street.

"Railroad and express fruit, other than that above described, goes direct to the commission merchants' stores, and from there is sold to the retailers and peddlers.

Vegetables..

"With few exceptions vegetables arrive at the same places as fruits, but are shipped from nearby points. The Far West sends celery, cauliflowers, and Europe potatoes. The season begins about March 15, with Floridian products, and as the season advances the supply gradually goes north until October, when the northern part of the State winds up with fresh shipments, potatoes, cabbages, turnips and carrots excepted, which are shipped all winter and until the beginning of the following season.

"Germany sends over large quantities of cabbage, while Ireland, Scotland, Belgium and Germany send potatoes, but this is only done when our crops are short and prices high, for there is a duty of 25 cents per bushel on potatoes and onions.

"Spain sends large quantities of onions and at times many come from Egypt

"Occasionally there is such an influx of vegetables from the South that the outgoing steamers of the Savannah and Old Dominion lines carry much of the product to sea and dump it. (I have known of 12,000 crates to be disposed of in this way in one day.)

"The chief places for distribution of vegetables in bulk (that is, loose in car lots) are Manhattan Market, foot of West Thirty-fourth street; Erie, foot of West Twenty-seventh street, and Palmer's Dock, Williamsburg

"The foreign produce is principally sold at the Anchor, Allen, State, Leyland, Atlantic Transport and International Navigation Lines, all located along the North River front.

Canned Goods.

"This is a subject that is very difficult to expatiate on in so far as receipts are concerned, for, after interviewing the brokers and wholesale grocers, their combined ideas and figures are but guess work, and sifting the matter thoroughly I find that approximating then I would be from three to five million cases wrong either way, from the aggregate figures of fifteen million cases per year.

"Nearly every known food product is canned. Originally they are sold by brokers to the wholesale grocers, who, in their turn, job to the retailers, and much is exported.

"The heaviest canning is of meats, which is done at the Chicago Stock Yards. Then the fruit and vegetable industry, fish and condensed milk.

Disposing of Condemned Goods.

"Arrangements have been made with the Savannah and Old Dominion Lines to carry large quantities of condemned goods to sea and there dispose of them beyond the Government's jurisdiction. With the Pennsylvania and Erie Railroads similar arrangements were made to clean the docks every day by loading the refuse in cars and dumping on the meadows between Jersey City and Newark. Bananas in large quantities are dumped at sea. That disposes of the major part. The balance is collected daily by men who have contracts with all the commission houses, and employ ten carts; this they take to Canal street dump.

Miscellaneous Fruits.

"This is simply to give a general idea from whence come the major portion of fruits:

"Apples—New York State, Virginia, Michigan and Missouri.

"Bananas—Islands of Jamaica, Cuba and Santa Domingo; all along Central American coasts to United States of Colombia.

"Cantaloupe—Colorado (heavy), New Jersey and New York.

"Cranberries—New Jersey and Massachusetts.

"Dates—Persia.

"Figs—Turkey.

"Grapes—Imported: Spain. Domestic: New York State.

"Cocoanuts—Central America and West Indian Islands.

"Grape Fruits—Jamaica, Florida and California.

"Lemons—Sicily, Italy and California.

"Melons—Georgia, North and South Carolina, Virginia and New Jersey.

"Oranges—California (heavy), Florida, Mexico, Jamaica, Cuba, Sicily and Spain.

NOTE—Foreign oranges few, duty 1 cent per pound.

"Pines—Cuba (heavy), Jamaica, Florida Keys and Bahamas.

Piers, Markets, Stores, Stands and Push-Carts.

"*Condition*—The general condition of 'fruits' throughout the city is exceptionally good, the dealers and peddlers are fully cognizant that to violate any of the Department's rules by selling inferior 'fruits' will not only meet with the forfeiture of their goods by seizure, but instant arrest as well.

"*Wholesale Inspection*—This particular branch of the Department's work is very delicate, for it treats with all the large wholesale dealers, railroads, steamship and transportation companies making New York their terminus.. All docks, railroad yards, commission houses and auction rooms are daily inspected before the fruit is delivered or sold. Fruit unfit for human consumption is carefully inspected and condemned. In case the competency of the inspector is questioned, outside disinterested people (usually two) are called to express an opinion, and during the past dozen years no suit has been brought against the Department for damages. Arrangements are made with the Western Union Company to notify the arrival of ships, and, as the railroad and ship markets are contiguous, it is impossible for anything to escape inspection.

"In addition to the inspection of fruits, a strict watch is kept to see that all places are in an absolutely clean and healthful condition. During the season when produce is at its height, inspections are made at early hours and until the markets are closed for the day. Inspector Philip Heist, who has charge of the Manhattan and Gansevoort markets, and the railroad yards, by virtue of his forty years' experience, has so carefully and thoroughly weeded out the heretofore existing evils between the peddlers and middlemen, that these places are cleaner than ever before known.

Work in Conjunction with the United States Government.

"Nearly all foreign fruits pay duty to the Government, and when it arrives in poor condition great care must be exercised in order that the two powers may work in harmony. The Government do not object to condemnation proceedings, but wish to be assured that the fruit will reach the dump. Heretofore the Government sold lemons at auction that were abandoned by the importers as not worth freight and duty; that was an evil to overcome, for nearly all of it was purchased by the East Side dealers. Finally arrangements were made with the Federal authorities that all abandoned goods were to be sold the same as usual, but only sound deliveries made; this action resulted during the year 1902-03, in the condemnation of nearly twenty thousand boxes of lemons, thus eradicating one of the most difficult propositions the Department ever had to deal with in fruit. Furthermore, all food products abandoned by the importers are regularly inspected and condemned if necessary. Notification of such abandonments is sent to the Department instantly by the Government, thus showing unity of action for the public good. The duty on citrus fruit is one cent per pound; onions, 25 cents per bushel; pines, 7 cents per cubic foot in packages and $4 per 1,000 in bulk.

"*Groceries*—This includes the general merchandise of wholesale and retail stores, including canned goods.

"These places are regularly inspected and samples of all kinds are taken to the laboratory for analysis. Any articles not found up to the standard. *i. e.*, containing deleterious ingregients, are carefully reinspected; if the same condition prevails, the goods are immediately condemned and disposed of in the usual way.

"*Condensed Milk*—This industry is watched with the greatest care. Many times during the year samples of every brand known to be sold in this market are analyzed to ascertain if the usual high standard is maintained. The slightest showing below the standard meets with immediate confiscation of the goods, arrests and heavy fines of the sellers, making a second offense quite out of the question.

"*Coffees, Teas and Confectionery*—These food products are treated in the same manner.

"*Eggs*—Recently a new trade made its advent in this city, that of bringing cheap, old and musty eggs in tin canisters, then freezing and selling them by the pound to the poor people. The eggs were used for various cooking purposes and by bakers.

"In a very short time this enterprise became known to the Department. A crusade against it was immediately started, and, in three days, the principal offender was arrested and heavily fined; subsequent regular inspection proved that the traffic had ceased.

RECAPITULATION.

Foreign Fruit and Vegetable Arrivals.

January 1st, 1902, to December 31st, 1902.

Bananas, bunches	5,150,000
Dates, boxes	298,000
Figs, packages	58,000
Grapes (Almeria), barrels	295,000
Lemons, boxes	1,900,000

Oranges, boxes	110,000	
Oranges, barrels	90,000	
	———	200,000
Onions, crates	195,000	
Onions, bags	110,000	
	———	305,000
Potatoes, bags		420,000
Cocoanuts		28,000,000
Pines, barrels	60,000	
Pines, crates	480,000	
Pines, loose	631,000	
	———	1,171,000

RECAPITULATION.

Domestic Fruit and Vegetable Arrivals.

Apples, barrels		971,086
Apples, evaporated, cases		153,845
Cranberries, cases	42,817	
Cranberries, barrels	57,767	
	———	100,578
Dried fruits, other than apples		3,700,000
Watermelons		1,427,188
Muskmelons, barrels and crates		11,000
California fruits, packages		2,130,000
Grapes, trays and baskets		1,870,000
Potatoes, barrels and bags		1,320,000
Onions, barrels and bags		207,000
Miscellaneous—Berries, small fruits, crates, boxes and barrels		1,874,000

"All of which is respectfully submitted.

"(Signed) BAYARD C. FULLER, Food Inspector."

To the inspection of the retail trade three inspectors are detailed. One of these is constantly employed among the "push-cart peddlers" on the lower East Side; another in the Harlem Market and adjacent territory; and the third is engaged in inspecting shops and stands in various portions of the borough.

The inspector in the lower East Side district is accompanied by a horse and wagon, and, whenever he sees unfit food of any character exposed for sale, either in push-carts, in the stores or on the sidewalks, he seizes and carts it away to the dumps. As much as five and six thousand pounds in one day are thus frequently seized and destroyed.

A somewhat similar condition to that existing on the lower East Side has been developed recently in the section known as "Little Italy," located on the East Side in the vicinity of 110th street, and it was found necessary during the summer to send an inspector with the wagon to this point in order that the work might be more efficiently carried on.

The question may be asked why such an amount of poor material is allowed to find its way to these centres? Why are not these goods seized at the source of supply? And the answer is, that when these goods are purchased at the wholesale markets, they are in good condition, but, much of the fruit comes from a great distance and is preserved in refrigerator cars, and, in carting it through the streets it is exposed to the hot weather, and is more or less bruised by jolting as it is carried through the streets, and begins to rapidly decay. If the stock on hand is not disposed of promptly it is kept until the following day, when often it is almost worthless. And this is the character of goods most frequently condemned and confiscated. The time of one inspector is entirely devoted to this work. The other two inspectors, beside attending to the duties already referred to, are engaged in collecting samples of canned goods of all description, and of drugs for analysis by the chemist of the Department. Many samples of this character have been procured during the year, as the following will show:

LIST OF SAMPLES.

Canned Goods.	
Anchovies	1
Baking powder	20
Ceres beans	7
Cocoa	9
Condensed milk	75
Corn	9
Corned beef	1
Extract of beef	4
Evaporated cream	4
Peas	22
Pickled herrings	2
Potted tongue	1
Roast beef	1
Salmon	3
Sardines	3
Smoked beef	2
Soused mackerel	1
Tomatoes	29
Vegetable soups	2
Total	196
Drugs.	
Almond oil	1
Beef, iron and wine	1
Camomile tea	1
Castor oil	1
Cocaine	1
Cream of tartar	50
Linseed oil	1
Medicines	11
Nasola	1
Mellin's Food	1
Nestle's Food	1
Jamaica ginger	7
Phenacetine	351
Spirits of camphor	6
Total	434

Groceries.

Bread	3
Butter	1
Buttermilk	1
Catsup	12
Cheese	3
Coffee	2
Cream	53
Eggs	4
Flour	2
Pepper (black)	4
Sugar	2
Vinegar	1
White oats	1
Total	89

Miscellaneous.

Candy	4
Carbonic water	13
Cider	9
Clams	2
Clam chowder	4
Currant jam	1
Frankfurters	11
Grape jelly	1
Hair dye	1
Hair restorer	1
Hokey pokey	12
Honey	1
Lemon soda	1
Lime juice	1
Milk preservative	1
Orange sugar	1
Pork	1
Sausages	12
Shredded wheat biscuit	1
Syrup	1
Water	49
Wine	1
Total	129
Grand Total	848

The result of the chemical examination appears in the report of the chemist.

During the year 8,471,538 pounds of this class of food-stuffs were condemned and destroyed.

MEAT INSPECTION.

Local slaughterers purchase their cattle in three general markets: In the Chicago and Buffalo stock yards, whence they are sent by rail to New York, and in the local stock yards in Jersey City and at Sixtieth street and North river, Manhattan. Animals from these three sources are all finally transported by boat to the foot of the street on which the abattoirs are located. Calves are often trucked from the West Sixtieth street yards direct to the abattoirs. Hogs are sent by rail direct to the Western stock yards at Fortieth street and the North river, and from there driven to the adjacent slaughter-houses. Food animals slaughtered in the West, whose carcasses are shipped here in refrigerator cars, are received by the local agencies, which are maintained in different parts of the borough to the number of about thirty-five. The largest group of these are situated in Manhattan Market, in West Thirty-fourth street, Riverside Market, at West One Hundred and Thirtieth street; and in Washington Market, lower Tenth avenue. They consist of refrigerator-rooms where the meat is hung and offered for sale. Every western slaughterer of prominence is represented by one or more of these agencies, and they form an important outlet for this merchandise.

Meat animals slaughtered in New York are subject to two general classes of inspection: First, that maintained by the United States Bureau of Animal Industry, and existing in almost all of the abattoirs. Second, that maintained by the Department of Health. The first, or United States Government inspection, was introduced some ten years ago. Its purpose was to certify by official stamping that the carcass so stamped was free from diseases and fit for human food. This was to meet the requirements of some foreign governments which refused to accept meats from this country unless so certified. A large body of competent inspectors are employed in New York City abattoirs for this work. They have proven an efficient aid to the Department of Health in the detection of diseased meats and its consequent destruction.

This Department maintains a force of food inspectors assigned to the inspection of meats, the duties of each varying in accordance with the district in which he is employed. One inspector is stationed at the stock-yards in West Sixtieth street, whose duty it is to examine the condition of all of the live animals offered for sale, and to quarantine such as may, upon physical examination, be found to be diseased; and to issue permits to lead cows across the city, which have been brought for dairy purposes, and see that each such cow is accompanied by a certificate from a competent veterinarian, who guarantees that the animal is free from tuberculosis; to issue permits for the removal of all dead animals to the Offal Dock. The average number of animals that passed through this stock-yard per week during this year were as follows:

Cattle	1,200
Calves	3,200
Sheep	3,000
Hogs	500

The abattoirs are divided into two general districts, one on the east side and one on the west side of the borough. To each district one inspector is assigned, whose duty it is to observe the animals when slaughtered, and to condemn and cause to be destroyed such carcasses as may be unfit for food by reason of disease, or otherwise.

To the City's wholesale markets is assigned another inspector to inspect the meats sent there for disposal, and who seizes and sends to the Offal Dock any meat found unfit for food. Another inspector is assigned to the butcher shops and refrigerating plants to inspect the meats offered for sale there.

With all these agencies at work the City's meat supply is pretty carefully guarded, and much unfit material is condemned and destroyed during the year. The amount so condemned during the past year was 1,278,019 pounds.

FISH.

There is only one inspector available for the work of fish inspection. His duties are mostly confined to the lower East Side, in Fulton Market, and among the peddlers, although much of his time is devoted to various other sections of the borough. Practically all the supplies of fresh fish throughout the borough are received from Fulton Market, and from this vantage ground quite a thorough supervision may be maintained.

With the stores very little trouble is experienced, for, as a general thing, the conditions maintained are excellent, and the amount of fish is comparatively small, and quickly disposed of. With the peddlers the chief difficulty is to compel them to keep the fish covered so that it will be protected from the dust of the streets. Considerable supervision and frequent arrests are necessary in order to enforce the requirements in this respect. In what is known as "Paddy's Market," a market maintained for several hours every Saturday night on Tenth avenue, between Thirty-ninth and Forty-second streets, the fish peddlers have provided in their wagons metal boxes shaped like a Noah's ark, with flap covers, which is an effectual protection. This as a result of the persistent efforts of our inspector, and the hearty co-operation of the precinct police. I am of the opinion that the hawking of food-stuffs through the streets should be discouraged as much as possible, as they are more or less exposed to contaminating influences under the best of conditions. Besides, in a community like this, where stores abound in which all these things can be purchased, it appears to be absolutely unnecessary for a street trade to be carried on. Inspector Alfred A. Birck, who is detailed to this class of work, has made a report showing the extent of the business, and the details connected with his inspections during the year. I herewith present said report.

"New York, January 3, 1903.

"*To the Chief Inspector:*

"Sir—I have the honor to report that I have made diligent and close inspection of the fish business in the year 1902, and found facts as follows:

"At Fulton Fish Market proper, on the East river front, from Fulton to Beekman street, and the adjoining districts bounded by Peck slip, Fulton and Front streets, and Beekman street, half way from Front to Water street, and all known under the general name of Fulton Fish Market, the sanitary conditions have been greatly improved during the year.

"In this section practically the whole supply of fresh fish, *i. e.*, unsalted and not preserved, for the city and its immense shipping trade, foreign and domestic, is received.

"This trade reaches an average of nearly, if not quite, 150,000 pounds daily, or about 55,000,000 pounds annually, and is steadily increasing and taxing the limited space available to its utmost, and yet, as this trade increases, the percentage of loss is as steadily decreasing, owing to the modern and approved methods for its care and preservation.

"Of this amount about 25 per cent. is cod, haddock and halibut from the New England and eastern Canadian coast, and during the past year shipments of cod and halibut have been made from Alaska in refrigerator cars and by express trains.

"These shipments were largely experimental and were fairly successful with halibut, but the cod shipments were a failure, not because they arrived in poor condition for food, but because of the very radical difference in color and texture of the flesh of the fish.

"The skin of the Alaskan cod is much darker than the native, and the flesh is much whiter and fatter, resembling whale blubber and salt pork, and when cooked would scarcely be recognized as cod.

"The Eastern product is handled now almost entirely through the Boston market, and is shipped by express trains and steamers to this market, only a very small percentage now being brought into this market by smacks.

"Large consignments of halibut are now received in refrigerator cars and by express from California, the receipts of Western now equaling the Eastern in quantity.

"Next in importance and forming about 5 per cent. of the total import is blue fish, this being now obtainable in this market about every month in the year. During the summer months they are most abundant, and are caught on the coast from Cape Cod to Cape Henlopen in nets and traps, but mostly by hand lines from the small boats or smacks. These are packed in ice houses in the smacks and brought directly to this market.

"Those taken by nets from the shore are packed in ice in boxes or barrels and are shipped by express trains or steamers.

"In the winter they are shipped by express to this market, packed in ice and in refrigerator cars, from the South Atlantic and Gulf States.

"Weak fish, porgies, flounders, sea bass and mackeral form about 2 per cent. of the total and are natives of the Atlantic coast.

"All of these fish have, in the last few years, and in the past year to a greater extent than ever during their season of abundance, been stored in freezers or cold storage houses to fill the demand during the short season.

"Herring forming about 2 per cent. of the total are taken in nets on the eastern coast of Canada, Iceland and Greenland in the fall and early winter, are frozen hard by exposure to the atmosphere, packed closely in bulk in the holds of vessels, the hatches sealed, and brought directly to the market.

"Smelt, forming nearly 5 per cent. of the total, are taken in nets in the same localities and on the New England coast, are frozen by the atmosphere in the winter season, packed in boxes of convenient size and shipped by express trains or boats to market.

"Above five thousand tons of fresh water fish—pike, perch, pickerel, mullet, carp, bass, etc., are annually received in this market from the Great Lakes and the Central and Southern States, more than 90 per cent. of which are used in the east side district and more than 75 per cent. by the venders of that district.

"These fish in the summer season are packed in ice in boxes in refrigerator cars, and are sometimes shipped that way in the winter, but more often are frozen by the atmosphere and shipped in tight box cars.

"From the North Pacific States, from Canada, the Central States and Alaska, by express and refrigerator cars, 2,500 tons of salmon were received, two-thirds of which were shipped to Europe directly from the cars to the steamers (one firm alone shipping three hundred tons during the year).

"Owing to this rapid increase in the volume of trade, encroachments upon the sidewalks and streets had gradually increased until practically the entire sidewalk and street were used by dealers and jobbers, and, owing to the wet and offensive nature of the business, the streets were impassable for pedestrians.

"This, with the hearty co-operation of the Department of Street Cleaning, the Police Department and the Bureau of Incumbrances, has been stopped, and at the present time, with the exception of a few instances, where a large consignment is being received or shipped, it is passable at any time, and the sale of fish in the open street is entirely stopped.

"Nuisances which existed by reason of defective drainage allowing the slime and offensive matter to run across the walks, old buildings stored with offensive boxes and barrels, and cellars filled with vile and stagnant water have been abated, or are in the course of abatement by curbing, concreting and sewer connecting the stoop lines; filling, grading, concreting and sewer-connecting the floors, and cleaning and disinfecting the store houses.

"This has, no doubt, been a hardship to many and a hindrance in business to many more, as the space obtainable for the business is very limited, but has resulted in the abatement of a great nuisance and menace to health.

"Should the proposed new fish market on the river front from Beekman street north to Peck Slip be built, it will provide a much needed space for a rapidly increasing trade, will still further increase the good results, and, in my opinion, solve a difficult problem.

"In conclusion I would say that while the best results are not always obtainable, the general conditions are a vast improvement on those which existed previous to the last year, and as good as can be expected under present circumstances.

"Great improvements have also been made during the year in the conditions of the fish stores in the East Side district. Some of these were located in cellars which had nothing but earthen floors and no ventilation, except into the light or air shafts; some in hallways of tenements, in stables, in tenements and school yards, and even in the light and air shafts. These, wherever found, have been ordered out. Others were in basements, which, if properly fitted for the business and kept clean, would not be offensive nor a nuisance, but, in the majority of cases, they were so crudely or inadequately fitted as to require almost daily inspection to prevent them from becoming a nuisance or a menace to health, and, in many instances proper provisions for the care, handling and sale of fish was made only after numerous inspections and summons into court.

"A fair compliance with the Sanitary Code obtains in this district as far as the shops are concerned, and it will be a difficult thing to obtain any better results with a class of people who seem to understand little the meaning of order or cleanliness.

"The fish venders in this district have improved from a sanitary point of view, but are by no means yet in the condition that they should be.

"If fish vending is permitted it should, in my opinion, be permitted only in carts or wagons, subject to approval of the Department of Health and to a permit issued by this Department, with proper restrictions and revocable if those provisions are violated. This would prevent a class of venders against which repeated complaints are made, and against which it is very difficult to obtain a conviction under the present provisions of the Sanitary Code from carrying on their business except under proper conditions.

"I refer to the basket venders of fish, who carry about with them through the streets a basket containing fish, which they sell in tenement apartments, cellars and basements. Their baskets are metal lined, covered, and they rarely make a sale in the street. They are generally Italians or Greeks, seldom have licenses, and generally, when arrested and convicted, plead that they have been in this country only a few weeks or months and know no better.

"They have, however, by diligent attention on the part of myself and the Police Department, been greatly reduced in numbers in this borough.

"The wagon venders in other parts of the city, after several arrests and convictions in various parts of the city, have also been greatly reduced in numbers, and those still remaining in the business have, in the main, provided water-tight and covered wagons, and have entirely abandoned the cleaning of fish in the streets. When found doing business under any other conditions by me they have been arrested and convictions obtained and a fine imposed in every instance.

"The shops selling fish throughout the other parts of the city are, as a whole, in good condition from a sanitary point of view, and violations by exposure are rare.

"I would also report that the proportion of unsound fish offered for sale has been greatly reduced, owing to the better provisions for their care, greater demand, less exposure and various other reasons, and that the complaints on this score are rare, except those made by persons for ulterior purposes and over fictitious names and addresses.

"Respectfully submitted,

"(Signed) ALFRED A. BIRCK, Food Inspector."

CARBONATED WATERS.

An entirely new feature of our work is that of investigating the conditions under which carbonated waters are manufactured, and requiring the business to be conducted under a permit from this Department.

During the past few years there has been a large increase in the consumption of this article, and hence it was important that it should be prepared under proper sanitary surroundings. The first action taken was to secure a list of the various places where these waters were manufactured; this was followed by an inspection of the premises, in which instructions were given to ascertain the condition under which the carbonated waters were prepared for use, the source of the water supply, and the methods used, if any, in the necessary purification. The investigation disclosed the fact that, in a large number of instances, the places occupied for the purposes were unsuitable from a sanitary point of view. Many were located in tenement houses, cellars and stables. There was an absence of proper drainage, and walls and ceilings were unclean and thick with dust.

Samples of these waters were taken in several cases and submitted to chemical examinations, the result of which appears in the report of the chemist.

The outcome of the investigation was the determination of the Board of Health to bring this character of business under its more direct supervision, and the following section was added to the Sanitary Code:

"Section 202. It shall be the duty of every manufacturer, importer or other person who manufactures or imports in the City of New York any artificial or natural mineral, spring or other water for drinking

> purposes to file under oath with the Department of Health the name of such water and the exact location from which it is obtained, together with the chemical and bacteriological analysis thereof; and when manufactured, the exact formula used in its production, giving qualitatively and quantitatively each and every item entering into its composition. No persons shall manufacture or bottle mineral carbonated or table waters in the City of New York without a permit from the Department of Health."

As soon as this section became effective after its adoption circular letters were issued calling the attention of the manufacturers, their agents or representatives, to the requirements, and directing them to make the necessary application.

On the application blank are the following questions to be answered by the applicant:

1. Describe premises.
2. What class of carbonated water is bottled?
3. What water is used?
4. If you use filter describe it or give name of maker.
5. If you manufacture artificial spring water, formula, supported by affidavit.

A series of rules were adopted which must be complied with before the permit is granted. They are as follows:

RULES

1. Carbonated waters shall not be manufactured in any tenement house or stable, excepting it be in a room or rooms entirely separated by a solid partition from the rest of the building above cellar floor.

2. Carbonated waters shall not be manufactured in any cellar or basement unless provision is made to properly ventilate the same.

3. All tanks and receptacles for water or syrup must be kept clean and provided with suitable covers.

4. Where filters are used they must be frequently cleaned and must at all times be kept tightly covered.

5. Bottles must be thoroughly cleaned before filling; prior to final washing they should be soaked in a solution of washing soda or other alkaline substance.

6. Floors of premises to be perfectly water-tight and sewer-connected.

7. Ceilings, floors and walls to be kept clean and in good sanitary condition.

8. Water employed in manufacturing to be city water, or if otherwise, it must on analysis show an equal standard of purity.

9. Water used in washing bottles must be same standard as above.

10. Agents, representatives or proprietors of carbonated or other spring or mineral waters bottled outside of this city shall furnish this Department with full particulars as to the sanitary condition of their bottling or manufacturing premises, and the same shall be duly sworn to.

11. It shall be the duty of every manufacturer, importer or other person who manufactures or imports into the City of New York any natural or artificial mineral or other spring water for drinking purposes to file with the Department of Health a sworn statement, giving the name of water, exact location from which it is obtained and a chemical and bacteriological analysis thereof.

In the case of manufacturer or bottlers of artificial or natural spring waters living outside of the city limits, and whose products are shipped in either directly or to agents or representatives, a sworn statement, giving the location, the sanitary condition of the premises, the character of the well or spring and the precautions taken to protect the water from contamination from surface or subsurface drainage, prior to bottling, is required. This must be accompanied by recent chemical and bacteriological analysis of the water.

In the short time that has elapsed since this permit system has gone into operation sufficient progress has been made to show the wisdom of the action taken. Subjoined is a table giving the number of permits applied for, number denied, etc.:

Granted on first application	48
Granted on second application	40
Granted on third application	4
Granted on fourth application	1
Total	93
Denied	25

89 affidavits, covering 129 formulas of local bottlers. 18 affidavits, with analyses of 25 foreign spring waters.

THE FOLLOWING IS A SUMMARY OF THE WORK PERFORMED BY THE FOOD INSPECTORS:

Number of inspections	460,997
Number of citizens' complaints returned for Board orders	646
Number of citizens' complaints returned as negative	1,036
Number of reinspections on orders	2,198
Number of specimens of milk examined	31,515
Number of specimens of milk collected for analysis	3,539
Number of quarts of adulterated milk destroyed	1,009

Number of inspections by veterinarians	75
Number of cows examined	26
Number of cows tagged	26
Number of cows condemned	3
Number of cow autopsies	0
Number of permits issued	5,845
Number of arrests	565
Number of persons held on bail	488
Number of persons discharged	77
Number of pounds of meat condemned	1,278,019
Number of pounds of fish condemned	302,260
Number of pounds of fruit and foods	8,471,538

Respectfully submitted,

H. E. BRAMLEY, Chief Sanitary Inspector.

DEPARTMENT OF HEALTH—CITY OF NEW YORK,
OFFICE OF THE ASSISTANT SANITARY SUPERINTENDENT,
SOUTHWEST COR. 55TH STREET AND 6TH AVENUE, BOROUGH OF MANHATTAN,
NEW YORK, August 29, 1903.

To the Chief Medical Inspector, Division of Contagious Diseases:

SIR—I have the honor to submit the following report of the work performed by the Division of Contagious Diseases of the Borough of Manhattan, during the year 1902.

The following table shows the number of cases of contagious diseases reported to this Department during the years 1898, 1899, 1901 and 1902:

	1898.	1899.	1900.	1901.	1902.
Small pox	12	54	132	1,198	755
Scarlet fever	5,694	4,240	3,927	10,113	6,895
Diphtheria and croup	6,899	7,582	7,230	6.774	9.679
Measles	9,916	8,517	10,690	7,592	11,645
Typhoid fever	1.453	1,237	1,658	1.860	2,524
Total	23,974	21,630	23.637	27.537	31,498

It will be observed that there was almost no smallpox in the city during the year 1898. In 1899 there were 54 cases, in 1900 there were 132 cases, and in 1901 there were 1,198 cases.

During the years 1898-1900 few vaccinators were employed and comparatively few vaccinations obtained. In 1901, when the disease had obtained a firm hold on the city, the number of vaccinators was increased, and an effort was made to rid the city of the pest. During the first six months of 1902 a force of from 150 to 200 vaccinators was kept continuously employed, with the result that more vaccinations were performed than ever before in the history of the Department, and the disease was practically under control by the middle of the year.

During many years past it has been the custom of the Department to perform wholesale vaccinations only during the progress of an epidemic. During 1887–1888 there was a moderate epidemic, which was brought to an end by vaccination. During the succeeding years, 1889, 1890 and 1891, only a few sporadic cases occurred. In 1882 another epidemic began, which was not brought to an end until 1894. During the years 1895, 1896, 1897, 1898, 1899 and 1900 sporadic cases occurred, gradually increasing in number. In 1901 a very considerable epidemic again occurred, which lasted until the middle of 1902. In other words, there would seem to be, in this city, a periodical recurrence of epidemics of smallpox about every six or seven years, each epidemic being followed by a periodical increase in the number of vaccinations performed by this Department. I thoroughly believe that if the work of vaccination was continuously and not intermittently performed, the absence of smallpox would also be continuous.

In scarlet fever there is a gratifying decrease in the number of cases reported, but it must be remembered that no real permanent improvement in this respect can occur until the Department provides sufficient hospital accommodations for all the cases of this disease occurring in tenement houses, stores and other places where proper quarantine is not or cannot be maintained.

During many years past attending physicians have been somewhat lax in reporting cases of measles, for the reason that the Department had taken little or no action in regard to them. Early in 1902 the Department began to visit all cases of measles; to enforce quarantine during the course of the disease, and to disinfect the premises after the recovery of the patients. Many physicians were summoned before the Board to show cause why they should not be punished for violation of the Sanitary Code, in failing to report cases. This increasing vigilance on the part of the Department has resulted in a marked decrease in the number of unreported cases, and the apparent increase in this disease is due, undoubtedly, in the past at least, to an increase in the number of reports, not necessarily in the number of cases.

A brief statement of the duties of the various employees of this division may be of interest as showing how the work of the office, mainly routine in character, is performed.

The force is divided as follows:

A—Medical Inspectors.

1. Diagnosticians.
2. District Medical Inspectors.
3. Summer Corps.
4. Vaccinators.
5. Medical School Inspectors.

B—Nurses.

C—Disinfectors.

D—Clerical Force.

E—Veterinarians.

The Diagnosticians are responsible for correct diagnoses in all cases of contagious diseases removed to the Department hospitals. To them is intrusted the duty of enforcing the removal to the Department hospitals of cases of contagious disease that persistently violate the rules of the Department concerning isolation.

They are required to visit Riverside Hospital at regular intervals, for the purpose of examining patients before discharge, and are held responsible for the departure of these patients only when fully recovered and in a non-contagious condition.

All cases of contagious disease reported which are not epidemic are visited by the diagnosticians, for the purpose of verifying the diagnosis.

They are on duty at all times and are subject to call at any hour, day or night. They are regularly intrusted with all work of a difficult, confidential or delicate nature.

To the District Medical Inspectors are referred reported cases of endemic contagious diseases. They are required to visit these cases forthwith, for the purpose of established quarantine, placarding the doors of infected apartments, and excluding from school attendance all persons liable to convey the disease to others.

Each family throughout the house is notified of the existence of the case of contagious disease. The following card is filled out and placed under the door in any case where the family is out and cannot be notified personally:

Form 92 J—636—'03 (8)—20M

DEPARTMENT OF HEALTH,

Borough of Manhattan,
6th Avenue and 55th Street.

DIVISION OF CONTAGIOUS DISEASES.

New York, ________________ 190__

TO THE OCCUPANT OF THIS APARTMENT:

You are hereby notified that there is ________________.

in the family of ________________,

on the ________ **floor of these premises No.** ________________

By order of the Board of Health.

ERNST J. LEDERLE, PH.D.,
President.

____

A BLAUVELT, M.D., **Medical Inspector.**
Chief Inspector.

Cases are visited once a week or oftener during the course of the disease, to maintain isolation.

In cases of diphtheria, unless otherwise requested by the attending physicians, cultures are taken as often as may be necessary. If an attending physician desires to take his own cultures he is always permitted to do so.

Citizens' complaints regarding unreported cases of contagious disease, and regarding violations of the rules of isolation, are immediately investigated by the District Medical Inspectors, and reports forwarded concerning the same.

A case of contagious disease occurring in the rear of or in the rooms communicating with a store is either removed to the Department hospital or the store is closed at once.

Whenever, in any case, isolation is not properly maintained, a sanitary police officer is sent to warn the parents that a repetition of the offense may be followed by the removal of the patient to the Department hospital. A further lack of isolation is followed by the removal of the patient, by force, if necessary.

Upon the recovery, death or removal of a patient to the hospital the District Medical Inspector orders fumigation of the premises and disinfection of infected materials. Full instructions are written on the proper blank and left at the premises for the guidance of the disinfector

56 J-680-.05 (S)-10 M.

No. 3.

THIS BLANK IS TO BE TAKEN BY DISINFECTOR.

DEPARTMENT OF HEALTH.

BOROUGH OF MANHATTAN.

DIVISION OF CONTAGIOUS DISEASES.

New York, ______________________ 190

TO DISINFECTOR:

The following Disinfection and Fumigation are to be performed at premises (______________________ *Floor. Room No.* ____*) in the manner designated.*

Name of Family ______________________ *Disease* __________

Character of Premises ______________________ *No. of Families* __________

DISINFECTION.

Carpets ______________________ *Rugs* ______________________

Bedding ______________ ______*Bolsters* __________ *Pillows* __________

Curtains ______________________ *Hangings* ______________________

Clothing ______________________ *Books* ______________________

Furniture ____

Remarks ____

____

FUMIGATION.

Pasting ____

____

No. of Rooms ______ *Cubic Ft. Air Space* ______ *No. of Pans to be used* ______

No. of Grains of Paraform ______________________________

No. of Ounces of Formalin ______________________________

No. of Pounds of Sulphur ______________________________

Remarks ____

____

______________________________________ *Medical Inspector.*

The instructions given above have been complied with by me.

Disinfection began ______________ *Disinfection finished* ______________

______________________________ *Disinfector.*

After fumigation and disinfection a final visit is made by the District Medical Inspector, for the purpose of ascertaining whether the work has been properly performed. If everything is satisfactory, a school certificate is issued, permitting the return of children to school attendance, and the official supervision which has been maintained over the premises comes to an end.

7 J—619—'03

DEPARTMENT OF HEALTH,

CITY OF NEW YORK.

BOROUGH OF MANHATTAN,

Sixth Avenue and Fifty-fifth Street.

DIVISION OF CONTAGIOUS DISEASES.

NEW YORK.............................190

The premises No. ....

....

occupied by..

are free from contagious disease.

Children residing thereat may return to school.

....

Chief Inspector.

In private houses or boarding houses where contagious disease has been reported, all children residing therein must be excluded from school attendance. In tenements, only children residing in the infected apartments need be excluded. No child excluded by order of the Department of Health should be readmitted without the formal permit of this Department.

After his final visit to a case of contagious disease the Inspector is required to turn in a report giving a full, detailed account of his action during the period of quarantine. The blank on which this report is made is as follows:

OBVERSE.

Measles—Diphtheria—Scarlet Fever—Typhoid Fever....................

Address .... *Floor* ....

Name .... *Age* .... *P. H.—Ten.—Fam.* ....

Date .... *Att. Phys* .... *Ad* ....

Date of Inspections ....

Date of Cultures by Att. Phys.-Inspt. ....

Complaints Received ....

Complaints Returned ....

Special Reports ....

School Cards—Yes—No. S. Certif. Issued ....

Fumigation Ordered .... *Performed* .... *Inspt.* ....

93 J—1902. .... *M. D., Med. Inspt.*

REVERSE.

SOURCE OF INFECTION:

OTHER CASES:

CHARACTER OF ISOLATION:

SOURCE OF MILK SUPPLY:

REMARKS:

The clerical force is employed in keeping the proper records of the division. Certain considerable changes have been made in the methods of keeping the records of contagious diseases, during this year. It may be of interest, therefore, to mention them in some detail:

Commencing March 31, 1902, a daily printed list, containing all cases of contagious disease reported to this Division during the previous twenty-four hours, and also all cases terminated and apartments fumigated during the same period, was mailed daily to each of the public and parochial schools and many private schools and kindergartens. Previous to this date, a typewritten list was sent daily to the Board of Education and copies sent by them to the public schools.

For many years a card index, arranged according to streets, has been used for keeping these records. During this year, what may be called an "envelope index" has been substituted for the cards.

DIPHTHERIA.

DIPHTHERIA Address **DIPHTHERIA**

Name ______ Age ______ Yrs. ______ Mo.

Date of Report ______ Removed to Hospital ______

Reported by Card, Telephone, Inspector "Dead List," Complaint, Culture.

Result of Culture—L. P.—L. A. ______

Complaint Received and Forwarded { No. ______ Date ______

Special Reports Received ______

Fumigated ______ Dead List ______

______ M. D.

School Certificate Issued ______ Med. Insp't.

SCARLET FEVER.

SCARLET Address **SCARLET**

Name ______ Age ______ Yrs. ______ Mo.

Date of Report ______ Removed to Hospital ______

Reported by Card, Telephone, Inspector "Dead List," Complaint.

Complaint Received and Forwarded { No. ______ Date ______

Special Reports Received ______

Fumigated ______ Dead List ______

______ M. D.

School Certificate Issued ______ Med. Insp't.

Measles.

MEASLES 100J—640—'08 (E)—5 M **MEASLES**

Address ______________________

Name ______________________ Age ______ Yrs. ______ Mo.

Date of Report ______________________ Removed to Hospital ______________________

Reported by Card, Telephone, Inspector "Dead List," Complaint.

____

Complaint Received and Forwarded { No. ______________________ Date ______________________

Special Reports Received ______________________

Fumigated ______________________ Dead List ______________________

______________________ M. D.

School Certificate Issued ______________________ Med. Insp't.

Typhoid Fever.

TYPHOID 100J—644—'08 (E)—1 M **TYPHOID**

Address ______________________

Name ______________________ Age ______ Yrs. ______ Mo.

Date of Report ______________________ Removed to Hospital ______________________

Reported by Card, Telephone, Inspector "Dead List," Complaint.

____

Complaint Received and Forwarded { No. ______________________ Date ______________________

Special Reports Received ______________________

Fumigated ______________________ Dead List ______________________

______________________ M. D.

School Certificate Issued ______________________ Med. Insp't.

SMALLPOX.

SMALL POX Address **SMALL POX**

Name__________ Age______ Yrs.______ Mo.

Date of Report__________ Removed to Hospital__________

Reported by Card. Telephone, Inspector "Dead List," Complaint.

Complaint Received and Forwarded { No.__________ Date__________ }

Special Reports Received__________

Fumigated__________ Dead List__________

__________ M. D.

School Certificate Issued__________ Med. Insp't.

BLANK.

Address

Name__________ Age______ Yrs.______ Mo.

Date of Report__________ Removed to Hospital__________

Reported by Card, Telephone, Inspector "Dead List," Complaint.

Complaint Received and Forwarded { No.__________ Date__________ }

Special Reports Received__________

Fumigated__________ Dead List__________

__________ M. D.

School Certificate Issued__________ Med. Insp't.

When a case is reported the outside of the envelope is filled out; the case given to the District Medical Inspector, and the reporting card, if report was received by mail, or an abstract from the telephone book, if case was reported by telephone, is placed in the envelope. If any complaint is received during the course of the disease, it is sent to the District Inspector, who investigates, attaches his report, and returns it to the Department. This complaint and report is then placed in the envelope.

When the premises have been disinfected, the disinfection blank, filled out and signed by both inspector and disinfector, is filed in the envelope. After his final visit, the inspector makes out his "history card," which is filed in the same manner. In other words, every record, every report, every complaint, every investigation or action by the Department, in reference to any one case, is filed in the one envelope, and a full history of any case may thus be obtained at a moment's notice.

SUMMER CORPS.

A. Blauvelt, M. D., *Chief Medical Inspector, Department of Health, New York City:*

Sir—I have the honor to submit the following report of work performed by the "Summer Corps" of 1902.

Tabulated Statement of Work Performed.

Number of houses visited	24,911
Number of families visited	206,121
Number of sick treated	94,160
Number of minor nuisances abated	2,554
Number of circulars distributed	31,093
Number of St. John's Guild tickets distributed	16,443
Number of vaccinations performed	23,065
Number of inspections of milk stores	2,458
Number of Straus' milk tickets distributed	....

The duty of the "Summer Corps" in past years has been to visit the tenement houses in the poorer and more crowded parts of the city and to provide medical attention for those who were ill and unable to employ private physicians. This year, in addition to the regular work, the inspectors performed many vaccinations, examined the conditions under which milk was sold in a large number of grocery stores, established dispensaries at the recreation piers, kept the smallpox houses under observation, and performed night duty in smallpox houses. The following instructions were given, in writing, to each inspector. These instructions will indicate the character of the work they were required to perform and the system by means of which the Department was able to communicate with each inspector, by telephone, at a certain hour each day.

INSTRUCTIONS FOR SUMMER CORPS 1902.

Hours of Duty—7 A. M. to 11 A. M.; 4 P. M. to 6 P. M; Saturdays, 7 A. M. to 10 A. M.; Reporting at Central Office Saturday at ten (10) o'clock.

Method of Inspection.

1. *General Inspection of Houses :*

Examine carefully halls, stairs, yards and cellars, roofs and water tanks on them. Abate all minor nuisances by personal application to janitor. All nuisances that require more careful examination or an order from this Department must be reported to headquarters.

2. *Special Examination of Each Apartment :*

Abate all minor nuisances as above and report unsanitary conditions requiring an order from this Department in the same manner as above stated.

Offer medical services to all sick persons throughout a tenement-house, with special reference to the gastro-intestinal diseases of childhood and infancy. In offering such medical service avoid all who have means to employ a private physician and all who have physicians in attendance, whether they are paying such physicians or not. Visit each case of sickness as often as may be necessary and treat each case exactly as you would a case in your private practice. Give careful instruction to the mother of each family concerning the feeding and general care of infants.

Contagious Diseases :

Measles—Mail a report to the central office, giving name, age, address and floor, and signing your own name as Medical Inspector in the Summer Corps. Treat such cases of measles as require treatment and have no physician in attendance.

Scarlet Fever—Mail a report in same manner as in cases of measles. The policy of the Department is to remove to the hospital all cases of scarlet fever which are unable to employ a private physician. Urge such removal upon the family of such patients, comparing the results of treatment in a large, well-ventilated hospital and in a small, dark, ill-ventilated tenement.

Diphtheria—Mail report of each case as above. If there is no physician in attendance report by telephone the name, age, address and floor to the Division of Contagious Diseases, for the purpose of having antitoxin administered. Cases of laryngeal diphtheria requiring intubation should be reported by telephone to the Division of Contagious Diseases in the same manner. It is the policy of the Department to remove all cases of diphtheria who are unable to employ a private physician. Urge the family of such cases to have them removed to the hospital in the same manner as in cases of scarlet fever.

Tuberculosis—Mail a report of each case of tuberculosis found on the special cards provided for this purpose.

Small-pox—Report at once by telephone any case of small-pox or any case of suspected small-pox. If there is any doubt whatsoever as to the diagnosis take no responsibility upon yourself regarding the case, but telephone to the Department for a diagnostician. Do not alarm the family, and perhaps lose the case, by acquainting them with the suspected nature of the illness.

Varicella—Report at once by telephone any case of chicken-pox occurring in an adult. Report by mail any cases occurring in children.

Avoid all cases of contagious disease living in apartments which have been placarded by the Department of Health.

Destitution :

Cases of destitution should be reported, if Hebrews, to the United Hebrew Charities, No. 356 Second avenue. If not Hebrews, should be reported to the Charity Organization Society, Edward T. Devine, Secretary, No. 105 East Twenty-second street. If the destitution requires immediate relief the case should be reported at once by telephone to either of the above societies. The King's Daughters Settlement, at No. 42 Henry street, will relieve cases of destitution and provide nourishment for same temporarily. Their main object, however, is to provide nurses anywhere throughout the city, and to take children to the country for an outing. The King's Daughters House in Harlem, at No. 216 East One Hundred and Twenty-eighth street, will provide nurses, nourishment for cases of destitution and outings for people living north of One Hundred and Tenth street, East Side. Children found without proper care or abused should be reported to the Children's Aid Society, at No. 105 East Twenty-second street.

Tickets :

St. John's Guild—These tickets are to be given out freely, but with some sort of discrimination. It is to be desired that they be given to all persons who will use them, but not thrown broadcast and given to those who do not require them or will not use them.

Straus Milk—Tickets for sterilized milk will be provided. On each ticket is printed the situation of stations and the various forms of sterilized and modified milk which can be obtained. These tickets may be used for healthy children as well as for those who are ill. Families who can pay for their milk, however, may be informed concerning the situation of the milk stations, and instructed to buy modified or sterilized milk for infant use, in preference to ordinary grocery milk.

Herald Free Ice—Tickets will be provided; on each ticket is printed the situations of the various stations where ice may be obtained.

Vaccination :

You will be expected to perform vaccination whenever requested during your house to house visits in your district. You will be expected to *urge revaccination.*

Weekly Reports.

a. Summer Corps report.

b. Report of vaccination.

These reports must be at the Department of Health by nine (9) o'clock Monday morning.

Arrange with some drug store in your neighborhood to put up your prescriptions at as cheap a rate as possible. Also, arrange in the same drug store to have messages received for you. Acquaint each family as you go through your district with the means which you have provided for communication, and visit this store personally at least once daily.

Summer Corps Inspectors belonging to squads will report at some convenient meeting place to their squad leader immediately after finishing their work each morning. The leader of the squad will then call up the central office, and if the squad is required for house to house vaccination in the neighborhood of a small-pox house, they will be given the situation of the house at that time and will be required to do this work from 4 to 6 P. M. If not so required for house to house vaccination, they will return to their Summer Corps districts from 4 to 6 P. M.

Summer Corps Inspectors not attached to squads will arrange to be at some store having a public telephone at eleven o'clock each day, and will inform the central office concerning the number of this telephone.

Special Vaccination Details.

Special details of the Summer Corps Inspectors will be made from time to time for the following purposes:

1. Vaccination at the City Lodging House.

2. Vaccinate and Take Census at Small-pox Houses—These census reports must be handed in at the Department of Health within twelve hours of the time of inspection.

3. Office Vaccination—Inspectors in turn will vaccinate in the office, each detail comprising a week of service. During the time they are on duty at the office they will be required to do a half-day's work only in their districts.

DISPENSARIES ON THE RECREATION PIERS.

An Inspector was on duty at each of the recreation piers daily from 4 to 6 P. M. By courtesy of the Department of Docks and Ferries, canvas enclosures were built for the convenience of the Inspectors in examining and treating the sick children brought to them. Such simple remedies as are used in the treatment of the diarrhœas of infancy and childhood were kept on hand and prescribed when indicated. Many cases of diarrhœa were thus treated who would have been reached in no other way.

INSPECTION OF MILK STORES.

Realizing that the conditions under which milk was kept in grocery stores might be the cause, to a certain extent, of the prevalence of infantile diarrhœa in the poorer quarters of the city, where grocery milk is commonly used for infant feeding, a careful investigation was made to determine the following facts:

Number of cans in store.

Number of cans iced or cooled.

Temperature of milk in cans.

Communication of store with living rooms.

Out of the total of 2,458 stores visited, only 454 were found where the milk was properly cooled, and where there was no communication with living rooms.

New circulars on infant feeding were prepared for the use of the Summer Corps, based on information and suggestions from Dr. Charles Gilmore Kerley and Dr. Rowland G. Freeman.

Through the courtesy of Mr. Nathan Straus, the Department was supplied with tickets, redeemable at the Straus Milk Depots, each ticket good for one day's feeding of sterilized milk, plain or modified. These were distributed by the Inspectors and were found to be of great service.

FLOATING HOSPITAL OF ST. JOHN'S GUILD.

An Inspector belonging to the Summer Corps was detailed to each of the Floating Hospitals, whose duty it was to examine the children on the piers as they applied for admission to the Hospital, and to turn away such as might be suffering from contagious diseases. By special invitation of Mr. John P. Faure, secretary of St. John's Guild, all the Inspectors of the Summer Corps, in groups of five or six, were enabled to make a short trip on a Floating Hospital and actually see the wonderful care and attention that was given to the sick children. Too much cannot be said in favor of this great charity.

At the end of the summer's work each Inspector was required to submit:

(a) A map of his or her district, giving location of all tenement-houses contained therein, with number of families accommodated in each.

(b) A statement of all work performed, with report of personal observation in the matter of sanitation and hygiene.

Respectfully submitted,

WALTER BENSEL, M. D., Assistant Chief Medical Inspector.

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK,

BOROUGH OF MANHATTAN.

CARE OF INFANTS AND YOUNG CHILDREN DURING THE SUMMER.

Clothing—During the very hot days, the babies should wear a napkin, thin gauze shirt and thin muslin slip; an abdominal binder made of *thin flannel* should be worn until the child is six months of age. After this age the binder is not necessary.

Bathing—Every child should have one tub bath daily. On very warm days from two to four general spongings with cool salt water (one teaspoonful of salt to a pint of water) will greatly add to the child's comfort.

Fresh Air—Fresh air is of vital importance. Leave the windows open. Keep the child in the open air when possible. Avoid the sun on hot days. Select the shady side of the street and the shade in the parks and recreation piers.

Sleep—Sleep is very necessary for growing children. A noonday nap of at least two hours is *advisable* up to the age of four, and should be *insisted upon* until the child is one year of age. The child should also have at least six hours of uninterrupted sleep at night.

Soiled Napkins—Soiled napkins should be placed in some covered receptacle, covered with water and washed at the earliest opportunity.

Breast Feeding—The mother should wash the nipple with plain, cold, boiled water before and after each nursing. She should be very careful as to diet and habits of life. The bowels should move once a day. Constipation in the mother produces pain in the child. There should be three plain, well-cooked meals daily, consisting of milk, meat, vegetables and cereals. *Beer and tea are always harmful.* A large quantity (a couple of pints or more daily) of either is positively dangerous.

From Birth to Third Month—The baby should be nursed every 2 or 2¼ hours during the day. There should not be more than nine nursings in 24 hours. A nursing should not last more than fifteen minutes.

Third to Sixth Month—Nursings should be at three-hour intervals during the day; seven or eight nursings in twenty-four hours.

Sixth to Ninth Month—The child now takes a larger quantity at each feeding, and should be nursed at three or three and one-half hour intervals; six nursings in twenty-four hours.

Ninth to Twelfth Month—The nursings should be at three and one-half hour intervals; five nursings in twenty-four hours.

Bottle Feeding—The bottle should be first thoroughly washed with cold water, then cleansed with borax and hot water (teaspoonful of borax to a pint of water) and boiled before using. The nipple should be turned inside out, scrubbed with a brush, using borax water. The brush should be used for no other purpose. There should be enough bottles with nipples for a full day's feeding. The bottles should be put upside down on a shelf, and nipples should rest in plain boiled water until wanted.

Use only bottled milk which is delivered every morning. From a quart bottle of fresh milk, carefully pour off the amount of top milk directed in the table below, taking as much of the cream as possible. Place this with the sugar and barley water, or boiled water, in a clean jar or agate ware pail; place the jar or pail in a larger pail containing four or five inches of water; place this on the stove, and allow the water surrounding the milk to boil for ten minutes; remove from the stove and allow to stand for ten minutes; then place in cold water so as to allow it to cool quickly. This is the whole day's milk supply for the baby. Keep this covered in the ice box and fill the baby's bottles (which had been previously cleaned) as needed. The feeding hours are the same as in breast feeding.

Milk, specially prepared for babies, may be procured at the Straus Milk Depots.

Straus Milk Depots.

No. 151 Avenue C,
No. 241 East Fifty-ninth street,
Hebrew Institute Roof Garden (Jefferson street and East Broadway),
Foot of East Third street,
Foot of Barrow street, North river,
Battery Park,
Tompkins square,
No. 65 Market street,
No. 235 West Sixtieth street,
Foot of East Twenty-fourth street,
Foot of West Fiftieth street,
City Hall Park,
Central Park (near the Arsenal),
No. 305 East One Hundred and Fourteenth street.

Children of the same age vary greatly as to the strength and amount of food required. For the average baby, the following mixtures will be found suitable. A mixture, when prepared, should be placed in a covered glass fruit jar and kept on the ice :

For a Child Under Three Months of Age.

Quantity for Each Feeding.

At birth, ½ to 1½ ounces.
1 month, 2 to 2½ ounces.
2 months, 3 to 3½ ounces.
3 months, 3 to 4 ounces.

Mixture.

9 ounces of milk from top of bottle.
27 ounces of boiled water.
6½ heaping teaspoonfuls of granulated or milk sugar.

Feed every 2¼ hours during day, beginning at 6 A. M., and giving last feeding at midnight. (Nine feedings in 24 hours.)

(One-half pint equals 8 ounces; two tablespoonfuls equal 1 ounce.)

From Third to Sixth Month.

Quantity for Each Feeding.

4 months, 5 ounces.
5 months, 5½ ounces.
6 months, 6 ounces.

Mixture.

16 ounces of milk from top of bottle.
27 ounces of barley water.
6½ heaping teaspoonfuls of granulated or milk sugar.

Feed every three hours during the day, beginning at 6 A. M., and giving last feeding at midnight. (Seven feedings in 24 hours.)

The barley water is prepared by boiling an even tablespoonful of Robinson's barley flour in one pint of water for twenty minutes. Strain and add boiled water to make one pint.

From Sixth to Ninth Month.

Quantity for Each Feeding.

7 months, 6½ ounces.
8 months, 7 ounces.
9 months, 7½ ounces.

Mixture.

24 ounces milk from top of bottle.
24 ounces barley water.
6 heaping teaspoonfuls of granulated or milk sugar.

Feed at three-hour intervals. (Six feedings in 24 hours.)

From Ninth to Twelfth Month.

Quantity for Each Feeding.	Mixture.
10 months, 8 ounces.	35 ounces of milk.
11 months, 8½ ounces.	10 ounces barley water.
12 months, 9 ounces.	6 heaping teaspoonfuls of granulated or milk sugar.
	Feed at 3½-hour intervals. (Five feedings in 24 hours.)

Feeding After One Year of Age—All children should be weaned at the age of twelve months, excepting in the middle of the hot weather, or unless otherwise ordered by a physician. Bottle-fed children, at this age, require more than milk, although this should still form the chief part of their food. During the second year children are almost invariably badly fed. Four meals a day should be given, selected from the following articles: Soft-boiled eggs, strained broths of beef, mutton or chicken, with stale bread thrown in; stale bread or toast with butter or milk; oatmeal or hominy (each cooked three hours) and milk; corn meal (cooked two hours) and milk; farina (cooked one hour) and milk. The milk used must be boiled.

Summer Diarrhœa—When the baby has loose green passages, it means that the baby is sick and needs medical attention. The disease is often mild at the beginning. There may be no fever, and the child show no sign of illness other than the diarrhœa. Such a baby often in a few hours becomes dangerously, if not fatally, ill. The simplest cases of vomiting and diarrhœa during the summer must never be neglected. A baby sick in this way should be given two teaspoonfuls of castor oil. *Stop the milk at once.* Give only barley water until the child can be taken to the family physician or dispensary, or send or telephone to the Health Department, Fifty-fifth street and Sixth avenue. (Tel. 1204 Columbus.)

12 M–1902.

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK,

BOROUGH OF MANHATTAN,

PREPARATION OF FOOD FOR BABIES.

Keep This Card and Hang It Up in Kitchen.

1. From a fresh quart bottle of milk, carefully pour off the amount of top milk directed in the table below, taking as much of the cream as possible. Place this with the sugar and barley water, or boiled water in a clean jar or agate ware pail; place the jar or pail in a larger pail containing four or five inches of water; place this on the stove and allow the water surrounding the milk to boil for ten minutes; remove from the stove and allow to stand for ten minutes, then place in cold water so as to cool quickly. This is the whole day's milk supply for the baby. Keep this covered in the ice-box, and fill the baby's bottle, which had previously been cleaned, as needed.

2. Milk, specially prepared for babies, may be procured at the Straus Milk Depots.

Straus Milk Depots.

No. 151 Avenue C,	Tompkins Square,
No. 241 East Fifty-ninth street,	No. 65 Market street,
Hebrew Institute Roof Garden (Jefferson street and East Broadway),	No. 235 West Sixtieth street,
	Foot of East Twenty-fourth street,
Foot of East Third street,	Foot of West Fiftieth street,
Foot of Barrow street, North river.	City Hall Park,
Battery Park,	Central Park (near Arsenal),

No. 305 East One Hundred and Fourteenth street.

3. Ice may be obtained from Herald Free Ice Depots.

Under Three Months of Age.

Quantity for Each Feeding.	Mixture.
At birth, ½ to 1½ ounces.	9 ounces of milk from top of bottle.
1 month, 2 to 2½ ounces.	27 ounces of boiled water.
2 months, 3 to 3½ ounces.	6½ heaping teaspoonfuls of granulated or milk sugar.
3 months, 3 to 4 ounces.	
	Feed every 2¼ hours during day, beginning at 6 A. M., and giving last feeding at midnight. (Nine feedings in 24 hours.)

(One-half pint equals 8 ounces; two tablespoonfuls equal 1 ounce.)

From Three to Six Months.

Quantity for Each Feeding.	Mixture.
4 months, 5 ounces.	16 ounces of milk from top of bottle.
5 months, 5½ ounces.	27 ounces of barley water.
6 months, 6 ounces.	6½ heaping teaspoonfuls of granulated or milk sugar.
	Feed every three hours during the day, beginning at 6 A. M., and giving last feeding at midnight. (Seven feedings in 24 hours.)
	The barley water is prepared by boiling an even tablespoonful of Robinson's barley flour in one pint of water for twenty minutes. Strain and add boiled water to make one pint.

From Sixth to Ninth Month.

Quantity for Each Feeding.	Mixture.
7 months, 6½ ounces.	24 ounces of milk from top of bottle.
8 months, 7 ounces.	24 ounces barley water.
9 months, 7½ ounces.	6 heaping teaspoonfuls of granulated or milk sugar.
	Feed at three-hour intervals. (Six feedings in 24 hours.)

From Ninth to Twelfth Month.

Quantity for Each Feeding.	Mixture.
10 months, 8 ounces.	35 ounces of milk.
11 months, 8½ ounces.	10 ounces barley water.
12 months, 9 ounces.	6 heaping teaspoonfuls of granulated or milk sugar.
	Feed at 3½-hour intervals. (Five feedings in 24 hours.)

1. Feed the baby regularly and on time, and not whenever it cries.

2. Don't give the baby any kind of raw food, or any kind of fruit.

3. Don't give the baby coffee, tea, beer or any liquor, or any food, except as prescribed on the other side of this card.

4. Bathe the baby every morning in cool or lukewarm water, and in hot weather two or three times during the day. Always wash baby when the diaper is changed.

5. See that the baby's bowels move every day.

6. The baby should sleep alone in a crib.

7. For diarrhœa, give two teaspoonfuls of castor oil, *stop the milk for 24 hours,* and give the baby barley water only.

8. Send for a doctor at once if the baby is sick.

9. If you cannot pay for a doctor, take the baby to the nearest dispensary, or telephone or send to the Board of Health, Sixth avenue and Fifty-fifth street, for a doctor. (Telephone, 1204 Columbus.)

10. The rooms should be free from garbage, and clean. Remove soiled pieces of carpet and unnecessary clothing and furniture.

11. The fire should be put out as soon as possible, so as not to heat the rooms.

12. The bedding must be kept clean. All coverings for the child should be of washable material, and kept clean and well aired. Heavy comforters should not be used.

VACCINATORS.

A. Blauvelt, M. D., *Chief Medical Inspector, Department of Health, New York City:*

Sir—I have the honor to submit the following report of the work performed by the Vaccinating Corps during the first six months of 1902.

On account of the prevalence of smallpox in the City, a large corps of vaccinators was appointed in January. For the better performance of their duty this force was divided as follows:

I.—Vaccinators on duty in squads.

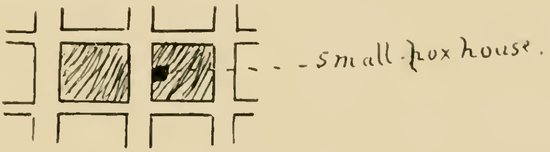
II.—District Vaccinators.

III.—Vaccinators on special duty in stores, hotels, etc.

IV.—Vaccinators in charge of smallpox houses.

I.—Vaccinators on Duty in Squads.

Seven squads were formed, designated by the letters of the alphabet from A to G, inclusive. Each squad consisted of from seven to nine men, having their homes in a certain neighborhood. These men were placed in charge of a vaccinator of known ability and energy, who also lived in the same neighborhood, and at whose office the members of the squad would meet each morning at 9 o'clock. At this hour the leader of the squad would report by telephone to the Central Office. It was thus possible to communicate with about fifty men in a very few minutes every morning, throwing this entire force, or any part of it, into any locality where vaccination was urgently needed. It was the practice to cover the entire two blocks in the locality of the infected house within forty-eight hours after the removal of a case of smallpox, thus:



These vaccinators were accompanied by patrolmen in full uniform, who rendered great service in increasing the efficiency of the work. The squads usually began vaccinating at 4 P. M., continuing until the work assigned was finished, or until 9 P. M. It was the duty of the squad leader to keep a daily record of the attendance and the amount of work performed by each member of his squad and to forward same each evening to the Central Office; to lay out each day the work to be performed by each man, and to see that it was performed satisfactorily.

II.—District Vaccinators.

These vaccinators were assigned to certain districts in which they were directed to visit each tenement house and offer vaccination to every family therein.

III. Vaccinators on Special Duty in Stores, Hotels, Factories, Etc.

The work of vaccination was greatly aided by the sending of official communications from the office of the Commissioner of Health to every concern in the City employing large numbers of men or women, informing them of the prevalence of smallpox in the City and offering to vaccinate the employees, free of charge, on any day, and at any hour, day or night, that might be convenient. In this way thousands of vaccinations were obtained in a very short time.

IV. Vaccinators in Charge of Smallpox Houses.

Whenever a case of smallpox was removed, the house was placed in charge of a reliable vaccinator, who made at once a census of the inmates in duplicate, forwarded one copy to the Department and kept one copy for his own use. During the next twenty-one days he visited each family at least every twenty-four hours.

Night Vaccination in Smallpox Houses.

Houses in which smallpox had occurred were visited by a vaccinator, accompanied by a policeman, after 8 P. M., on the evening of the same day, and every inmate was urged to be vaccinated. This duty in general was performed by the vaccinators (except those in charge of small-pox houses) in turn.

Early Morning Vaccination in Lodging-houses.

In March, 1902, owing to the many cases of smallpox occurring in lodging-houses, the Board of Health passed a resolution requiring every keeper of a lodging-house to refuse admission for more than one night, to any applicant who was unable to show a certificate of recent successful vaccination.

Once each week at 5 A. M. all the lodging-houses in the City were visited by the inspectors. From 5 to 7 A. M. each inspector remained in the office of the lodging-house to which he was assigned, examining the "guests" as they departed, vaccinating those who required it, issuing certificates to those who were entitled to them. At 7 A. M. the inspector would go through the rooms or dormitories in the house, awaking the sleepers, vaccinating and issuing certificates. In a comparatively few weeks practically all the lodging-house inmates were vaccinated.

Respectfully submitted,

WALTER BENSEL, M. D.,

Assistant Chief Medical Inspector.

A. BLAUVELT, M. D., *Chief Medical Inspector, Department of Health, New York City:*

SIR—I have the honor to submit the following report of work performed by the Medical School Inspectors for the last four months of 1902.

The following instructions were given (in writing) to each Medical Inspector assigned to school duty:

INSTRUCTIONS FOR MEDICAL INSPECTORS ASSIGNED TO SCHOOLS.

MORNING INSPECTIONS.

Inspectors are required to visit the schools to which they are assigned for morning work, before 10 A. M. each school day. They are to examine each child that has been isolated by the teachers as a possible source of contagion, and exclude from school attendance any one affected with, or showing symptoms of, an infectious or contagious disease.

The following affections should be excluded from the schools, without any delay, and the patients sent to their homes, viz.: Measles, diphtheria, scarlet fever, whooping cough, mumps, chicken-pox and any acute catarrhal affection of eyes, nose or throat. In a case of suspected small-pox, a very remote possibility, the patient should be kept at school, isolated in a suitable room, and the Department of Health notified at once. Each pupil who is excluded from school is to be furnished with a card on which is noted the name, age and address of the pupil; the number and situation of the school, and the reason for exclusion. These cards are to be made out by the Inspector, and submitted to the principal of the school, or to any one whom the principal may designate, with a proper supply of envelopes. The principal will have a record made of the names, etc., for his or her own convenience, and will then have each card sealed in an envelope and taken home by the pupil excluded. Children afflicted with pediculosis, contagious eye or skin disease, or pulmonary tuberculosis, may be allowed to return to their classes temporarily. Exclusion cards are to be made out in the usual way and submitted to the principal, who will cause these children to be excluded at the next occurring recess.

WEEKLY EXAMINATION OF ALL CHILDREN.

Once each week the inspector will make a round of all the classrooms and examine the eyelids, throat, hair and skin of each pupil, individually. Any child suspected of having measles, scarlet fever, whooping cough, chicken-pox, diphtheria or mumps, or having any acute catarrhal affection of the eyes, nose or throat, is to be sent from the classroom at once for more careful examination in the room assigned to the Inspector. Cases of pediculosis, contagious eye or skin diseases are to have their names and addresses taken, and to be excluded at the first occurring recess by the principal. Cards are to be made out for these cases, and submitted to the principal with a proper supply of envelopes, as directed above.

Whenever any difference of opinion arises between an inspector and a physician not connected with the Department concerning the propriety of excluding a case of eye disease, the patient is to be sent to the Central Office between the hours of 12 M. and 1 P. M. on any school day, for examination by the oculist of the Department.

Cases of measles or scarlet fever are to be reported to this Department by telephone. They will be visited at their homes by diagnosticians for the purpose of confirming the diagnosis. Cultures are to be taken in all cases excluded for throat affections. Cases of chicken-pox are to be reported to the Department by mail. They will be visited by the district medical inspector within twenty-four hours, for the purpose of confirming the diagnosis. Children excluded from school on account of measles, scarlet fever, chicken-pox, small-pox or diphtheria must not be allowed to resume attendance until they have received a written certificate from the district medical inspector that the rooms occupied by these cases are free from contagious disease and that the children are ready to return to school.

Children excluded from school on account of whooping cough, contagious eye or skin diseases, or pediculosis, should be told to return after a proper interval, for re-examination by the medical inspector, and may be re-admitted to school whenever the inspector may deem fit.

Children excluded from school on account of contagious eye disease may resume attendance, when, in the judgment of the school inspector, the discharge has ceased under treatment, although such cases may not be considered entirely cured.

The inspectors shall ascertain from the principals and teachers of their schools the names and addresses of all children said to have contagious diseases in their families, where notification has not been sent to the schools by the Department of Health, and shall forward such lists with their daily reports.

If by reason of illness, or other cause, an inspector is unable to report at his schools, he must notify the Department of Health at once by telephone, telegram or special messenger. This notification must be followed within three hours by a written application for leave of absence. When the inspector returns to duty after illness, or other cause of absence, he must report in person at the Department, make out a second written application for leave of absence, stating definitely the dates during which he was away from duty, and attach thereto a certificate from his attending physician.

Every Saturday at 9 A. M. the Medical School inspectors shall report at the Central Office in person.

Each inspector is required to obtain from the principal of each school in his charge a list of all the pupils absent for more than five days for no assigned cause. The inspector is to visit these children at their homes, find out the cause of absence and report same to this office.

Each inspector has in charge from three to five schools situated in one neighborhood. He is instructed to make the morning inspection in each school at approximately the same hour each morning, so that the children to be examined, either for exclusion or for readmission after exclusion, shall be kept waiting as short a time as possible.

EXCLUSIONS AND METHODS OF EXAMINATION.

I.—Acute Catarrhal Affections.

Acute catarrhal affections of eyes, nose or throat are excluded from school attendance because they are often the first symptoms of either measles, diphtheria, whooping cough or scarlet fever, and also because they are often, in themselves, contagious.

II.—Pediculosis.

It is the policy of the Department to exclude from school attendance all children who have pediculi in their hair, and to allow them to return as soon as the pediculi have been killed by proper and vigorous treatment. It is not considered necessary or desirable to exclude children on account of "nits" so long as an earnest endeavor is being made by the parents to better this condition.

III.—Trachoma.

On account of the wide prevalence of trachoma and the length of time required to successfully treat cases, all children so afflicted are excluded with instructions to obtain treatment at the earliest possible moment. They are ordered to report at the school at intervals of a few days, and if the treatment is being successfully and faithfully carried out, they are allowed to return to school as soon as all evidences of discharge have ceased.

IV.—Throat Affections.

Cultures are required in all cases excluded for acute catarrhal condition of the throat. In each instance an inspector visits the case. If the case is one of true diphtheria the child is kept under observation, and when entirely free from contagion is given a certificate allowing it to return to school. If the case is a false one, a certificate is given allowing the child to resume attendance at once.

V.—Instructions as to Methods of Examination.

In the weekly examinations in the classrooms, the inspectors are instructed, in the absence of any means of cleansing the hands, to carefully avoid infecting their fingers from the eyes or heads of the children. The children are to submit their faces, hands, hair and throats to the scrutiny of the inspector and to draw down their own lower eyelids. In many instances children will be found who are unable, or unwilling, to evert their own lower lids. In these cases the inspector must draw down the lids himself, but must use pledgets of cotton or gauze to protect his finger tips.

In cases where there is a suspicion of disease, the child is sent to the inspector's room for more careful examination after the routine work is completed or, in the case of trachoma or pediculosis, the child is ordered to report to the inspector at the following morning inspection, at which time it is carefully examined and, if necessary, excluded.

DEPARTMENT OCULIST.

In many cases of eye affections there is a question of diagnosis between the inspector and the physician treating the case. Therefore, an oculist has been placed on duty at the Department of Health daily from 12 M. to 1 P. M., and all disputed cases are referred to him for diagnosis. His decision is final.

DEPARTMENT OF NURSING.

It has been observed that many of the children excluded from school have received little or no care or attention at home, often returning to school in the same or in a worse condition than when excluded. In a number of instances this lack of attention was due, not only to carelessness, but to the fact that the parents were ignorant of the true nature of the affection. To combat this lack of co-operation, a corps of nurses were formed. Each nurse has charge of from three to five schools. Each day she visits each one in turn, obtains from the inspector a list of the children suffering from conjunctivitis (except trachoma), pediculosis and contagious skin diseases, with diagnosis and suggestions for simple but effective treatment. These cases she treats at the school, keeping them under observation and treatment and instructing them as to home care, until they have recovered. In this way the contagion is destroyed and the children are allowed to remain in school. The nurse also obtains from the inspector a list of all exclusions. These cases, with the exception of diphtheria, scarlet fever and measles, she visits at their homes, sees that the children are receiving treatment and, whenever necessary, leaves instructions as to care and hygiene.

DEPARTMENT HOSPITAL FOR TREATMENT OF EYE DISEASES.

Through the courtesy of Dr. John Winters Brannan, the Department of Bellevue and Allied City Hospitals has given the Department of Health the use of part of the old Gouverneur Hospital building. This has been fitted up as a dispensary, and temporary hospital for the treatment of cases of trachoma excluded from the public schools. The rooms have been arranged as waiting, treatment and operating rooms with two wards, male and female. Inspectors assigned by the Department are on duty from 9 to 12 A. M. and 2 to 5 P. M. The morning hours are reserved for the treatment of cases, and the afternoon for operative work. Although the hospital has been in working order only since December 15, 1902, it has already been necessary to increase the accommodations, and its existence has been more than justified by the large number of cases presented for treatment.

Respectfully submitted,

WALTER BENSEL, M. D.,
Assistant Chief Medical Inspector.

Exclusion Card.

(OBVERSE).

Form No. 11 N—697—'05 (S)—150M

DEPARTMENT OF HEALTH,
BOROUGH OF MANHATTAN.

New York, ... 190...

Name .... *Age* ....

Address ....

IS ORDERED TO DISCONTINUE ATTENDANCE at

School No............., *located at* ....

REASON: ....

....
Medical Inspector.

(SEE OTHER SIDE.)

(REVERSE).

NOTICE TO PARENTS.

The disease mentioned on the other side of this card is a contagious affection and liable to be transmitted to other children. The child should receive prompt treatment by any physician (or at any dispensary), and should return to school ...., 190...., for re-examination by the Medical Inspector of the Department of Health. If found free from contagion at this time, he may resume attendance at school.

RECORD CARD.

Week Ending ....190....	Children Examined.	School No .... at .... 824 FORM 3 N-'03 J. C. 15 M.										
		Number of Children Excluded.										
Date		Diph.	Scar.	Meas.	S. P.	Var.	Eye.	Skin.	Parasitic	Whoop. Cough	Mumps	Total
Total												

The following is a summary of the work of the division for the year 1902:

Number of visits to cases of contagious diseases		94,495
Number of cases visited for special diagnosis		5,317
Number of cases treated with diptheria antitoxin		204
Number of persons immunized with diphtheria antitoxin		219
Number of school notices sent		13,827
Number of complaints forwarded for Board orders		188
Number of visits to tenement-houses		76,468
Number of visits to hotels		318
Number of visits to schools and institutions		4,055
Number of visits to private houses		3,609
Number of miscellaneous visits		3,787
Total number of visits to houses		88,237
Number of primary vaccinations		47,445
Number of revaccinations	555,984	490,825
Number of vaccinations in schools		17,714
Total number of certificates of vaccination issued		10,935
Number of visits to infected houses (small-pox ?)		7,300
Number of visits to sick children		130
Number of prescriptions filled		117
Number of animals examined		19,862
Number of post-mortems on animals		212
Number of glandered horses condemned		470

Number of persons removed to Contagious Disease Hospital..........	2,907
Number of dead bodies removed to Morgue..........................	59
Number of houses visited for disinfection........................	15,092
Number of infected rooms disinfected.............................	30,001
Number of times ambulances, etc., disinfected....................	2,374
Number of pieces of infected goods disinfected...................	50,955
Number of pieces of infected goods destroyed.....................	9,602
Total inspections....................................	105,720

Respectfully submitted,

WALTER BENSEL, M. D.,

Assistant Chief Medical Inspector.

Department of Health—City of New York.
Division of Chemistry,
Southwest Cor. 55th Street and 6th Avenue, Borough of Manhattan,
New York, April 28, 1903.

To the Assistant Sanitary Superintendent:

Sir—I have the honor to present the following report of the work performed by the Division of Chemistry during the year 1902.

The present Division of Chemistry was formerly part of the Division of Food Inspection and Offensive Trades, and was created a separate division on March 5, 1902. The statistics given in this report, however, include all the work of the Chemical Laboratory since January 1, 1902.

The division staff at the end of the year consisted of 1 Chemist, 3 Assistant Chemists, 1 Assistant Bacteriologist, 4 Laboratory Assistants, 1 Clerk and 1 Cleaner. One Assistant Chemist and the Assistant Bacteriologist were added during the latter part of the year.

The laboratory work may be conveniently divided as follows:

Daily and periodical examinations, as in the case of milk and water.

Examinations of samples collected by the various inspectors of the Division of Inspections, either as the result of complaints of citizens, for special investigations, or at the request of the Chemist.

Examinations of milk and cream samples left for analysis by milk dealers.

Examinations of samples submitted by the Clerk of Accounts and Supplies.

Samples examined for other departments of the City Government.

Special investigations.

Experimental work.

With exception of milk samples collected in the Borough of Brooklyn, all samples for analysis from the five boroughs are sent to the Laboratory at Fifty-fifth street and Sixth avenue.

The following table will show the general character of the analytical work, giving the names of articles examined, what they were examined for, and the reason for such examination:

Substance.	Number of Samples.	Examined For.	Reason For Investigation.
Alcohol	1	Percentage strength	For Clerk Supplies.
Anchovies	1	Preservatives	Systematic examination.
Apples	1	Injurious ingredients	Citizen's complaint.
Ashes	10	Amount and character of organic matter	For Department of Street Cleaning.
Baking powders	23	Character and injurious ingredients	Systematic examination.
Beef capsules	1	Injurious ingredients	Citizen's complaint.
Bitter almond oil	1	Poison	For Police Department.
Bread	6	Injurious ingredients	Citizen's complaint.
Broth	1	"	"
Burlap	1	"	"
Butters	2	Adulteration	"
Buttermilks	1	Injurious ingredients	"
Cake	4	"	"
Candies	21	Injurious ingredients and alcohol	General complaints, and in relation to sale of candy containing alcohol to children.
Castor oil	1	Poison	For Police Department.
Catsups	12	Preservatives and coloring matter.	Systematic examination
Cereals	2	Injurious ingredients	Citizen's complaint.
Chamomile tea	1	"	"
Cheese	3	"	"
Cherries	1	"	"
Chewing gum	2	"	"
Chloral hydrate	2	Identity	For Police Department.
Ciders	9	Preservatives	Citizen's complaint and systematic examination.
Clam chowders	1	"	Systematic examination.
Clam extracts	5	"	For United States Commissary Department.
Coal	2	Composition	For Clerk of Supplies.
Cocoas	3	Adulteration	Citizen's complaint.
Coffees	2	"	"
Coke	1	Percentage of sulphur	For Division of Inspections.
Coloring matter	1	Composition	Systematic examinations.

Substance.	Number of Samples.	Examined For.	Reason For Investigation.
Corns, canned.................	7	Preservatives and poisonous metals	Systematic examinations.
Corned beef..................	2	Preservatives....................	"
Cotton seed oil...............	1	Poison....	For Police Department.
Crackers......................	1	"	"
Creams, adulterated...........	18	Gelatin and preservatives........	Systematic examinations.
Creams, unadulterated	184	"	"
Creams, evaporated...........	1	Adulteration......................	"
Cream of tartars	44	"	"
Cream thickeners.............	1	Composition.....................	"
Dust..........................	1	Character	Citizen's complaint.
Eggs, dried, etc	4	Injurious ingredients............	"
Enameled ware................	1	"	"
Extract of beef	3	"	"
Fish	2	"	"
Fish cakes	1	"	"
Fish liquor....................	1	"	"
Flour	2	"	"
Formaldehyde	4	Percentage strength...........	For Division of Contagious Diseases.
Frankfurters and sauerkraut...	1	Preservatives...............	Systematic examinations.
Fruit juices...................	1	"	"
Grape juice...................	1	Presence of alcohol	For Excise Department.
Hair dyes.....................	2	Injurious ingredients	Citizen's complaint.
Hair restorers................	1	"	"
Ham, canned..................	1	Preservatives....................	Systematic examinations.
Horse ball.....................	1	Poison	For the Society of Prevention of Cruelty to Animals.
Ice cream, etc................	15	Injurious ingredients	Systematic examinations.
Jelly.........................	1	"	Citizen's complaint.
Jelly powder.................	1	"	"
Koko black	1	Composition.....................	Special complaint.
Leaf.........................	1	Character of coating............	Citizen's complaint.
Linseed oil................ ...	1	Adulteration	For Clerk of Supplies.
Liquids......................	1	Composition.....................	For Police Department.
Lobster, canned.............	1	Preservatives....................	Systematic examinations.
Malt tonics...................	1	Adulteration.....................	Citizen's complaint.
Meal.........................	1	Injurious ingredients	"
Meats........................	3	"	"
Medicines....................	20	Composition..................	Citizens' complaints and for Police Department, District Attorney and Coroner.

Substance.	Number of Samples.	Examined For.	Reason For Investigation.
Milks	3,970	Preservatives and composition	Systematic examinations.
Milks, evaporated	15	" "	"
Milks, preserved	57	" "	"
Milk foods	3	Composition	"
Milks, modified	4	"	"
Oil	1	Poison	For Police Department.
Opium pastes	28	Identity	"
Orange sugar	1	Injurious ingredients	Citizen's complaint.
Paper	1	" "	"
Paste	1	" "	"
Peas, canned	25	Coloring matter and preservatives.	Systematic examinations.
Phenacetine	208	Adulteration	"
Pills	1	Character	For Police Department.
Pork	1	Injurious ingredients	Citizen's complaint.
Potted tongue	1	Preservatives	Systematic examinations.
Powders	3	Character	For Police Department.
Preservatives	3	Composition	Systematic examinations.
Preserves	2	Injurious ingredients	Citizen's complaint.
Roast beef, canned	1	Preservatives	Systematic examinations.
Salmon, canned	3	"	"
Salve	1	Injurious ingredients	Citizen's complaint.
Sandwiches	1	" "	"
Sardines	3	Preservatives and poisonous metals	Systematic examinations.
Sausages	23	Preservatives	Systematic examinations and citizen's complaints.
Sediment	1	Character	Citizen's complaint.
Sewage, bacteriological examination	6	Number of organisms and character	Inspection of watershed.
Shredded wheat biscuit	1	Injurious ingredients	Citizen's complaint.
Smoked beef	2	Preservatives	Systematic examinations.
Soaps	7	Composition	Department of Finance.
Soda waters	1	Injurious ingredients	Citizen's complaint.
Soups	2	Preservatives	Systematic examinations.
Soused mackerel	1	"	"
Stomach and contents	2	Poison	For Society for Prevention of Cruelty to Animals.
String beans, canned	8	Preservatives and artificial color	Systematic examinationss.
Sugar	1	Injurious ingredients	Citizen's complaint.
Sweetener, artificial	1	Composition	Special complaint.
Syrups	1	Injurious ingredients	Citizen's complaint.

Substance.	Number of Samples.	Examined For.	Reason For Investigation.
Tomatoes, canned	29	Preservatives, metals and coloring matter	Systematic examination.
Turpentines	24	Adulteration	For Department of Correction.
Urine	1	Composition	Clinical purposes.
Veiling	2	Injurious coloring matter	Citizen's complaint.
Vinegars	3	Adulteration	For United States Commissary Department.
Wall papers	2	Injurious ingredients	Citizen's complaint.
Wall scrapings	1	Character	To detect the presence of wall paper.
Waters, bacteriological examination	6	Number and character of organisms	Systematic examinations.
Waters, carbonic	22	Composition	Systematic examinations in connection with sanitary control and permit system.
Waters, cellar	54	Character	To determine origin of water in cellars.
Waters, complete sanitary and mineral analysis	1	Complete analysis	Systematic examinations.
Waters, mineral	24	Composition	In connection with the permit system.
Waters	456	Sanitary purity	Systematic examinations of public supplies and wells.
Whiskey	11	Percentage of alcohol	For Police and Excise Departments.
White leads	8	Adulteration	For Department of Correction.
Wines	10	Percentage of alcohol and adulteration	For Police and Excise Departments and Citizen's Complaint.
Lactometers tested	183	Accuracy of scale	For Division of Inspections.
Thermometers tested	218	"	"

During the year the Chemists attended court as expert witnesses on eighty-five days.

Of the routine work, the most important has been that relating to the examination of samples of milk and water.

Milk.

Samples of milk, cream and condensed (evaporated) milk are brought to the laboratory daily by the milk inspectors. These are examined by the Assistant Chemists, and in case of adulteration and subsequent prosecution, the analyst appears in court as expert witness.

METHOD OF EXAMINATION.

Total Solids—Five grams of the sample (which must first be thoroughly mixed) are weighed in a previously tared, shallow flat-bottomed lead capsule, using a pipette. The weighing is made as rapidly as possible in order to prevent excessive evaporation and consequent error.

The dish is placed on a water bath and when the solids are apparently dry, transferred to an air-bath kept at 100-105° C. and left there for about two and a half hours. The dish and contents are transferred to a dessicator. cooled and weighed and returned to the air-bath for half an hour, again cooled and weighed, and this process repeated until the weight is constant. The final weight of the dish gives the total solids.

New York State law and city sanitary code require the presence of at least 12 per cent. of total solids in milk.

When large numbers of samples are examined the solids are first approximately determined by the use of proper tables on which the percentage of solids may be read when the lactometer reading at 60 degrees F. and the percentage of fat present are known. In all samples found to be below standard in this manner the solids are determined gravimetrically, as described above.

Fat—Two methods are in use for the determination of fat, the Babcock centrifugal and the Adams paper-coil method.

When large numbers of milk samples are to be examined the Babcock test is used. This consists in putting a definite quantity of milk (17.6 c. c.) in a specially made test bottle, adding a fixed quantity (17.5 c. c.) of sulfuric acid of proper strength (sp. gr.=1.825) to the milk for the purpose of dissolving all of the solids except the butter fat, then placing the bottles containing the mixture of acid and milk in a suitable centrifugal machine and whirling at the rate of approximately 1,200 revolutions per minute for the purpose of making a separation of the fat from the liquid. After whirling five minutes the machine is stopped, the bottles filled with hot water and whirled again for about one minute.

The test bottles are graduated so that the spaces in the neck bear a definite relation to the pipette full of milk, and in this way the percentage of fat contained in the milk can be read directly from the graduations on the test bottles. All samples found to be below standard by the Babcock test are re-examined by the Adams test as follows:

Five grams of milk are accurately weighed in a tared platinum dish. A paper coil (Schleicher and Schull fat-free paper), thoroughly dried, held in shape by a loop of wire, is then placed on end in the dish until the milk is absorbed. The dry end of the coil is then used to remove the remaining small portion of the milk from the dish. With proper care the dish can in this manner be wiped perfectly dry. The coil is hung in an air-bath and dried at 100° to 105° C. until a cold piece of glass, held at one end of the coil, shows no trace of condensed moisture. (This requires about two hours' drying.) The coil is now placed in a small Knoeffler extraction apparatus, the latter connected with an upright condenser and a previously tared flask and extracted for at least two hours with anhydrous ether. An electric stove is used for heating purposes. In order to save the ether the coil and inner syphon tube are removed, a tube closed at one end inserted and the ether in the flask distilled into the same. The flask is now dried, first on the water-bath and then in an air-bath, to constant weight, at a temperature of 100°

to 105° C. (about one-half hour drying). The process of extraction is repeated until there is no longer a gain in weight of fat. The weight of the fat is calculated in the usual way. Before taring the flask, it should be dried in the air-bath and allowed to cool in the air. The flask containing the fat should be cooled in the same way. Care must be taken not to electrify the flask by rubbing. The ether used must, of course, be tested for non-volatile residue, alcohol or water.

New York State law and the city sanitary code require the presence of at least 3 per cent. of butter fat in milk.

PRESERVATIVES.

The preservatives most commonly used at present are formaldehyde and boric acid.

Formaldehyde—Hehner's test is used for the detection of formaldehyde. A small quantity of milk in a test tube is brought into contact with concentrated sulfuric acid containing a trace of ferric chlorid (one drop of a 10 per cent. solution to 200 c. c. of acid) by pouring the acid carefully down the side of the tube. In the presence of formaldehyde a bluish violet ring will be formed immediately above the brownish ring due to the caramelized milk sugar. One part of formaldehyde in one million parts of milk may be detected by this test. In case formaldehyde is found, its presence is confirmed by one or more other tests.

Boric Acid and Borax—Five to ten cubic centimeters of the milk to be examined are placed in a small porcelain capsule and acidified by the addition of three drops of concentrated hydrochloric acid. After thoroughly stirring with a glass rod, a strip of freshly prepared turmeric paper is saturated with the mixture and placed on a watch glass. The glass is then heated over steam, carefully regulating the heat so as not to char the turmeric. Reddening of the turmeric is indicative of the presence of boric acid. A drop of dilute ammonia water turns the red coloration to a dark green. If no boric acid is present the ammonia produces a dark red color when brought in contact with the turmeric.

If boric acid is found, its presence is confirmed by means of the flame test.

Annatto, Anilin Orange or Caramel—(A. E. Leach, Journ. Am. Chem. Soc., Vol. 22, p. 208.) About 150 c. c. of the milk are curdled by the aid of heat and acetic acid, preferably in a porcelain casserole over a Bunsen flame. By the aid of stirring rod, the curd can nearly always be gathered into one mass, which is much the easiest method of separation, the whey being simply poured off. If, however, the curd is too finely divided in the whey, the separation is affected by straining through a sieve or colander. All of the annatto or of the anilin orange present in the milk treated would be found in the curd, and part of the caramel. The curd, pressed free from adhering liquid, is picked apart, if necessary, and shaken with ether in a corked flask, in which it is allowed to soak for several hours or until all the fat has been extracted and with it the annatto. If the milk is uncolored, or has been colored with annatto, on pouring off the ether the curd should be left perfectly white. If, on the other hand, anilin orange or caramel has been used, after pouring off the ether the curd will be colored more or less deeply depending on the amount of color employed. In other words, of the three colors annatto, caramel and analin orange, the annatto only is extracted by the ether. If caramel has been used, the curd will have a brown color at this stage; if anilin orange, the color of the curd will be a more or less bright orange.

The ether extract, containing the fat and the annatto, if present, is evaporated on the water-bath, the residue is made alkaline with sodium hydroxid and poured upon a small, *wet* filter, which will hold back the fat and, as the filtrate passes through, will allow the annatto, if present, to permeate the pores of the filter. On washing of the fat gently under the water tap, all the annatto of the milk used for the test will be found to have been concentrated on the filter, giving it an orange color, tolerably permanent and varying in depth with the amount of annatto present. The confirmatory test for annatto with stannous chlorid may afterward be applied to the colored filter, producing the characteristic pink color.

The fat-free curd, if colored after the ether has been poured off, is examined further for anilin orange by placing a portion of the curd in a test tube and treating with concentrated hydrochloric acid.

If the milk has been colored with anilin orange, the curd will immediately turn pink. If caramel is present or if the milk is uncolored, the color of the curd itself remains unchanged, but the solution will turn blue and that gradually. If a large amount of the anilin orange has been used in the milk, the curd will sometimes show the pink coloration when hydrochloric acid is applied directly to it, before treatment with ether, but the color reaction with the fat-free curd is very delicate and unmistakeable. If the curd has a brownish tint, the presence of caramel may be suspected, its presence may best be determined by one of the following tests:

Scheme for Color Analysis—Curdle 150 c. c. of the milk in casserole with heat and acetic acid. Gather curd in one mass. Pour whey or strain if curd is finely divided. Macerate curd with ether in corked flask. Pour off ether.

Ether Extract—Evaporate off ether, treat residue with sodium hydroxid and pour on wetted filter. After the solution has passed through, wash off fat and dry filter, which, colored orange, indicates presence of annatto. (Confirm by stannous chloride.)

Extracted Curd—1. If colorless: Indicates presence of no foreign color other than in ether extract. 2. If orange or brownish: Indicates presence of anilin orange or caramel. Shake curd in test tube with concentrated hydrochloric acid. If orange curd immediately turns pink, indicative of anilin orange. If solution gradually turns blue, indicative of caramel. (Confirm by testing for caramel in whey of original milk.)

Table Showing Percentage of Deficiency in Solids in Samples of Milk Containing Less than 12 Per Cent.

Deficient in Solids.	Per Cent. of Total Solids.	Deficient in Solids.	Per Cent. of Total Solids.
Per Cent.	Per Cent.	Per Cent.	Per Cent.
Less than 1	11.89–12.00	26	8.77–8.88
1	11.77–11.88	27	8.65–8.76
2	11.65–11.76	28	8.53–8.64
3	11.53–11.64	29	8.41–8.52
4	11.41–11.52	30	8.29–8.40
5	11.29–11.40	31	8.17–8.28
6	11.17–11.28	32	8.05–8.16
7	11.05–11.16	33	7.93–8.04
8	10.93–11.04	34	7.81–7.92
9	10.81–10.92	35	7.69–7.80
10	10.69–10.80	36	7.57–7.68
11	10.57–10.68	37	7.45–7.56
12	10.45–10.56	38	7.33–7.44
13	10.33–10.44	39	7.21–7.32
14	10.21–10.32	40	7.09–7.20
15	10.09–10.20	41	6.97–7.08
16	9.97–10.08	42	6.85–6.96
17	9.85–9.86	43	6.73–6.84
18	9.73–9.84	44	6.61–6.72
19	9.61–9.72	45	6.49–6.60
20	9.49–9.60	46	6.37–6.48
21	9.37–9.48	47	6.25–6.36
22	9.25–9.36	48	6.13–6.24
23	9.13–9.24	49	6.01–6.12
24	9.01–9.12	50	5.89–6.00
25	8.89–9.00		

EXTENT OF ADULTERATION.

During the year 3,970 samples of milk were examined. Of these 2,095 were adulterated and 1,875 were unadulterated.

2,078 were deficient in solids or fat or both.
8 contained borax or boric acid.
26 contained formaldehyde.
2 contained artificial coloring matter.

The following table shows the number of milk samples examined each month, with the number and the percentage of the total found adulterated :

Month.	Total.	Adulterated.	Unadulterated.	Per cent. Adulterated
January	75	47	28	62.67
February	121	75	46	61.98
March	259	156	103	60.23
April	302	193	109	63.91
May	387	209	178	54.01
June	682	438	244	64.22
July	558	337	221	60.39
August	526	250	276	47.53
September	290	136	154	46.89
October	306	121	185	39.54
November	337	85	252	25.22
December	127	48	79	37.79
Total	3,970	2,095	1,875	52.77

Cream.

As there is at present no legal standard for fat or solids, cream is examined only for preservatives, coloring matter, gelatin and in some instances starch.

For boric acid, formaldehyde and coloring matter proceed as in milk.

Gelatin—This is the active constituent of most of the so-called "cream thickeners" on the market.

For its detection the method of Stokes is used. Dissolve some mercury in twice its weight of strong nitric acid (sp. gr. = 1.42). Dilute this with water to twenty-five times its bulk. To about 10 c. c. of this solution add a like quantity of the cream and about 20 c. c. of cold water. Shake this mixture vigorously; let it stand for five minutes and filter. If much gelatin is present it will be impossible to get a clear filtrate.

To the filtrate or a portion of it, add an equal bulk of a saturated aqueous solution of picric acid. In the presence of gelatin a yellow precipitate or distinct turbidity will be produced immediately.

The whole operation is performed in the cold and (if the mercury solution is ready) will not take more than ten minutes.

Starch—1. Chemical Examination: Dilute with water, boil for some minutes, allow to cool and add a few drops of test solution of iodin. If starch is present a blue color will be produced.

Microscopical Examination—Place the cream, somewhat diluted, in a conical glass (urine or sherry glass), allow to stand some hours. With a pipette remove a few drops of the portion at the bottom of the glass and examine for starch granules under the microscope.

Of 184 creams examined 18 were found to be adulterated.

7 contained formaldehyde.

None contained boric acid, or borax.

14 contained gelatin.

Condensed Milk, Evaporated Milk, Preserved Milk, Evaporated Cream (so-called)

Condensed milk is the general term used for all milks which have been concentrated by the removal of more or less water.

The law requires that the fat present in condensed milk shall not be less than 25 per cent. of the milk solids.

Method of Analysis of Evaporated Milk.

Total Solids and Ash—Two grams of the milk are weighed in a tared platinum dish, about five cubic centimeters of distilled water are added, and a thorough mixture effected by stirring with a small glass rod. The rod is washed by means of a fine stream from a wash bottle. The total solids are determined as in the case of milk. The dry solids, after weighing, are gently ignited in a muffle furnace, taking care not to allow the heat to rise above a dull red. When the ash appears white or gray, cool in a dessicator and weigh. Calculate the percentage of ash.

Fat—Two grams are weighed, as for total solids, dissolved and soaked on paper, dried and extracted as under milk.

Preservatives are determined as under milk and cream.

Preserved Milk.

Preserved milk is condensed milk containing from 40 to 50 per cent. of cane sugar. It is sold in tins, and, on account of the large amount of sugar, will keep for a long time, even when exposed to the air.

METHOD OF ANALYSIS.

For solids, and fat, a thoroughly dried graduated 50 c.c. flask and small, short stem funnel are accurately balanced and ten grams of the well-mixed condensed milk are carefully weighed into the funnel. When the bulk of the weighed-out condensed milk has been run down into the flask the remainder is carefully rinsed down with cold water from a wash botle. The flask is then stoppered and shaken until the condensed milk is in complete solution, made up to the mark and again shaken to produce a homogeneous solution. From a double marked 5 c.c. pipette, 5 c.c. of this solution, representing one gram of the condensed milk, are distributed evenly over a strip of Schleicher & Schull fat free absorption paper, rolled into a coil, dried and the fat determined as in fluid milk.

It has been found that the caking of the mass on the paper coil, due to the large amount of sugar present, prevents the ether from dissolving out the fat completely. In order to extract the last traces of fat the exhausted coil should be washed with water, to dissolve the greater part of the sugar, dried and re-extracted with ether. Any fat obtained by this second extraction is added to the first.

Solids—These are determined by evaporating another five cubic centimeters of the above solution (representing one gram of milk) in a tared lead capsule and proceeding as in fluid milk.

Ash—This is determined as in evaporated milk.

Proteids—These are estimated by determining the nitrogen present by one of the modifications of the Kjeldahl method and multiplying the result by 6.25.

Lactose—Open can, remove all the contents to a casserole, mix thoroughly and weigh exactly five grams into small lipped beaker. Dissolve in distilled water and wash carefully in a 250 c.c. flask. Dilute to about 200 c.c. and add about eight drops of acetic acid. Shake until precipitate separates, make up accurately to 250 c.c. mark, mix thoroughly, let settle and filter through a dry ribbed filter. Reject the first portion of the filtrate and, if clear, use the remainder for copper titration.

Titration—From a burette measure exactly 10 c.c. of Fehling's copper solution into a 200 c.c. casserole, add by pipette 10 c.c. of Fehling's alkali solution, dilute to 100 c.c. and bring to a boil on a ring stand to which a 50 c.c. burette containing the sugar solution is clamped over the copper solution. When boiling has commenced run in the sugar solution 10 c.c. at a time until the blue color of the copper has nearly disappeared. At this point run in 1 c.c. at a time, boiling one-half minute after each addition, and test as follows: With a small pipette draw out about one-half cubic centimeter of the boiling solution, filter through a 5 cm. filter without a funnel into a cavity of a porcelain test plate. Add one drop of acetic acid and one drop of dilute potassium ferrocyanid solution. A reddish brown precipitate indicates that copper is still present and more of the sugar solution must be added. Continue the addition of sugar solution, 1 c.c. or a half c.c. at a time, until test samples produce no precipitate with the ferrocyanid reagent. Note the amount of sugar solution required.

To another boiling copper solution prepared as before run in, all at once, the same amount of sugar solution as was used in the first trial.

Boil exactly six minutes and test as before. If necessary, add a half c.c. of sugar solution at a time as before until the operation is finished. If too much sugar solution is used on the second trial a third test must be made with less sugar solution.

Calculation—X = number of c.c. of sugar solution required.

Y = grams of condensed milk represented by X.

Z = percentage of lactose, without correction.

Then—250 : X : : 5 : Y and Y : 0.134 : : 100 : Z.

Since the precipitate caused by the acetic acid occupies an appreciable portion of the total volume of the 250 c.c. the solution actually used for titration will be a little too concentrated and the percentage of lactose found will be too high. A corrective should be made for this, the exact amount of which may be determined by the method of double dilution.

Cane Sugar—This may be estimated by difference or may be determined directly as follows:

100 c.c. of the filtrate prepared as in the determination of lactose are placed in a beaker, 100 c.c. of water and 5 c.c. of a 50 per cent. citric acid solution are added. This is then evaporated at a gentle heat to about 100 c. c., cooled and diluted to 200 c.c. The copper titration is performed as before. The cane sugar factor for 10 c.c. Fehling's copper solution used in 0.095. A proper allowance must of course be made for the reduction due to the lactose found.

Evaporated Cream (so called).

This is simply evaporated milk in tins, which have been sterilized by means of heat. The name is a deception. At present there is no such product made as evaporated cream, *i. e.*, condensed cream.

During the year 73 samples of condensed milk were examined, three of which were found to be adulterated.

Water.

Croton water samples are taken each week at a public hydrant located at or near Fifty-fifth street and Sixth avenue. Complete sanitary analyses are made in each case, the results of which are published in the weekly report of the Department and also in the "City Record." Following is a sample of the report:

Department of Health—City of New York.

Sanitary Bureau.

ANALYSIS OF CROTON WATER FOR NOVEMBER 6, 1903.

Sample Taken from 55th Street and 6th Avenue.

Temperature at Hydrant, 50° F.

	Results Expressed in Grains Per U. S. Gallon of 231 Cubic Inches.	Results Expressed in Parts by Weight in One Hundred Thousand.
Appearance	Slightly turbid.	
Color	Light yellowish brown.	
Odor (heated to 100 degrees Fahrenheit)	Marshy.	
Sediment	None.	
Chlorine in chlorids	0.169	0.290
Equivalent to sodium chlorid	0.279	0.478
Phosphates	None.	None.
Nitrogen in nitrites	None.	None.
Nitrogen in nitrates	0.0182	0.0313
Free ammonia	0.0012	0.0020
Albuminoid Ammonia	0.0096	0.0165
Hardness equivalent to Carbonate of lime — before boiling	2.22	3.81
Hardness equivalent to Carbonate of lime — after boiling	2.22	3.81
Organic and volatile matter (loss on ignition)	1.224	2.10
Mineral matter (non-volatile)	3.033	5.20
Total solids (by evaporation)	4.257	7.30

Remarks ....

Date, November 8, 1902.

For water analyses other than Croton water the following form of report is used:

DEPARTMENT OF HEALTH—CITY OF NEW YORK,

BOROUGH OF MANHATTAN.

SANITARY BUREAU—DIVISION OF CHEMISTRY.

Analysis number—17,062.

Date received—November 10, 1902.

Date reported—November 15, 1902.

Received from—Borough of Queens.

Marked—Well water No. 79, premises of John Smith, Maspeth.

....

Reason for analysis—Determine sanitary purity.

Report.

	RESULTS EXPRESSED IN GRAINS PER U. S. GALLON OF 231 CUBIC INCHES.	RESULTS EXPRESSED IN PARTS BY WEIGHT IN ONE HUNDRED THOUSAND.
Appearance	Very slightly turbid.	
Color	......	None.
Odor (heated to 100 degrees Fahrenheit)	......	Stale.
Sediment	......	None.
Chlorine in chlorids	......	11.400
Equivalent to sodium chlorid	......	18.786
Phosphates	......	None.
Nitrogen in nitrites	......	0.0020
Nitrogen in nitrates	......	1.0329
Free ammonia	......	0.0170
Albuminoid ammonia	......	0.0040
Hardness equivalent to (before boiling)	......	16.80
Carbonate of lime (after boiling)	......	9.68
Organic and volatile matter (loss on ignition)	......	11.10
Mineral matter (non-volatile)	......	54.60
Total solids (by evaporation)	......	65.70

Analyst ....

Remarks—Sample is contaminated and not suitable for domestic purposes.

METHOD OF WATER ANALYSIS.

Appearance—Determined by comparing the degree of turbidity with standards made by agitating weighed amounts of pure diatomaceous earth in water; classified in general as "very turbid," "turbid," "slightly turbid," and "clear."

Sediment—Amounts classified as "very heavy," "heavy," "slight," etc. Character determined by microscopic examination.

Color—Estimated by comparison with the Hazen platinum-cobalt standards prepared as follows: 1,246 grams of potassium platinic chlorid and one gram of crystallized cobalt chlorid are dissolved in 100 c.c. concentrated hydrochloric acid and the solution made up to one liter. This stock solution has a color = 5.00. By dilution standards are made equal to 0.05, 0.10, 0.15, 0.20, etc.

Odor—Ascertained by heating in a flask to about 100° Fahr. and noting the character and strength of the odor.

Chlorin—Reagents required:

(a) Standard silver nitrate solution—Prepared by dissolving 4.8022 grams of crystallized silver nitrate in one liter of water. Each cubic centimeter of such a solution is of a strength sufficient to precipitate one milligram of chlorin.

(b) Potassium chromate, indicator—Dissolve two grams of the pure salt in 100 c.c. of distilled water. Add two or three drops of silver nitrate and filter.

(c) Saturated sodium carbonate solution—Dissolve 50 grams of pure sodium carbonate in 300 c.c. of distilled water.

Determination—One hundred c.c. of the water to be examined are placed in a porcelain casserole, six drops of potassium chromate solution added and then the standard silver nitrate solution is run in from a burette, until the red tint of the silver chromate just appears. From the known amount of silver solution used the amount of chlorin present is obtained.

Waters low in chlorin must be concentrated before titration. It is important always to evaporate to the same volume (100 c.c.), as it has been shown that the bulk of liquid has an influence on the amount of silver used in the titration. In evaporating it is well to add a small amount (0.1 c.c.) of sodium carbonate solution to prevent loss of chlorin.

Sodium Chlorid—This is calculated from the amount of chlorin, determined as above.

Phosphates—These are determined qualitatively in the residue left in the determination of mineral matter, by dissolving in a small quantity of concentrated nitric acid, diluting slightly, filtering, transferring to a test tube, adding solution of ammonium molybdate and heating in a water bath.

Nitrogen in Nitrites—Reagents required:

(a) Sulfanilic acid—Dissolve 1.25 grams of sulfanilic acid in 250 c.c. of water and 125 c.c. of glacial acetic acid.

(b) Naphthylamin acetate—Dissolve 0.200 grams of alpha naphthylamin in 280 c.c. of water and 120 c.c. of glacial acetic acid.

(c) Standard sodium nitrite solution—Dissolve 0.22 gram of silver nitrite in hot water. Decompose with slight excess of sodium chlorid, cool and dilute to one litre. Allow the precipitate of silver chlorid to settle, remove 5 c.c. of the clear solution and dilute the same to one litre. This second solution will contain an amount of nitrite per centimeter equivalent to 0.0001 milligram of nitrogen.

To determine the nitrogen in nitrites in a water, measure from a burette into 100 c.c. Nessler jars 1, 2, 3, 4 and 5 c.c., respectively, of the standard nitrite solution. Fill to 100 c.c. mark with distilled water. Fill another tube to 100 c.c. mark with water to be tested. Add to each of these tubes 2 c.c. of the sulfanilic acid and 2 c.c. of the solution of naphthylamin acetate. Mix the contents of the tubes by means of a glass stirrer, allow them to stand for twenty minutes, and then match the depth of the pink color formed in the unknown with the known standards.

Nitrogen in Nitrates—Picric acid method. Reagents required:

Phenol Sulphonic Acid—925 grams of concentrated sulphuric acid, specific gravity 1.84, are weighed into a flask of about one litre capacity; melted phenol is now mixed with the sulphuric acid, with constant stirring, until the whole weighs 1,000 grams. The flask and contents are now immersed in a water bath and boiled for six hours, care being taken to keep the level of the boiling water above the line of contents of the flask.

Standard Nitrate—Dissolve .722 grams of potassium nitrate in one litre of water. This is the strong stock solution. For the standard stock solution, 10 c.c. of the strong stock solution are evaporated to dryness on a water bath, and when dry 25 c.c. of phenol sulphonic acid are added quickly to cover all the residue and dilute with distilled water to one litre. Five c.c. of ammonia are added to aliquot portions of this solution, and diluted to 100 c.c. for use as standards.

Standards made up in accordance with the above will remain constant for some time.

Determination—Evaporate 100 c.c. (or less, according to the nitrate contents) of the water to dryness on the water bath, having previously added 1-10 c.c. sodium carbonate solution to prevent loss from volatilization of nitric acid. Moisten the dry residue with 2 c.c. of the sulphonic acid solution and add about 5 c.c. of ammonium hydroxid. Make up to 100 c.c. in a Nessler jar and compare the depth of color with that produced by using different amounts of the standard nitrate solution.

Free Ammonia—Reagents required: Sodium carbonate saturated solution, Nessler's solution, ammonium chlorid standard, distilled water free from ammonia.

(a) Nessler's Solution—Dissolve 62.5 grams of potassium iodid in 250 c.c. of boiling water, and while hot add, in small portions at a time, a hot saturated solution of mercuric chlorid until a slight red precipitate is formed which will not be dissolved by vigorous shaking and continued heating on a water bath. Set aside until cool, add 200 grams of potassium hydroxid dissolved in 200 c.c. of water, shake well and dilute to one litre. If necessary, add a few drops of mercuric chlorid solution to insure a slight permanent red precipitate. The reagent is improved by age.

(b) Standard Ammonia Solution—Dissolve 0.315 gram pure, dry ammonium chlorid in one litre of distilled water (free from ammonia). Dilute 100 c.c. of this solution to one litre. This second solution will represent a strength of 0.01 milligram of ammonia per cubic centimeter, and is the standard solution used.

The distillation is carried on in a glass stoppered flask of a capacity of two litres, having a side exit tube connected with an upright block tin condenser. The heat is supplied by a large rose burner. Fill the retort about half full of water, free from ammonia, add 2 c.c. of sodium carbonate solution, and distill until 50 c.c. of the distillate shows no reaction for ammonia with Nessler's solution. Add 500 c.c. of the water to be examined (or less in cases of high ammonia content) and distill off in separate portions of 50 c.c. into Nessler tubes until the last 50 cc. distilled shows no reaction for ammonia. The ammonia is estimated by matching the color produced by Nessler's solution in the distillates with that produced by the solution in one of a series of standard tubes prepared by measuring into Nessler tubes ¼, ½, 1, 2, 3 and 4 c.c. respectively of the standard ammonium chlorid solution and filling to the 50 c.c. mark with distilled water free from ammonia. The tubes will then contain 0.0025, 0.0050, 0.01, 0.02, 0.03 and 0.04 milligrams of ammonia respectively. The analysis and comparison tubes should all be Nesslerized at the same time, which is done by adding 2 c.c. of Nessler's solution to each tube and mixing with a glass stirrer. They should be allowed to stand at least five minutes before reading.

Albuminoid Ammonia—Reagents required. Same as in the determination of free ammonia, with the addition of:

(a) Alkaline permanganate of potassium—Dissolve 8 grams of potassium permanganate in one litre of distilled water (free from ammonia), add 200 grams of potassium hydroxid and boil in a long-necked flask, to prevent much evaporation, for one hour; make up to one litre with distilled water, free from ammonia.

In determining the amount of albuminoid ammonia, in peat waters, it appears to be in certain cases impossible to arrive at a point where no ammonia is given off. Drown proposes to take off a certain number of distillates, say six, and then stop. We, in practice, continue distillation until the last 50 c.c. taken shows less than 0.0025 milligrams of ammonia.

The successive distillates, in the determination of both free and total ammonia, should exhibit a steady decrease in the amount of ammonia contained. If this is not the case, the analysis must be repeated.

Hardness, Equivalent to Carbonate of Lime, Before and After Boiling—Soap test: Reagents required: (a) Soap solution—(Strong) Dissolve 10 grams of a neutral hard soap in one litre of 90 per cent. alcohol and filter.

(b) Soap Solution (Standard)—To 100 c.c. strong soap solution add 33 c.c. 90 per cent. alcohol and 100 c.c. distilled water. Mix, allow to stand and filter.

(c) Standard Solution of Calcium Chlorid—Dissolve one gram of calc spar in a small amount of hydrochloric acid, evaporate to dryness on a water bath, with repeated additions of distilled water, until all uncombined acid is driven off; dilute to this one litre with distilled water. Each c.c. is equal to one milligram of calcium carbonate.

The soap solution is standardized as follows: 10 c.c. of the calcium chlorid solution are diluted to 100 c.c. with distilled water and placed in a glass-stoppered bottle of about 250 c.c. capacity; the soap solution is then run in from a burette, not more than 0.25 c.c. at a time, shaking well after each addition, until the addition of the last portion produces a permanent lather. The lather formed should remain on the surface of the liquid in the bottle for five minutes without breaking.

By dividing the amount of calcium carbonate taken by the number of c.c. of soap solution used the value of 1 c.c. of soap solution is obtained. Some soap solution (approximately ½ c.c., varying according to the strength of the soap solution) is required to produce a lather on distilled water. This quantity should be deducted from the total used before calculating the soap solution standard. A similar deduction must be made from the amount used in each determination.

Hardness Before Boiling—One Hundred c.c. of the water (or less, if very hard—diluted to 100 c.c.) are measured into a bottle and the determination conducted as in the standardization of the soap solution.

Hardness After Boiling—One hundred c.c. of the water and 100 c.c. of distilled water are measured into a 250 c.c. flask and boiled until the bulk is reduced to 100 c.c. This is filtered into a bottle, cooled and the determination completed as above.

Total Solids—One hundred c.c. of the water are measured into a tared platinum dish and evaporated to dryness on the water bath. The dish is placed in an air bath and heated to 130° C. for one-half hour. Cool in desiccator and weigh.

Organic and Volatile Matter (loss on ignition) and Mineral Matter—The contents of the dish are heated to a dull redness over a Bunsen burner until the organic matter is driven off. The dish is then placed in a desiccator, cooled and weighed. The loss represents the organic and volatile matter and the residue the mineral matter.

Water Laboratory—All water analyses must be conducted in a specially constructed room, which can be completely separated from the general working laboratory, and under no circumstances should ammonia or its salts be brought into this room.

The following table shows the averages of the weekly examination of Croton water for each month during 1902, also the highest and lowest results and average for the year expressed in parts per 100,000:

1902.		Temperature.	Chlorin in Chlorids.	Equivalent to Sodium Chlorids.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates.	Hardness before Boiling.	Organic and Volatile.	Mineral Matter.	Total Solids.
January	Highest	38	0.240	0.396	0.0050	0.0140	0.0416	3.99	2.50	5.10	7.20
	Lowest	36	0.220	0.363	0.0030	0.0080	0.0264	2.87	1.80	3.90	6.10
	Average	37	0.232	0.382	0.0039	0.0125	0.0338	3.47	2.14	4.42	6.56
February	Highest	38	0.270	0.445	0.0050	0.0105	0.0395	3.24	1.90	5.30	6.70
	Lowest	36	0.205	0.338	0.0020	0.0070	0.0329	2.74	1.40	4.10	6.00
	Average	37½	0.246	0.406	0.0035	0.0085	0.0362	2.95	1.77	4.55	6.32
March	Highest	48	0.220	0.363	0.0045	0.0130	0.0436	2.45	2.70	4.30	5.60
	Lowest	37	0.150	0.247	0.0015	0.0085	0.0210	2.15	1.30	2.30	5.00
	Average	43	0.187	0.309	0.0031	0.0109	0.0334	2.32	1.75	3.47	5.22
April	Highest	54	0.215	0.354	0.0020	0.0120	0.0449	3.71	2.20	5.30	6.80
	Lowest	48	0.195	0.321	0.0005	0.0070	0.0239	2.73	1.40	4.10	5.90
	Average	50	0.209	0.344	0.0012	0.0087	0.0309	3.17	1.80	4.62	6.42
May	Highest	66	0.220	0.363	0.0035	0.0155	0.0305	4.03	2.40	5.10	7.00
	Lowest	54	0.195	0.320	0.0020	0.0080	0.0181	3.32	1.50	4.10	6.20
	Average	59½	0.205	0.333	0.0028	0.0112	0.0240	3.85	2.02	4.60	6.62
June	Highest	68	0.240	0.396	0.0025	0.0165	0.0367	4.23	2.70	5.70	8.30
	Lowest	64	0.195	0.321	0.0005	0.0080	0.0227	3.65	1.90	4.70	6.60
	Average	66	0.219	0.336	0.0016	0.0116	0.0296	3.92	2.10	5.25	7.35
July	Highest	71	2.235	0.387	0.0040	0.0140	0.0321	4.11	3.70	7.00	8.20
	Lowest	68	0.195	0.321	0.0005	0.0100	0.0235	3.24	1.60	4.50	6.40
	Average	69½	0.215	0.354	0.0019	1.0115	0.0289	3.65	2.16	5.34	8.50
August	Highest	74	0.240	0.395	0.0015	0.0155	0.0399	4.50	2.30	5.60	7.20
	Lowest	72	0.205	0.338	0.0005	0.0100	0.0148	3.37	1.40	4.30	6.60
	Average	72½	0.222	0.366	0.0010	1.0121	0.0268	3.81	1.85	5.00	6.85
September	Highest	74	0.240	0.396	0.0035	0.0200	0.0317	3.83	2.70	5.30	7.30
	Lowest	68	0.200	0.330	0.0010	0.0100	0.0238	2.98	1.60	4.00	6.60
	Average	70	0.219	0.361	0.0017	0.0157	0.0263	3.51	2.20	4.67	6.87
October	Highest	68	0.260	0.428	0.0020	0.0205	0.0531	4.18	2.30	6.80	8.70
	Lowest	54	0.235	0.387	0.0005	0.0100	0.0276	3.20	1.90	5.10	7.40
	Average	61½	0.247	0.407	0.0012	0.0147	0.0373	3.68	2.06	6.02	8.08

1902.		Temperature.	Chlorin in Chlorid.	Equivalent to Sodium Chlorids.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates.	Hardness before Boiling.	Organic and Volatile.	Mineral Matter.	Total Solids.
November......	Highest..........	50	0.290	0.478	0.0020	0.0165	0.0350	5.00	2.30	6.70	8.50
	Lowest	48	0.225	0.371	0.0010	0.0120	0.0250	3.81	1.70	5.20	7.30
	Average..........	49	0.249	0.410	0.0014	0.0150	0.0303	4.17	2.00	6.05	8.05
December	Highest	42	0.260	0.428	0.0060	0.0105	0.0500	4.71	2.80	8.10	10.00
	Lowest..........	34	0.210	0.346	0.0020	0.0071	0.0300	2.38	0.80	3.00	5.80
	Average.........	38	0.234	0.387	0.0037	0.0084	0.0390	3.43	1.90	5.56	7.46
	Highest..........	74	0.290	0.478	0.0060	0.0205	0.0531	5.00	3.70	8.10	10.00
	Lowest..........	34	0.150	0.247	0.0005	0.0070	0.0148	2.15	0.80	2.30	5.00
	Average........	54½	0.223	0.366	0.0022	0.0117	0.0313	3.49	1.98	4.96	7.02

Calculated Yearly Averages of Analyses of Croton Water from 1888 to 1902, inclusive.

	Temperature, Fahr.	Appearance.	Chlorin in Chlorid.	Equivalent to Sodium Chlorid.	Nitrogen in Nitrites.	Nitrogen in Nitrates.	Free Ammonia.	Albuminoid Ammonia.	Total Nitrogen.	Hardness before Boiling.	Organic and Volatile Matter.	Mineral Matter.	Total Solids.
1888	..	.....	0.204	0.338	......	0.0468	0.0007	0.0070	0.0360	3.65	1.92	4.92	6.84
1889........	..	.....	0.196	0.324	......	0.0356	0.0005	0.0049	0.0398	4.00	2.01	5.12	7.13
1890........	..	.....	0.183	0.300	......	0.0445	0.0006	0.0084	0.0513	4.20	1.89	6.03	7.93
1891........	..	.....	0.205	0.338	......	0.0265	0.0010	0.0112	0.0366	4.30	1.94	6.05	7.99
1892........	..	.....	0.238	0.364	......	0.0260	0.0008	0.0128	0.0372	4.90	2.16	6.40	8.56
1893........	53	S. T.	0.250	0.411	0.000017	0.0279	0.0008	0.0087	......	4.13	1.74	6.02	7.76
1894........	55	S. T.	0.247	0.407	None.	0.0267	0.0013	0.0084	0.0348	4.17	1.77	6.20	7.97
1895........	54	S. T.	0.258	0.426	None.	0.0250	0.0031	0.0196	0.0436	4.25	2.15	6.39	8.54
1896........	53	S. T.	0.267	0.439	None.	0.0298	0.0023	0.0225	0.0495	4.11	2.42	6.77	9.18
1897........	54	S. T.	0.286	0.470	None.	0.0282	0.0011	0.0167	......	4.49	2.13	6.38	8.51
1898........	53	S. T.	0.256	0.425	None	0.0281	0.0011	0.0153	......	4.58	1.98	6.33	8.32
1899........	53	S. T.	0.231	0.382	None.	0.0282	0.0013	0.0157	......	....	1.81	5.52	7.33
1900........	54	S. T.	0.231	0.382	None.	0.0288	0.0021	0.0167	......	4.24	2.21	5.17	7.38
1901........	53	S. T.	0.232	0.382	None.	0.0359	0.0028	0.0154	......	3.98	2.13	5.68	7.81
1902........	54½	.....	0.223	0.366	None.	0.0313	0.0022	0.0117	......	3.49	1.98	4.96	7.02

The following is a complete sanitary and mineral analysis of a sample of Croton water taken from a public hydrant on August 1, 1902:

	Parts in 100,000.
Silica (SiO_2)	0.822
Iron and alumina ($Fo_2O_3+AL_2O_3$)	0.179
Lime (CaO)	1.581
Magnesia (MgO)	0.603
Sulfuric anhydrid (SO_2)	0.351
Chlorin	0.215
Soda (Na_2O)	0.696
Potash (K_2O)	0.499
Nitrogen in nitrates	None.
Nitrogen in nitrates	0.0309
Free ammonia	0.0025
Albuminoid ammonia	0.0105
Organic and volatile matter (loss on ignition)	2.10
Mineral matter	6.10
Total solids (by evaporation)	8.20

Other Municipal Supplies.

In addition to the weekly analyses of Croton water, regular monthly examinations have been made of the supplies in the boroughs other than Manhattan, as follows: Kensico and Westchester in The Bronx, Blissville, College Point, Dunton, Elmhurst, Far Rockaway, Flushing, Jamaica, North Beach, Sunnyside, Whitestone, Woodhaven and Woodside in Queens, Crystal, Staten Island and South Shore Water Companies and Tottenville in Richmond.

A large number of analyses of water also have been made, principally of samples taken by inspectors in connection with dairy and farm inspections. These examinations include waters from wells, cisterns, springs, brooks and ponds. A large number of samples have been found to be contaminated with sewage.

Mineral and Waste Waters.

Mineral Waters—These examinations include the analysis of carbonic waters to determine whether distilled water, Croton or artesian well water had been used in their preparation, the determination of the sanitary purity of bottled mineral and spring waters, and, also, in cases where analyses have been published or filed at the Department under the permit system, a general examination to determine if the waters are as represented. A large part of this work was done in connection with the sanitary inspection of bottling establishments and plants of artificial mineral water manufacturers.

Waters from Cellars and Excavations—These examinations are made in connection with investigations of the sanitary inspectors and also of the Department of Water Supply, the object being to determine the origin of the water, whether river water, Croton, sewage or underground water. In cases where attempts are being made to trace the source directly by means of uranine, this coloring matter is sought also.

Microscopical Examinations.

Examinations of milk and cream for colostrum and starch. Examination of sediment in samples of water. Identification of animal and vegetable life. Identification of starches in foods. Identification of adulterants in spices. Identification of poisons.

Experimental Work.

Work is in constant progress in improving and perfecting methods for analysis already in use and examining new tests and methods for the examinations of foods and water appearing from time to time in current chemical literature, or suggesting themselves to the chemists. The more important lines of investigation have been:

The detection and estimation of preservatives in foods, such as boric acid, borax, formaldehyde, salicylic acid, benzoic acid and fluorids. The detection and identification of artificial coloring matter in foods.

The methods used for determining nitrates and nitrites in drinking water.

Of the chemical work performed at the request of other City Departments, the most important is as follows:

Police Department.

Samples of liquors for alcohol in excise cases. Examination of materials found on prisoners and suspected of containing narcotics—so-called "Knockout Drops."

Samples of opium sold for smoking purposes.

Department of Street Cleaning.

Samples of ashes and garbage.

Coroner's Office.

Identification of samples of drugs.

Examination of material for poisons.

Department of Water Supply, Gas and Electricity.

Samples of waters from cellars and excavations to determine origin of same.

Examinations of samples for sanitary purity.

EXCISE DEPARTMENT.

Samples of liquors for alcohol.

DEPARTMENT OF CORRECTION.

Examination of contract supplies.

The very great increase over former years in the number of samples of milk, water, etc., examined, and also in the number of miscellaneous food samples received either directly from citizens or from inspectors investigating complaints of citizens, has taxed the personnel of the Division and the facilities of the laboratory to their utmost capacity.

Attempts have, however, been made to take up various classes of food products systematically, with the view of determining the extent and character of adulteration practiced and taking steps towards its suppression.

In this connection examinations have been made of the following:

Canned Goods—Comprising meat, fish, soup, tomatoes, corn, peas, string beans and clam juices, examined for preservatives.

Sausages and Sausage Meat—Examined for preservatives.

Ice Creams—Especially that sold from push-carts, general examination for foreign ingredients.

Catsups—Examined for artificial coloring matter and preservatives. Of twelve brands examined, all contained either benzoic or salicylic acid and a coal-tar color.

Cider—Of nine samples examined, all contained salicylic acid.

Cream of Tartar—Examined for general adulteration. Of 44 samples examined, 26 contained no cream of tartar whatever, but consisted usually of a mixture of alum, acid phosphate of calcium and starch.

Miscellaneous samples of baking powder, bread, candy, cereal foods, cocoa, dried eggs, beef extracts, fruit juices, preserves and jellies were also examined. The extent of the field covered and number of samples in each class examined has been limited, but the results obtained show how widespread and frequent the adulteration of food products is and the importance of continuing this work.

A field scarcely as yet touched upon at all is the adulteration and substitution of drugs, known to be of common occurrence. This evil is a decided menace to life and health and should be taken in hand at once. In this connection some control ought to be exercised over the promiscuous sale of so-called patent medicines containing poisonous or deleterious ingredients.

In order to take up this work in an adequate manner an increase in the laboratory is an urgent necessity. With the present limited number of chemists these fields of investigation can be touched upon only superficially, and even then at the sacrifice of other work of equal importance.

Respectfully submitted,

J. A. DEGHUÉE, Ph. D., Chemist.

DEPARTMENT OF HEALTH—BOROUGH OF MANHATTAN,
DIVISION OF BACTERIOLOGY.
NEW YORK, August 25, 1903.

Dr. Walter Bensel, Assistant Sanitary Superintendent :

SIR—I have the honor to submit the following report of the work of the Diagnosis Laboratory and Office of the Division of Bacteriology for the year 1902:

The statistical report of the work done is given on a separate sheet; wherever possible the corresponding figures are given for 1901. In many instances the work was only transferred to this division in 1902.

The work of the laboratory and office has been continued along the lines pursued during 1901, but every one of the different branches shows a considerable increase, and some of them have been greatly extended and made more thorough and efficient.

The following changes have been made in the force of employees. One clerk and 1 laboratory attendant resigned during the year. One helper, 3 laboratory attendants and 1 clerk were transferred elsewhere. Office boy appointed to clerk and new office boy appointed. Three clerks transferred to office from other Divisions.

At present on duty:

Clerks	4
Stenographer	1
Assistant Bacteriologists	4
Laboratory Attendants	11
Medical Inspectors	9
Office Boy	1
	30

DIPHTHERIA.

As shown in the table of statistics, the number of cultures examined shows a marked increase over those examined in 1901. Increase in primaries, 3,109; in secondaries, 3,673; in school cases, 802. Total increase, 7,584.

During the year 66,706 culture tubes and 77,383 swabs were prepared and issued. As was noted in the report for 1901, while the number of tubes issued compares fairly closely in ratio to the prevalence of the disease, a comparison of this number with the number returned showed a large loss.

1901.

Tubes issued	46,450
Tubes returned	24,680
Loss	46 per cent.
Swabs issued	51,935
Swabs used	24,680
Loss	52 per cent.

1902.

Tubes issued	66,706
Tubes returned	31,756
Loss	53 per cent.
Swabs issued	77,383
Swabs used	31,756
Loss	59 per cent.

No complaint has been made of the quality of the culture media, and the stations have been maintained satisfactorily, very few complaints having been made of delay in forwarding or loss of specimens.

In the boroughs of Manhattan and Bronx 34 culture stations were established and 5 were discontinued.

Since March 1 great improvement has been made in sending early reports to physicians of the results of examinations of cultures. The laboratory work—preparing specimens—begins at 8 o'clock; the office work—searching the files for the results of previous examinations—begins at 8.30; at 8.45 the microscopic examinations begin, and as results are ascertained, they are telephoned to the physicians in all cases in which the telephone number has been given on the slip, as asked for, or where it can be found in the directory. It is thus possible that a culture may be taken at 3 P. M.

(or later if left at the Department building), collected, incubated, examined, and the result reported to the physician in his office before 10 A. M. the following morning. Reports signed by the examining bacteriologist are mailed to the physicians and inspectors by noon daily, and in most instances should reach their destination the same day.

In Brooklyn, many complaints having been made of the inadequacy and inefficiency of the culture service, an entire reorganization was effected. The old system of visiting only such stations as notified the Borough office by telephone of their having specimens for collection was inadequate, and frequently inefficient, and physicians were charged for the telephone calls. They were also compelled to wait 48 hours or longer before learning the laboratory findings in their cases. Only two collectors being on duty, and the cultures having to be brought to the Manhattan Laboratory for incubation by 6.30 P. M., collections were begun *before* 2 P. M.

The following changes have been made: Two additional collectors have been appointed and four routes of stations (30 stations in all) have been established, which are visited daily after 4 P. M. An incubator has been placed in the Borough office, where all cultures so collected are incubated and brought to the Diagnosis Laboratory by 8 A. M. the next morning for examination. Reports of the findings in each case are telephoned to the Brooklyn office at 9.30, whence they are telephoned to the physicians, as in Manhattan. Reports signed by the examining bacteriologist are mailed at noon daily to the physicians and inspectors, as in Manhattan. A special circular announcing the above changes in the service, and giving a list of the stations was sent to every physician in Brooklyn late in March, and the new system went into effect April 1. The location of the stations wes determined at a conference between delegates from the various Brooklyn Medical Societies and a representative of the Department.

In Queens stations have been maintained for some years, but there has been no provision for the forwarding of specimens to this laboratory. On April 1, a collector was assigned to vist daily, beginning at 4 P. M., stations at Long Island City, Jamaica and Flushing, reaching the Diagnosis Laboratory by 6.30 P. M. Specimens are sent by the outlying stations to one of these points, car fare being allowed, they being so scattered and at such distances from central points that it seems impracticable for a collector to visit them regularly.

The laboratory findings are telephoned to the Borough office by 10 A. M., whence the physicians are notified by telephone. Reports signed by the examining bacteriologist are mailed to the physician s at noon daily.

A letter announcing the above changes in the service was sent to every physician in the Borough.

In The Bronx, a few complaints having been made of the inadequacy of the service, the one station visited daily by a collector was moved from One Hundred and Thirty-eighth street to One Hundred and Sixty-ninth street and ten new sub-stations were established. Laboratory findings are telephoned to the Borough office by 10 A. M., whence the physicians are notified by telephone. Reports signed by the examining bacteriologist are mailed to physicians and inspectors at noon daily.

To facilitate the earlier administration of antitoxin, the Department offered to supply all of the larger dispensaries in Manhattan with antitoxin and culture tubes, that cases of diphtheria first seen there might be diagnosed and injected at the earliest possible moment. A letter informing them of this offer was sent to the physician in charge of eighteen dispensaries. To accomplish the most and best results the supply of antitoxin should be well kept up, and frequent inspections made to see that this is done, and both this and a further extension of the plan is contemplated.

Administration of Antitoxin.

The administration of antitoxin in diphtheria was begun by the Department of Health January 1st, 1895. Previous to that date the death rate from diphtheria had ranged between 16.7 and 11. per 10,000, and the case mortality of the disease from 64 per cent. to 44 per cent. With the introduction of antitoxin a marked improvement at once took place in both the death rate and the mortality from diphtheria, and this improvement was progressive until 1898. These statements are best proven by the diagram given later, showing the death rate of and the mortality from diphtheria from 1888 to 1903. Up to 1899 a special corps of inspectors was maintained, whose duty it was to administer antitoxin, free of charge, in cases of diphtheria, and to immunize all children and adults who had been exposed to infection. Early in 1899 this corps of inspectors was abolished, and the administration of antitoxin made a part of the work of the diagnosticians of the Department.

In 1902 the death rate and mortality having risen quite markedly, it was determined to do everything possible towards (1) lessening the prevalence of diphtheria; (2) preventing its occurrence in persons exposed to it, and (3) promoting the recovery of patients suffering therefrom. To these ends a special corps of inspectors, four in number, was organized March 1st, 1902, and assigned to the free administration of diphtheria antitoxin. This number was soon found to be insufficient, and four more inspectors were added to the corps. The city was divided into eight districts, as follows: East of Broadway—(1) Battery to Broome street; (2) to Sixth street. West of Broadway—(3) Battery to Thirty-fourth street. East of Fifth avenue—(4) Sixth street to Forty-second street; (5) Forty-second street to Eightieth street; (6) Eightieth street to the Harlem River. West of Fifth avenue—(7) Thirty-fourth street to Ninetieth street, and (8) Ninetieth street to the Harlem River. The inspectors are on duty day and night. Every call sent in to the Department is at once telephoned to them, and attended to at once. All have received thorough training in intubation and extubation, and special attention is paid to cleanliness and asepsis in the injection of antitoxin. So far, not a single case of infection or injection abcess has been reported. Besides the administration of antitoxin to persons suffering from diphtheria, the inspectors have, as far as possible, immunized all persons coming under their observation who have been exposed to the disease. Besides the establishment of the above-mentioned corps of inspectors, other efforts have been made to extend the use of antitoxin as far as possible.

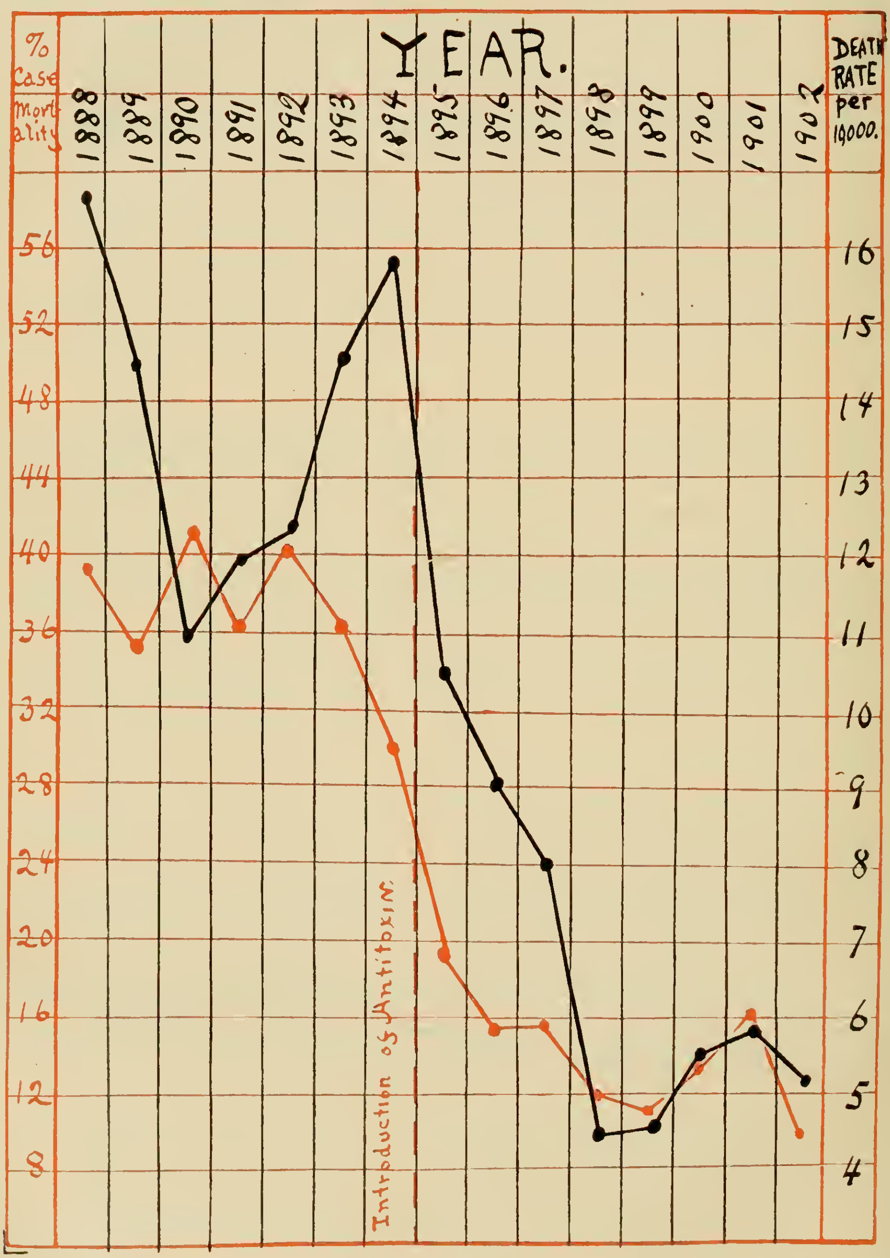
In every case of diphtheria reported to the Department (and this includes practically all cases occurring in the boroughs of Manhattan and The Bronx), the attending physician was asked (either by telephone or personal interview), if his patient had received antitoxin and the rest of the family immunized. If this had not been done, the Department offered either to do it for him, or to furnish the antitoxin free of charge.

All cases of diphtheria reported by dispensaries were at once visited, and injection and immunization performed. In all fatal cases of diphtheria, inquiry was made of the attending physician as to whether antitoxin had been used, and at what stage of the disease (see later for statistics).

The diagnosticians, district inspectors, school inspectors and other employees of the Department were notified of the formation of the antitoxin corps, and instructed to report for inspection and injection, if necessary, all cases of diphtheria in tenement-houses where isolation was not or could not be enforced, or where no physician was in attendance. Every district inspector was instructed to report whether the cases of diphtheria seen by him, private or institution cases, had received antitoxin.

And finally circulars, leaflets and other literature were distributed widely to the medical profession, urging the early use of antitoxin, and the great advisability of widespread immunization against the disease, as preventive of its spread. The results of these various steps have been most satisfactory, as is shown in the table, the death rate in 1902 being 21 per cent. lower, and the mortality 9.5 per cent. lower than in 1901. And it must be borne in mind that these steps were not taken until March 1st; January and February are two of the heaviest months of the year as regards the occurrence of diphtheria. Were the figures for these months deducted from the statistics, the showing made would be even better.

Table Showing Death Rate (Black) and Case Mortality (Red) from Diphtheria in the Boroughs of Manhattan and The Bronx from 1888 to 1902.



As shown in the above table, between 1888 and 1894 the case mortality of diphtheria ranged from 64 to 44 per cent. (average 37 per cent.), the death rate per 10,000 from 16.7 to 11.0 (average 13.9). During the four years from 1895 to 1898, the mortality dropped to 12 per cent., and the death rate to 4.6 per cent. Since 1898 both the mortality and death rate have risen. In 1901, the mortality was 15.9 (an increase of 20 per cent.) and the death rate 5.8 (an increase of 25 per cent.). In 1902, the mortality was 10.9 per cent., a decrease of 31 per cent., and the death rate 53.4 per 10,000, a reduction of 9.5 per cent.

Tabulation of Cases of Diphtheria in Which Antitoxin Was Administered by Inspectors of the Department of Health, from January 1, 1902, to January 1, 1903.

TABLE I.

Total number of cases injected	1,512
False cases	283
Cases sent to Willard Parker Hospital	117
Total	400
Total number cases considered as diphtheria	1,112
Of these Klebs-Loeffler bacilli were present in	1,018
Of these doubtful (too late, only suspicious, etc.)	76
No culture	18
	1,112

TABLE II.

Total Number Cases Considered as Diphtheria, Showing Deaths and Mortality Per Cent.

	Cases.	Deaths.	Mortality Per Cent.
	1,112	84	7.6
Moribund deducted	1,082	54	4.9

TABLE III.

	Laryngeal Cases.			Non-Operative Cases. (Intubation.)			Operative Cases.		
	Cases.	Deaths.	Mort. Per Cent.	Cases.	Deaths.	Mort. Per Cent.	Cases.	Deaths.	Mort. Per Cent.
....	177	33	18.6	137	22	16	40	11	27.5
Moribund deducted.............	157	13	8.3	124	9	7.2	33	4	12.

TABLE IV.

Showing Location of Lesion.

Tonsils	481	43.7 per cent.
Pharynx	256	22.6 per cent.
Larynx	177	15.9 per cent.
Nares	186	16.8 per cent.
Not stated	12	1. per cent.
	1,112	100 per cent.

TABLE V.

Showing Character of Cases.

Mild	254	22.4 per cent.
Moderate	464	41.7 per cent.
Severe	276	25.6 per cent.
Septic	102	9.8 per cent.
Not stated	6	.5 per cent.

TABLE VI.

Showing Cause of Death.

Pneumonia	14
Nephritis	3
Cardiac paralysis	18
Asphyxia	17
Exhaustion	4
Sepsis	24
Pulmonary œdema	2
Endocarditis	1
Meningitis	1
	84

TABLE VII.

Cases Arranged According to Day of Disease on Which Antitoxin Was Injected, Giving Mortality Per Cent.

First day.....	Total cases..	120	Deaths...........	2	Moribund.....	0
	Moribund deducted..............	120	"	2	Mortality.....	1.6 per cent.
Second day...	Total cases.......................	340	"	15	Moribund....	5
	Moribund deducted..............	335	"	10	Mortality.....	3 per cent.
Third day....	Total cases.......................	320	"	22	Moribund. ...	6
	Moribund deducted..............	314	"	16	Mortality.....	5 per cent.
Fourth day...	Total cases.......................	136	"	19	Moribund.....	9
	Moribund deducted..............	125	"	10	Mortality.....	8 per cent.
Fifth day.....	Total cases...	65	"	10	Moribund.....	4
	Moribund deducted..............	61	"	6	Mortality.....	9.9 per cent.
Over fifth.....	Total cases.......................	71	"	11	Moribund.....	5
	Moribund deducted..............	66	"	6	Mortality.....	9 per cent.
Unknown	Total cases.......................	10	"	1		
	Moribund deducted..............	10	"	1		

TABLE VIII.

Number of Injections.

1 injection	930
2 injections	159
3 injections	16
Over 3 injections...	4
Not stated	3
	1112

TABLE IX.

Rashes.

1st to 5th day, inclusive....................	Erythema	14
" " "	Urticaria	16
6th to 10th day or over....................	Erythema	6
" " "	Urticaria	56
Total rashes		92

Number of families immunized..	1,170
Number of individuals immunized..	4.254
Number of institutions immunized..	5
Number of individuals in institutions..	1,225
Number of individuals contracting diphtheria before 2 or after 30 days....	7

Number of individuals contracting diphtheria between 2 and 30 days.....	17
Number of individuals contracting diphtheria where immunization was refused or impossible to give..	4
Rash reported in..cases	86

REMARKS ON INSPECTORS' CASES.

The above figures only go to confirm an already established fact—the specific curative action of diphtheria antitoxin in cases of diphtheria. These are not selected cases: they occur among the poorest classes, who are unable to pay for the antitoxin used. In many cases the patients were apparently moribund; every week the inspectors report cases literally dragged back from the grave by the use of antitoxin. And yet, even without deducting the moribund cases, the case mortality is less than 8 per cent., as contrasted with the awful figures of twenty years ago—36 to 40 per cent.

Cardiac paralysis, asphyxia, broncho-pneumonia and sepsis were the most frequent causes of death in the fatal cases. Of the cases injected during the first forty-eight hours of the disease only 3 per cent. proved fatal, showing that the imperative duty of the physician in diphtheria is to use antitoxin and use it early. Many a case, mild at first, gradually increases in severity, and when the physician, as a last resort, uses antitoxin late in the disease, it fails to effect a cure.

An interesting fact in connection with the harmless urticarial and erythematous rashes associated with the injection of antitoxic serum is that urticaria occurs more frequently a week or longer after the injection, while erythema appears within the first week.

PHYSICIANS' CASES.

With the introduction of free administration of antitoxin in 1895, the Department of Health also began to furnish antitoxin free of charge to physicians for their poor patients. Physicians are required to certify that the patient is unable to pay for the antitoxin, and to forward to the Department a history of the case on its termination, special history blanks being furnished for that purpose. This was begun on October 1, 1895. The following tables show the number of cases injected from that date to January 1, 1903, in the Boroughs of Manhattan and The Bronx. The number of cases has varied but little during the last two or three years, so that the separate figures for each year are not given. These cases represent only a fraction of all those receiving antitoxin. The higher mortality among the physicians' cases over the inspectors' cases is chiefly due to the fact that the average dose of antitoxin given by physicians is but rarely more than 2,000 units, while the inspectors give 3,000 units and up in all cases over two years of age.

Tabulation of Cases of Diphtheria in Which Antitoxin Was Administered by Physicians From October 1, 1895, to January 1, 1903.

Total number of cases considered as diphtheria..........	8,318
Total number of cases showing K. L. B..................	6,563 or 78 per cent.
Total number of cases showing doubtful and no culture..	2,755 or 22 per cent.

TABLE I.

Total Number of Cases Considered as Diphtheria, Showing Deaths and Mortality Per Cent.

	Cases.	Deaths.	Mortality, Per Cent.
....	8,318	1,046	12.6
Moribund deducted	425	425	....
Remain..	7,893	621	6.3

Cases of Laryngeal Diphtheria, Operative and Non-Operative, Showing Mortality Per Cent.

TABLE II.

	Laryngeal Cases.			Non-operative Cases.			Operative Cases.		
	Cases.	Deaths.	Mort., P. C.	Cases.	Deaths.	Mort., P. C.	Cases.	Deaths.	Mort., P. C.
....	2,504	629	25.1	1,843	389	21.1	661	240	36
Moribund deducted	319	319	......	211	211	......	108	108	....
Remain..................	2,185	310	14.2	1,632	178	10.9	553	132	23

The following tables relate to cases from January 1, 1899, to January 1, 1903:

TABLE III.

Showing Number of Cases Receiving One, Two, Three or More Injections of Antitoxin.

1 injection	4,816	77 per cent.
2 injections	1,030	16 per cent.
3 or more..	215	3 per cent.
Not stated	145	4 per cent.
Total..................................	6,206	

TABLE IV.

Showing Location of Lesion.

Tonsils	2,313	37 per cent.
Pharynx	1,416	22 per cent.
Nares	509	8 per cent.
Larynx	1,753	28 per cent.
Not stated	215	5 per cent.
Total	6,206	

TABLE V.

Showing Severity of Cases.

Mild	954	15 per cent.
Moderate	2,137	34 per cent.
Severe	2,343	37 per cent.
Septic	462	7 per cent.
Not stated	310	7 per cent.
Total	6,206	

TABLE VI.

Cases Arranged According to Day of Disease on Which Antitoxin Was Injected, Giving Mortality. Per Cent.

Day of Disease.	Cases.	Deaths.	Mortality, Per Cent.	Moribund, Deducted.	There Remain.		Mortality, Per Cent.
					cases.	deaths.	
First day	995	62	6.2	35	960	27	2.9
Second day	2,526	179	7.0	74	2,452	105	2.6
Third day	1,335	150	11.2	50	1,285	100	7.8
Fourth day	485	107	22.0	40	445	67	15.0
Fifth and over	425	121	26.0	62	363	59	16.0
Unknown	440	54	12.2	21	419	33	7.8
Total	6,206	673	10.8	282	5,924	391	6.6

TABLE VII.

Showing Complications.

1902 only.

Scarlet fever	14
Measles	7
Nephritis	38
Pneumonia	14
Bronchitis	27
Paralysis	12
Whooping cough	4
Abscess of necks	1
Rash	50

TABLE VIII.

1902 Only.

Causes of Death as Stated.

Pneumonia	23
Nephritis	19
Cardiac paralysis	46
Sepsis	32
Asphyxia	23
Scarlet fever	7
Pulmonary œdema	1
Measles	1
Exhaustion	1
Convulsions	1
Not stated	35

IMMUNIZATION.

Cases immunized by physicians, January 1, 1899, to January 1, 1903.	2,864	
Cases developing between 24 hours and 30 days		22, or 0.7%
Cases developing before 24 hours and after 30 days		21, or 0.7%
Families immunized	1,329	

Fatal Cases.

As before mentioned, a special investigation was made of all fatal cases of diphtheria occurring in the Boroughs of Manhattan and The Bronx from May 20, 1902, to January 1, 1903. Following are the results obtained:

Total cases investigated	277

In 198 cases, or 71%, antitoxin was used.

In 79 cases, or 29%, antitoxin was not used.

I.

The location of the membrane was given as follows:

Tonsils		13	4.7 per cent. of all cases
Pharynx		36	13 per cent. of all cases
Larynx—			
Operative cases	28		
Non-operative cases	93		
		121	43.6 per cent. of all cases
Nares		49	17.7 per cent. of all cases
Not stated		58	21 per cent of all cases
		277	100

II.

Character of Disease.

Mild	1	0.3 per cent. of all cases
Moderate	7	2.5 per cent. of all cases
Severe	86	31 per cent. of all cases
Septic	138	49.9 per cent. of all cases
Not stated	45	16.57 per cent. of all cases
	277	

III.

Cause of Death.

Pneumonia	20	7.4 per cent. of all cases
Nephritis	14	5.2 per cent. of all cases
Sepsis	83	30 per cent. of all cases
Cardiac Paralysis	41	15 per cent. of all cases
Asphyxia	59	21.6 per cent. of all cases
Exhaustion	15	5.7 per cent. of all cases
Scarlet Fever	9	3.4 per cent. of all cases
Measles	1	0.3 per cent. of all cases
Myocarditis	2	0.7 per cent. of all cases
Endocarditis	1	0.3 per cent. of all cases
Not stated	32	11.7 per cent. of all cases
	277	

IV.

Day of Death After First Injection.

Moribund, i. e., within 24 hours	62	31 per cent. of injected cases
1st day, 24-48 hours	22	11 per cent. of injected cases
2d day, 48-72 hours	24	12 per cent. of injected cases
3d day, 72-96 hours	8	4 per cent. of injected cases
4th day, 96-120 hours	5	2.5 per cent. of injected cases
5th day, 120-144 hours	11	5.5 per cent. of injected cases
Over 5 days	28	14 per cent. of injected cases
Not stated	38	20 per cent. of injected cases
	198	100

V.

Number Days Ill When First Injection Was Given.

1st day	5	2.5 per cent.
2d day	25	12 per cent.
3d day	22	18.5 per cent.
4th day	28	13 per cent.
5th day	22	11 per cent.
Over 5 days	22	11 per cent.
Not stated	64	32 per cent.
	198	100

VI.

Number of Injections Given.

1 injection	101	51	per cent.
2 injections	49	24	per cent.
3 injections	6	2.7	per cent.
Over 3 injections	4	2.3	per cent.
Not stated	38	20	per cent.
	198	100	

VII.

Units Given.

1—2,000	23	11	per cent.
2—3,000	40	21	per cent.
3—4,000	47	23	per cent.
Over 4,000	54	25	per cent.
Not stated	33	20	per cent.
	197	100	

Analysis of Cases Injected on First or Second Day.

Total	30
Laryngeal	17

8 (operative (intubation); 5 septic, 3 severe; 4 within 24 hours; 1, 28 hours; 1, 32 hours; 2 pneumonia, 2 had whooping-cough.

9 non-operative; 5 septic, 4 severe; 4 within 24 hours; 3, 48 hours; 1, 4 days, pneumonia; 1 not stated; 5 asphyxia.

1 case involved tonsils, pharnyx and nose; died 8th day, septic.

1 pharynx, 9-12 years old, severe; had one injection, 1,500 units.

2 pharynx, septic, died 5th day from sepsis.

1 pharynx, scarlet fever, complicating.

2 cases had apparently recovered and died after 2 or 3 weeks, one from nephritis and the other from broncho-pneumonia.

1 tonsils, 4-12 years old, moderate—complicated by colitis.

1 nose, pharynx and tonsils, moderate, complicated by gastro-enteritis.

1 nose pharnyx and tonsils, severe, suppression of urine.

1 pharynx and nares, septic—meningitis—5 days.

1 nares and tonsils, septic—broncho-pneumonia.

1 location and character not stated—died 3 days—exhaustion.

Of the 79 cases where antitoxin was not administered, in 42 the physicians stated that they did not use it because the cases were either moribund or seen so late that they thought antitoxin would do no good.

In 8 cases the physicians stated they did not believe in antitoxin.

In 4 cases the parents refused injection.

In 25 cases no reason was given for not using it.

Pulmonary Tuberculosis.

Early in the year the inspection and supervision of tuberculosis was transferred to this division, and systematic organization of this very important work has proceeded during the year, amplification of and improvement in the service being made from time to time as opportunity offered. The routine inspections have been made by the antitoxin corps and special inspections by other inspectors, as, for example, it being found that the various dispensaries and hospitals were not reporting as many cases as they should, an inspector of the Department visited the physicians in charge and the superintendents and called their attention to the falling off in the number of cases reported. As a result, the number of such cases reported has greatly increased, 2,493 cases being reported for the year by institutions, against 2,043 for the previous year, a gain of 22 per cent. and a total number of new cases from all sources of 13,722.

Comparison of deaths reported from tuberculosis with the tuberculosis records show that only a small proportion of such cases fail to be reported while living.

From April 6, 1902, to July 10, 1902, all deaths occurring in the Borough of Manhattan were looked up in the tuberculosis records of the Department, in order to determine if many reported cases of tuberculosis were reported as having died of other maladies. During that period there were 9,491 deaths from all causes. Of these 1,042 were reported as due to tuberculosis; of the remaining 8,449 only 47 (0.5 per cent.) had been previously reported as having tuberculosis. Of these 47 the cause of death was stated to be:

Pneumonia	14
Nephritis	9
Bronchitis	7
Carcinoma	4
Diarrhœa	2
Gastric ulcer	2

Senility	1
Abscess	1
Cirrhosis	1
Pul. gangrene	1
Typhoid fever	1
Aneurism	1
Peritonitis	1
Embolism	1

Reported as phthisis by—

Physicians	17
Institutions	28
Not stated	2

Death reported by—

Physicians	27
Hospitals	8
Coroner	2
Doubtful	10

In 35 cases (74 per cent.) the age was between 20 and 50.

The increased attention paid to the inspection of tuberculosis and to the disinfection and renovation of premises formerly occupied by persons suffering from tuberculosis is well shown in the table of statistics.

Typhoid Fever.

During the year, 3,369 specimens of blood and serum were subjected to the Widal test. Of these, 1,179 produced the reaction, 35 per cent.; 2,190 were negative. The increase in the positive percentage and the very few complaints of unreliability of results seem to indicate that our increased experience has given us more skill and decision in the study of the Widal reaction, and that when obtained, it is a fairly positive indication of the presence of the disease. The following analysis of the work done for 1901 is here submitted:

The Results of Examinations of the Blood for the Widal Reaction Performed at the Diagnosis Laboratory of the Health Department of New York City During 1901.

During 1901, 2,702 specimens of blood from patients suspected of having typhoid fever were examined at the Diagnosis Laboratory of the Health Department. The great majority of the specimens consisted of dried drops of blood upon glass slides. Although the Department furnishes special outfits for the collection of serum, yet very few physicians take advantage of the opportunity. The reaction may be more distinct with pure serum than where the blood corpuscles are also present, yet the longer time necessary to use the cantharides plaster and the attendant irritation seem to be patent reasons against the use of the serum outfits, and the results attained with the dried blood seem to be very satisfactory.

The Department of Health is conservative in making a diagnosis of typhoid fever from examination of the blood. There must be well marked clumping and death of the bacilli (evidenced by loss of motility) within ten minutes when the serum is diluted twenty-fold. Such a reaction is looked upon as positive evidence that typhoid infection exists or has existed very recently. All specimens are first examined with a low dilution—one to ten—and here the reaction should appear at once. Doubtful reactions are divided into two classes:

(1) Negative, with a dilution of one to twenty; positive, with a dilution of one to ten.

(2) Negative, with a dilution of one to twenty; incomplete reaction, with a dilution of one to ten.

Theoretically, reaction No. 1 would point more strongly to the existence of typhoid infection than reaction No. 2; but practically, as is shown later by consideration of the cases which were doubtful on the first examination and positive or negative on the second examination, the diagnostic value of the two classes of reaction appears to be about equal.

During 1902, the Department has reported the results of blood examinations to the attending physician over the telephone, where it is possible to obtain his telephone call. In cases where the result is negative, the physician is asked whether he wishes the Department to still consider the case one of typhoid fever.

In considering the results obtained during 1901, reference is had only to specimens of blood from patients residing in the Borough of Manhattan. In every case where the physician's diagnosis was typhoid fever and the laboratory findings negative, a letter was written to the physician, asking for information as to the outcome of the case, and a similar letter was sent in every case where the laboratory findings were doubtful. A special blank form was sent with each letter, for forwarding the desired information. 443 such letters were written, and the desired information received in 266. The statistics here given are based upon these reports, together with the information given on the original specimen slip. 1,908 specimens were examined. Of these, 304 showed a positive reaction and 111 cases were considered by the attending physicians as being cases of typhoid, even though the results of blood examination were doubtful or false. In 131 instances, where the result of examination was doubtful, and in 1,362, where it was negative, the cases proved not to be typhoid fever. In 210 instances a second specimen was sent; in 74 a third. The greatest number from one case was nine.

CASES SHOWING A POSITIVE REACTION.

The chief point of interest as regards the 304 cases which showed a positive reaction was the day on which the reaction appeared.

Day of Disease on which Reaction Appeared.	1st to 3d.	4th.	5th.	6th.	7th.	8th to 10th.	11th to 14th.	Not Stated.
No. of Cases............	3	5	15	13	48	65	51	11

From a consideration of the above table it will be seen that in 88 per cent. of the cases showing a positive reaction the blood was not taken until the end of the first week of the disease. It may be argued that the specimens could have been taken earlier in the disease and would have proved positive. Yet, as will be shown later, of those cases showing no reaction which proved clinically to be typhoid fever, in 63 per cent. the blood was taken previous to the seventh day. Further, in 47 cases in which the blood was negative on the first examination and positive on later examinations, in 81 per cent. the first examination was made prior to the seventh day of the disease. These facts go to show that a negative result during the first week has no great significance. Indeed, the reaction may not appear until very late. In one case the reaction did not appear until the sixth week, the blood being negative during the first, second, fourth and fifth weeks. The reaction may be present for one or two days only. In one case, eight negative examinations were made up to the fourteenth day; a positive reaction then appeared, but the blood was again negative on the sixteenth day and remained so. In only a few instances did a doubtful reaction intervene between a negative result and a positive reaction. The latest period at which a reaction was found was thirteen weeks after the beginning of the illness. Every case showing a positive reaction proved clinically to be typhoid fever.

CASES SHOWING DOUBTFUL REACTION.

In 164 cases the blood showed a doubtful reaction of one of the two classes previously described. Of these 39 proved not to be cases of typhoid fever, 33 were typhoid, while in 92 no information could be obtained.

In the 39 negative cases the disease afterward proved to be:

Influenza	4
Cerebro-spinal meningitis	4
Entero-colitis	5

Pneumonia	3
Gastro-enteritis	3
Malaria	11
Tuberculosis (chronic miliary)	1
Autotoxæmia	2
Small-pox	1
Tonsilitis	1
Abscess supra-renal capsule	1
Not stated	3

Of these 39 cases, 21 showed doubtful reaction No. 1 and 18 doubtful reaction No. 2.

The four cases of cerebro-spinal meningitis were interesting. All showed a positive reaction with a dilution of one to ten. Two cases showed a rose rash, and all had enlargement of the spleen and typical typhoid stools.

In 33 cases where the result of examination was doubtful the diseases afterward proved to be typhoid.

The day of the disease on which the doubtful reaction appeared was as follows:

Day of Disease.	1st to 3d.	4th.	5th.	6th.	7th.	8th to 10th.	11th to 14th.	Over two weeks.	Not Stated.
No. of Cases	1	1	0	2	3	6	8	10	2

This shows that the doubtful reaction was not due to the specimen having been taken too early in the disease. In 19 cases the doubtful reaction was the result of a second examination, the first examination being either negative or doubtful. Of the 33 cases, 17 showed doubtful reaction No. 1 and 16 reaction No. 2.

In the above tables no account is taken of the cases showing first a doubtful reaction and later a positive reaction. The following table shows all cases showing a doubtful reaction in which two or more specimens were taken:

First examination, negative; second, doubtful	19
First examination, negative; second, positive	18
First examination, negative; second, doubtful; third, positive	5
First examination, doubtful; second. positive	24
First examination, doubtful; second, negative	11

CASES SHOWING DOUBTFUL OR NO REACTION, AFTERWARD PROVING TO BE TYPHOID FEVER.

These cases include not only the 33 instances of doubtful reaction previously mentioned, but also 78 cases which failed to show a reaction, but which afterward proved to be typhoid fever, 111 in all.

The following table shows that in the 78 negative cases the blood was taken before the seventh day in 63 per cent.:

Day of Disease on which Blood was Taken.	1st–3d.	4th.	5th.	6th.	7th.	8th to 10th.	11th to 14th.	Over Two Weeks.	Not Stated.
Number of cases	5	8	18	11	4	6	6	8	12

Yet, too early examination was not at fault in all cases. A second examination also proved negative in 43 cases, and a third in 22 cases. In two cases the blood was examined respectively six and nine times, and was always negative. Yet, in each case, autopsy showed the correctness of the diagnosis of typhoid fever. In these 111 cases enlargement of the spleen was present in 73 (65 per cent.), skin eruptions in 68 (61 per cent.) and a relapse in 8 (7 per cent.).

It has been stated that cases of typhoid fever in which relapses occur are apt to show a doubtful reaction during the original attack and a positive reaction during the relapse. Of the eight cases which relapsed a doubtful reaction was present in but two.

The clinically true cases of typhoid, together with the cases which showed a positive reaction, amount to 415. Classified as to season, these cases occurred as follows:

Spring.	Summer.	Autumn.	Winter.	Not Stated.
40	53	160	144	18

The youngest case was that of an infant aged six months. Two cases were over sixty years of age, one being sixty-seven.

Ten cases had previously had typhoid fever; in one case it was claimed that the patient had had three previous attacks. Of the ten cases, one had had the disease within one year, two within five years and seven more than five years previously. In 104 cases there was a probability that the disease had been acquired outside of the Borough of Manhattan.

GENERAL REMARKS.

It is interesting to note what varied and diverse conditions may so simulate typhoid fever as to lead the attending physician to have the blood examined for the presence of the Widal reaction. Among them may be mentioned ulcer of the intestines, tumor in the right lumbar region, cirrhosis of the liver, acute hepatitis and abscess of the supra-renal capsule. Only one instance of the association of typhoid fever and malaria was noted, both the parasite and the Widal reaction being found.

Paratyphoid Reaction.

Several observers have noted that certain cases, apparently typhoid fever, the blood of which failed to show the Widal reaction, were not due to infection with the bacillus typhosus, but were due to other typhoid-like (hence "paratyphoid") organisms. Such cases are clinically indistinguishable from typhoid fever, but their blood serum gives a reaction only with its own paratyphoid organism, and not with the true typhoid bacillus. It seemed possible that the number of varieties of paratyphoid bacilli might be limited; if so, testing of the blood of cases of typhoid fever which failed to show the Widal reaction, with cultures of such organisms would prove of value. Accordingly, cultures of six such varieties of paratyphoid bacilla were collected from various sources, among them those isolated by Gwynn, Cushing, Coleman and Buxton and Smith. Whenever the examination of a specimen from a case diagnosed as typhoid proved to be negative with regard to the Widal reaction, inquiry was made of the attending physician as to whether he still considered the case one of typhoid fever; if so, the Department would be glad to make the paratyphoid test. Thirteen such specimens were examined, each one being tested with the above different strains of paratyphoid bacilli. The results may be summed up in a word: they were uniformly negative; so that it seems likely that the blood of cases of paratyphoid infection react only with their own particular organism.

Ehrlich's Diazo Reaction.

Early in 1902 the Department of Health, believing that the presence in the urine of Ehrlich's diazo reaction for typhoid fever furnishes an early and valuable aid in the diagnosis of this disease, determined to make such examinations a part of the routine work done, free of charge, for the physicians of Greater New York. This was done on June 1, 1902. A circular descriptive of the reaction was prepared and distributed to the medical profession throughout the city.

Outfits, consisting of a suitable stoppered bottle in a wooden case, a blank slip for the necessary data, with directions on its reverse side, for obtaining and forwarding the specimen of urine were prepared and issued to the various drug stores throughout the city, which act as Department stations. The specimens are examined on the morning of the day following their collection, and the results of examination telephoned to the attending physician. Where his telephone call cannot be ascertained the report is sent by mail.

The test is performed in the following manner: Equal parts of the suspected urine and the following solution (saturated solution of sulphanilic acid in 5 per cent. hydrochloric acid, 40 parts; 0.5 per cent. solution of sodium nitrite, 1 part) are mixed and well shaken. On the addition of a few drops of ammonia a brilliant rose pink color should appear if the case be one of typhoid fever. The twelve-hour sediment is also characteristic, consisting of a dirty gray lower layer and a narrower dark olive-green upper layer.

The first specimen was received June 5, 1902. Between that date and January 1, 1903, 409 specimens were examined. Of these 40 were second or confirmatory specimens. Of the remaining 369, 158 showed a positive reaction, 46 a doubtful reaction, and 165 no reaction.

1. Cases showing positive Diazo reaction:

Physicians' clinical diagnosis "Typhoid"	86
Physicians' clinical diagnosis "Doubtful"	72
Total	158

Day of disease on which reaction was found:

1	0
2	0
3	0
4	22
5	16
6-10	63
11-14	24
Over 14	11

In 91 cases blood was examined for Widal reaction. A positive reaction (1-20) was found in 43; doubtful (1-10) in 23; negative in 25. Albumen present in 77 cases.

2. Cases showing doubtful Diazo reaction. (By doubtful is meant cases where the typical rose-pink coloration was not obtained, yet where a reaction was present.)

Physicians' clinical diagnosis "Typhoid"	36
Physicians' clinical diagnosis "Not Typhoid"	10
Total	46

Day of disease on which reaction was found:

1	1
2	1
3	2
4	4
5	3
6-10	22
11-14	4
Over 14	3
Not stated	6

In 19 of the doubtful cases confirmatory specimens were received. Of these 14 proved negative and 5 still doubtful. In 14 cases there was a trace of albumen present. In 20 cases a blood examination for the Widal reaction was also made. A positive reaction (1 to 20) was found in 5 cases; doubtful (1 to 10) in 5; and no reaction in 10.

3. Cases not showing Diazo reaction:

Physicians' clinical diagnosis "Typhoid"	57
Physicians' clinical diagnosis "Doubtful"	108
Total	165

Day of disease on which specimen was examined:

1	0
2	6
3	7
4	14
5	18
6-10	51
11-14	24
Over 14	23
Not stated	22

In 77 cases a blood examination for the Widal reaction was also made. A positive reaction (1 to 20) was found in 7 cases; doubtful (1 to 10) in 11; and no reaction in 59. Albumen present in 30 cases. In 4 cases a confirmatory specimen was received.

REMARKS.

That the examination of urine for the presence of the Diazo reaction in cases of suspected typhoid fever is of value and fairly reliable is shown by the absence of complaints from physicians. It is stated in the circular issued in every outfit that the reaction occurs in other conditions than typhoid. But these conditions can be clinically distinguished from typhoid fever with comparative ease—*e. g.*, pulmonary tuberculosis, scarlet fever and measles, etc. The reaction is more constant in typhoid fever than almost any other sign or symptom, not even excepting the Widal reaction in the blood.

It is most marked between the fourth and tenth days, being found in the great majority of cases by the fourth day, and in not a few on the third. The more intense the infection the earlier the appearance of the reaction. It begins to fade after the tenth day, and in many cases has disappeared by the beginning of the third week. This accounts in part for the relatively large number of negative specimens—47 were sent in too late in the course of the disease.

Practically no advantage was taken by physicians of the offer of this Department to examine microscopically specimens of urine from convalescent cases of typhoid fever for the presence of typhoid bacilli.

Comparison of the Widal and Diazo results shows the following:

(a) Diazo positive, Widal positive, 43. In the majority of instances the two specimens from each case were sent in on the same day. In seven the Widal reaction was not positive until three or more days after the finding of the Diazo reaction in the urine.

(b) Diazo positive, Widal doubtful, 23. In 19 the cases proved to be clinically typhoid; in 4 the clinical diagnosis was doubtful. In all but five instances the blood examination was made on or after the seventh day of the disease.

(c) Diazo positive, Widal negative, 25. In 19 the cases proved to be clinically typhoid, and the Widal test was made on or after the sixth day of the disease.

(d) Diazo negative, Widal positive, only 5 cases. Of these the examination in one was made on the fourth day (too early), in three after three weeks (too late), and in one on the tenth day.

CONCLUSIONS.

1. The examination of the urine in cases of suspected typhoid fever is of value, provided that its limitations be recognized.

2. While not so absolutely pathognomonic of typhoid fever, yet the Diazo reaction is even more constantly present in that disease than the Widal reaction. So that its absence at a period when it should be present, if the case be one of typhoid fever, is of considerable value in making a negative diagnosis.

3. In a majority of instances the Diazo reaction is present in the urine at least 48 hours earlier than the Widal reaction in the blood.

4. It disappears much earlier than the Widal reaction, however, and negative results obtained later than the second week are of little or no value.

5. "Doubtful reactions" have slight significance.

Malaria.

During the late summer and early autumn of 1902 two circulars were prepared relating to the various steps which the Department of Health proposed to take in connection with its campaign against malaria. The first—the "Prevention" circular—treats of the causation of the disease, of the mode of its transmission by means of mosquitoes, and the various means of prevention—destroying the breeding places of the mosquitoes, covering stagnant water with kerosene, etc. The second circular on "The Notification and Microscopical Diagnosis of Malarial Fever" announces the intention of the Department to investigate all cases of malaria occurring in New York City with reference to the source of infection. To this end it became necessary that physicians and institutions should report every case of malaria coming to their notice. Suitable postal cards for reporting the cases to the Department were prepared, and also cards for filing and indexing the various data reported. In return for such co-operation on the part of physicians, the Department offered to make free microscopical examinations of the blood in cases of suspected malarial fever, a part of its routine work.

During November one of each of the above-mentioned circulars was sent to every physician in Greater New York. A number were sent to each of the hospitals for the use of the staff of physicians, together with a supply of postal cards.

Outfits for preparing specimens of blood were first issued to the culture stations of the Department of Health on September 1, 1902. They consist of a wooden slide box, surgical needle, two glass slides, blank slip for required data, and the necessary instructions for preparing the specimen. The specimens are examined on the morning of the day following their collection, and the result of examination reported by telephone. Where this is not possible, reports are sent by mail. The specimens are first stained by a rapid non-differentiating method, such as Jenner's or Carbol-thionin. If any appearances suggestive of malarial parasites are observed one of the specific methods of staining is used (Romanowsky: Goldhorn). It was feared that the great majority of specimens would prove unsatisfactory, owing to the unfamiliarity of physicians with the technique of preparing the smears. But so far the proportion of unsatisfactory specimens has been relatively small (20 per cent) and it lessens as time goes on.

The routine examination of specimens of blood for the presence of malarial parasites began on September 1, 1902. Between that date and January 1, 1903, 140 specimens were received. Of these 30 (21 per cent.) were improperly prepared (smear too scanty or too thick) and could not be examined. Of the remaining 110, two were from The Bronx, 81 from Manhattan and 27 from Brooklyn. Malarial parasites were found in 11 specimens; in each instance the parasites were of the tertian type. In 10 of the positive cases no clinical diagnosis was made by the physician. Specimens were sent from cases of sepsis, typhoid fever, gastritis, lobar pneumonia, auto-infection, bilious remittent fever, etc.; all were negative. In 23 instances the patient had previously had malaria; of these the results of examination were positive in 1, negative in 23. In 38 there was no previous history of malaria; of these 5 were positive and 33 negative. In 41 instances there was a history of a chill; malarial parasites were found in two of these cases. In 17 instances there had been no chill; no parasites were found in any of these. In 40 cases quinine had been used; only one of these showed parasites. In 46 cases the blood examination was made within one week of the beginning of the illness; of these 4 were positive. Of 22 cases over one week old, 2 were positive. In many cases the disease was stated to have been contracted outside the city, yet no information of any value could be obtained beyond that most of the cases originated in nearby towns or resorts. They were divided about equally between New Jersey and New York.

The registration of cases of malarial fever reported by postal cards and otherwise was begun on September 1. Between that date and January 1, 1903, 87 cases were reported. The fact that the work was begun so late in the year accounts for the relatively small number of cases reported. Of the 87 cases, 33 were reported by inspectors of the Division of Medical School Inspection during September. Since then all the cases (54) have been reported by institutions or physicians. From the reports the following figures were obtainable:

Borough—Manhattan, 35; Bronx, 6; Queens, 5; Richmond, 5; Brooklyn, 3.

Character of Illness—Primary attack, 38; secondary or relapse, 17; not stated, 9.

Duration of Illness When Reported—1 week, 9; 2 weeks, 17; over 2 weeks, 22; not stated, 6.

Where contracted—Manhattan, 18; Bronx, 8; Richmond, 7; Queens, 5; Brooklyn, 2; outside the city, 8; not stated, 6.

Means of Diagnosis—Verified by microscope, 30; no blood examination, 14; not stated, 10.

Source of Report—Institutions, 38; physicians, 16

Three facts of interest may be gathered from the above figures:

1. The late period of the disease at which the cases are usually reported—almost 50 per cent. over two weeks.

2. The small proportion of cases that contracted the disease outside of the city (11.1 per cent.). This goes to show that while malaria may not be very prevalent in the city, it is almost entirely of local origin, and not imported, as is the case with most cases of typhoid fever. That being the case, efforts to stamp it out have a greater chance of success.

3. The relatively large number of cases in which the diagnosis of the disease was confirmed by microscopical examination of the blood—over 50 per cent. Physicians are as ready, if not more so, to take advantage of the offer of the Departmen to make routine blood examinations as they are to have cultures examined in cases of suspected diphtheria.

RECOMMENDATIONS.

In view of the fact that while malaria will not be prevalent until spring, yet the number of cases then reported (by requests for blood examinations as well as by notification) will probably be large, all possible preparations should be made in advance. Among the steps to be taken seem to be the following:

1. The purchase of large maps of every Borough of the City. There is such a map, about half the size of the regular insurance map, costing about $100 for each Borough. Two maps are needed. On one the cases should be permanently plotted out, as is done with the cases of diphtheria and tuberculosis. On the other existing cases should be marked by means of movable pins—thus showing by means of a cluster of pins that a source of infection, i. e., a breeding-place of mosquitoes, is close at hand.

2. The assignment of one or more inspectors to every Borough, to whom each case or collection of cases is to be assigned, his duty being to locate the source of infection, destroy it, or render it harmless, and promulgate necessary information as to prophylaxis—i. e., that it is as important to prevent the infection of mosquitoes from a case of malarial fever as to prevent healthy persons being bitten by infected mosquitoes.

3. The circulars on malaria issued by the Department, together with postal cards for reporting cases, should be again sent to every physician in Greater New York about April 1, and physicians should be further urged to report their cases earlier. A full supply of postal cards should be sent to all the institutions throughout the city, especially such as constantly have cases in their wards, such as Fordham Hospital, the Marine Hospital on Staten Island, etc.

REMARKS.

The preparation of a specimen of blood for examination for malaria requires considerable experience and a certain amount of skill, and the negative specimens include many which were imperfectly prepared and, therefore, could not be studied. It is thought that as physicians become more practiced in the preparation of these specimens the number of imperfect ones will be greatly reduced.

In this connection may be noted that the intimate relation of a certain variety of mosquito (Anopheles) as a causative factor to malarial fever having been established, an inspector was assigned to the work of inspecting in Bronx Borough the swamp lands and water collections. These inspections were made not only in a routine and systematic way, but also wherever and whenever complaints to the Department indicated their need.

Considerable experimental work was done in treating the mosquito-breeding localities with crude petroleum, and it is very desirable that this work should be continued and extended. A copy of the report made on this subject is here given:

DEPARTMENT OF HEALTH,
NEW YORK, November 17, 1902.

To the Assistant Director of the Diagnosis Bacteriological Laboratory :

SIR—In obedience to the instructions received to submit a general summary of the work performed by the "Mosquito Corps" in the Borough of The Bronx, from July 21, 1902, to date, I have the honor to report as follows:

Number of ponds and other bodies of standing water inspected..........	195
Original complaints forwarded for Board orders to fill in, drain, etc......	104
Number of bodies of standing water filled in, drained or otherwise improved and rendered innocuous in compliance with Board orders....	57
Original complaints forwarded for Board orders to treat standing water with petroleum (all complied with)................................	56
Number of ponds treated with petroleum by Department..................	91
Number of original complaints referred to superintendents of other departments	30
Number of citizens' complaints received and reported upon..............	10

SPECIES OF MOSQUITOES.

Culex—Invariably found where there were any mosquitoes at all, either alone or associated with the other species.

Psorophora—A single specimen of an adult female Psorophora, found in the meadows north of Classon's Point road, about one-half mile west of Classon's Point.

Anopheles—Found in natural collections of water only, in shaded localities, woods and in the public parks principally.

Distribution of Anopheles in the Borough of The Bronx.

South of Classon's Point road, near Classon's Point.

Van Cortlandt Lake.

Northwest corner Intervale avenue and Freeman street.

Meadow to east of Broadway, Kingsbridge, and south of East Two Hundred and Thirty-sixth street.

Ditches along Putnam Railroad, south of East Two Hundred and Thirty-eighth street.

250 feet south of East Two Hundred and Thirty-third street and 50 feet east of Webster avenue, Woodlawn (nuisance abated).

Four puddles in Crotona Park (nuisance abated).

West side Woodlawn road, north of East Two Hundred and Twelfth street (nuisance abated).

Jerome Park Reservoir (Anopheles found in eight ponds).

West side Inwood avenue, 50 feet south of Featherbed lane.

East side Inwood avenue, 175 feet south of Featherbed lane.

Zoological Park, Bronx Park (Anopheles found in fourteen ponds).

Tiffany street and Viele avenue.

Williamsbridge, north of Briggs avenue, between Fourth and Fifth avenues.

South side City Island road, 400 feet east of Eastern Boulevard (Pelham Bay Park).

Pelham Bay shore, near Country Club.

Pelham Bay Park (old Furman estate).

East side Eastern Boulevard (Coster estate).

East side of Macomb's lane, south of Belmont street.

Bronx Park, 200 feet east of Bronx river, opposite East One Hundred and Eightieth street.

Bronx Park south of Nursery of Zoological Garden.

Botanical Garden, Bronx Park (Anopheles in six ponds).

Morris avenue, from East One Hundred and Sixty-seventh street to Teller avenue (inspected too late in season, but undoubtedly contains Anopheles larvæ during warm weather).

West side Davidson avenue, south of East One Hundred and Eighty-fourth street (inspected too late in season, but undoubtedly contains Anopheles larvæ during warm weather).

Van Cortlandt Park, east side of Jerome avenue, south of Yonkers line (nuisance abated).

Valuable assistance in this work was given by the Department of Parks and the Department of Sewers. On the other hand, the Department of Highways failed to respond to any of the original complaints referred by this Department to its Superintendent.

I would recommend that in those localities where there are no sewers and where, in consequence, cesspools and open drains abound, the inhabitants be supplied with suitable literature, instructing them as to the means for abating the mosquito nuisance.

Respectfully submitted,

(Signed) WILLIAM T. KLEIN, M. D., Assistant Bacteriologist.

The laboratory work has thus included the preparation of culture media, sputum, blood and urine outfits, and their distribution to stations and institutions; the collection, preparation and examination of all specimens; the preservation for a certain period of tuberculosis and diphtheria smears, and the disinfecting and cleansing of all utensils and stock used.

The routine office work has included the reporting by telephone and post the results of all examinations and the recording and filing of the same; the direction, recording and assignment to inspectors of all diphtheria and tuberculosis work; special inspections (hospitals and institutions, culture stations, etc.); the preparation and distribution of announcements and circulars, and the handling of all business (bills, reports, estimates, requisitions, etc.) of the Division.

Table of Statistics.

	1901.	1902.
Diphtheria – Greater New York.		
Number bacteriological diagnoses suspected diphtheria	13,544	16,653
Number showing Klebs-Loeffler bacilli	5,851	7,757
Number not showing Klebs-Loeffler bacilli	5,426	6,837
Number indecisive	2,277	2,059
Number trial cultures (healthy throats)	236	620
Number later cultures (convalescents)	10,810	14,483
Number cultures taken by medical school inspectors	90	892
Diphtheria bacilli found	16	......
Diphtheria bacilli not found	59	......
Indecisive	15	......

	1901.	1902.
Diphtheria—Manhattan and Bronx.	These figures not prepared separately until 1902.	
Number bacteriological diagnoses suspected diphtheria		12,468
Number showing Klebs-Loeffler bacilli		5,880
Number not showing Klebs-Loeffler bacilli		4,970
Number indecisive		1,396
Diphtheria—Brooklyn.		
Number bacteriological diagnoses suspected diphtheria		3,940
Number showing Klebs-Loeffler bacilli		1,785
Number not showing Klebs-Loeffler bacilli		1,563
Number indecisive		592
Diphtheria—Queens.		
Number bacteriological diagnoses suspected diphtheria		191
Number showing Klebs-Loeffler bacilli		79
Number not showing Klebs-Loeffler bacilli		59
Number indecisive		53
Diphtheria—Richmond.		
Number bacteriological diagnoses suspected diphtheria		54
Number showing Klebs-Loeffler bacilli		13
Number not showing Klebs-Loeffler bacilli		23
Number indecisive		18
Total number of cultures	24,680	31,756
Number cultures tubes prepared	46,450	66,706
Number swabs prepared	51,935	77,383
Number of new cases treated with antitoxin	Assigned Mar., 1902	1,073
Number curative injections given	"	1,836
Number of cases immunized	"	4,186
Number cases intubated	"	79
Total number diphtheria inspections	"	5,615

	1901.	1902.
Tuberculosis.		
Total number specimens sputum examined, Greater New York	6,744	7,587
Number showing tubercle bacilli	2,564	3,000
Number not showing tubercle bacilli	4,180	4,587
Total number cases reported, Manhattan and Bronx	8,686	9,130
Number deaths from tuberculosis	4,630	7,571
Number duplicates	3,005	3,633
Number tuberculosis inspections	Assigned Mar., 1902	9,138
Number living cases visited by inspectors	"	6,099
Number dead cases visited by inspectors	"	3,039
Number original complaints	"	1,319
Number fumigations and special reports	"	1,100
Number cases referred to Charity Organization Society	"	5
Number of cases referred to hospital	"	17
Typhoid.		
Number specimens blood examined for Widal reaction	2.702	3,369
Number showing reaction	668	1.179
Number not showing reaction	2,034	2,190
Number specimens of urine examined for diazo	Begun June 1, 1902	402
Number showing diazo reaction	"	150
Number not showing diazo reaction	"	182
Number showing doubtful reaction	"	70
Malaria.		
Number specimens blood examined	Begun 1902	89
Number showing plasm. malariæ	"	8
Number not showing plasm. malariæ	"	81
Number of visits to collect specimens	15,075	16,025

Respectfully submitted,

J. S. BILLINGS, Jr., M. D.,
Assistant Director of the Diagnosis Bacteriological Laboratory.

DEPARTMENT OF HEALTH—CITY OF NEW YORK.
SOUTHWEST COR. 55TH STREET AND 6TH AVENUE, BOROUGH OF MANHATTAN,
NEW YORK, August 17, 1903.

Dr. E. J. LEDERLE, *President, Health Department:*

SIR—I have the honor to submit the following brief statement of some of the work of the Vaccine Laboratory during 1902.

During 1902 the routine work of the Laboratory went on in the usual manner, and the following table gives a brief summary of that portion of the work which can be so exhibited:

Animals vaccinated	228
Animals collected	222
Vaccine pulp collected, in grams	8,530.80
Amount of virus prepared, in cubic centimeters	31,573
Capillary tubes prepared	188,925
Small vials prepared (1/5 c.c.)	8,917
Large vials prepared (1 c.c.)	17,560
Spades collected	6,845
Bacteriological examinations	515
Experimental animal examinations	84
Mailing blocks prepared	280,920

The smallpox in the city made great demands on the Laboratory during the first three months of the year, and it was necessary to increase largely the list of employees. In January, for example, there were thirteen employed, and in February that number was increased, by a special contract for labor to be done at the Laboratory, so that the total number of workers was twenty-one. Even with this number it was necessary, for the greater part of January and February, for work to be continued regularly until eleven or twelve o'clock at night. At present the number is what may be considered normal for the Laboratory, that is eight employees. During the first three months of the year there was issued from the Laboratory material for about 525,000 vaccinations.

During the year the number of animals yielding virus of inferior quality, that is, virus which did not give 100 per cent. success in the clinical tests, has been unusually large. In some months more than a third of the animals vaccinated failed to give perfect virus. As such imperfection can be recognized only by clinical test the importance of such test is manifest.

In addition to the routine work there has been conducted much experimental work, chiefly on the relations of tetanus to vaccine, and on the effect of filtering virus. It has been demonstrated that the tetanus germ occurs at times in the fæces of calves, and that there is every reason, therefore, for insisting on the greatest cleanliness and care in the collection and preparation of vaccine virus. It has been found too, that filters which separate the bacteria from virus also separate the vaccine organism, and that the filter, therefore, cannot be employed in the preparation of virus.

The following statement gives the work on tetanus in detail:

The recent epidemic of tetanus following vaccination has brought out the facts that such cases are exceeding rare, that these rare cases have followed the use of points and glycerinated virus indiscriminately, and that while conclusive demonstration is lacking that the tetanus bacillus has been in any case inoculated with the vaccine organism, the possibility of the combined infection certainly exists. There has, however, been hitherto little or no experimental work on the association of the tetanus germ with vaccine virus, and the following experiments have therefore been made.

A—It is well known, of course, that tetanus germs are found with some degree of frequency in horse manure. It is not known, I believe, how frequently they occur in calf manure. The calves supplied to the Vaccine Laboratory of the Health Department are old enough to have received hay before admission. After admission they are fed on sterilized milk, and may therefore be considered as at least not adding to the tetanus which may have been carried in with the hay. To determine the presence of this infection, I have examined the fæces of twenty-five calves. A small amount (¼ to 1 c.c.) of the fæces passed by each calf immediately after entrance to the stable was mixed with bouillon and incubated for forty-eight hours under hydrogen gas. Two smears were then made and stained from each culture. Microscopical examination showed suspicious spore-bearing bacilli in six; nothing suspicious in the remaining nineteen. The cultures containing suspicious bacilli were heated to 85 degrees for ten minutes, and fresh cultures were made from these into bouillon and incubated under hydrogen gas for another forty-eight hours. Examination of smears from these showed typical spore-bearing bacilli in two cases. Two white mice were injected each with a capillary tube of the culture from the one case, and two other mice in the same way from the other case. The two mice from one case developed typical tetanic spasms in twenty-four hours and died in forty-eight hours. One of the other mice developed spasms in forty-eight hours and died twenty-four hours later; the fourth mouse was not affected. For absolute certainty of identification, these two cultures were planted in two flasks of bouillon, protected by paraffin, and these were incubated for ten days. The flask cultures were then filtered through a Pasteur filter, and of this filtrate, in one case, ¾ c.c., and in the other ½ c.c. was injected into a white mouse. One mouse died rigid in twenty-four hours, and the other developed typical tetanic spasm in seventy-two hours, and died in twenty-four hours more. It is therefore demonstrated that in two calves out of twenty-five fed with hay tetanus bacilli have been found in the fæces.

B—The calf is not included in the list of animals notably susceptible to tetanus, but, in order to learn the degree of immunity, one was injected on October 10th with 1 c.c. of tetanus toxine; on the 15th with 5; on the 21st with 10; on the 22d with 15; on the 23d with 20; on the 24th with 25; on the 25th with 35; and on the 28th with 45. The calf showed no evidence of being affected, and as it was conceivable that tetanus antitoxin had been produced by this method of injection another calf was given 55 c.c. in a single injection. This calf also was unaffected. A third calf was therefore injected with 100 c.c. of toxine, and two days later, with all the available store—670 c.c. The toxine used for this experiment was of such virulence that 1-500 c.c. would kill a guinea pig in forty-eight hours. This injection proved fatal within thirty hours. It may be regarded as proved, therefore, that calves are so insusceptible to tetanus that if this infection were present in the vaccine vesicles the calf would not present any symptoms to show it.

C—It has been said that if tetanus germs were contained in the glycerinated virus and the latter were placed in sealed glass capillary tubes the tetanus would increase in amount, on account of the anaerobic conditions. To test this assertion, two flasks of bouillon, diluted to the same extent as vaccine pulp is diluted, were taken. Into one was put bouillon diluted with three times its amount of water, and the whole covered with paraffin. Into the second, protected in the same way, was placed bouillon, diluted with three times the amount of 50 per cent. glycerine in water. Each flask was inoculated with 1-10 c.c. of tetanus culture incubated for three days. The culture in the flask containing bouillon and water grew luxuriantly, and tetanus was demonstrated by smears. In the second flask there was no growth, but the spores were still alive, as was shown by planting from the flask into a fresh tube of bouillon. It is clear, therefore, that a threefold dilution of 50 per cent. glycerine exercises an inhibiting influence on tetanus, even when the temperature is best adapted for growth.

D—It is of interest to know how easily tetanus germs deposited on vaccine virus before collection can be demonstrated in the material collected. A bouillon culture of tetanus, forty-eight hours old, was smeared on the vaccine vesicles of a calf (986), when they were ripe for collection. No cleansing was done. The vesicles were scarified and bone points charged from the issuing serum. These were planted in bouillon incubated under hydrogen, and tetanus germs found. The pulp was then curetted and similar anaerobic cultures made. Again tetanus was demonstrated. The pulp was mixed with glycerine and water in the usual ratio and a capillary tube of the emulsion was placed beneath the skin of each of two mice No symptoms of tetanus appeared in either. From the bases of the vesicles, after the pulp had been curetted, additional points were collected.

Cultures were made as before, and again tetanus wes demonstrated. These demonstrations were made from material collected after the tetanus had been added, before the vesicles had been cleansed. Another portion of the area on which the culture had been smeared was then washed as carefully as it would ordinarily be before collection of virus. Exactly similar collections of points and pulp were made again. First points from the surface of the pulp, then pulp, and finally points from the curetted bases of the vesicles were collected and tested by cultures as before for tetanus. All showed typical spore-bearing bacilli on smears from the culture. The pulp was then made into an emulsion and tested on two mice, as before, and, as before, the mice were unaffected. It became clear, therefore, in the first place, that bone points and glycerinated virus may alike carry tetanus; second, that the ordinary washing is not sufficient to remove tetanus germs when they are added in considerable amount, and third, that the animal is somewhat less delicate than the cultural test, at least to ordinary tetanus germs.

E—To learn how much tetanus must be present in vaccine virus to become easily evident on culture, varying amounts of forty-eight-hour tetanus culture were mixed with vaccine virus. One, two and three loopfuls of the culture were added, each amount to one c.c of vaccine virus. The mixture was stirred with a glass rod for five minutes and cultures were made, but no tetanus was found. Three mice were injected with the same mixtures and were unaffected. That a small amount of vaccine virus does not inhibit the development of tetanus is shown by the fact that when a loopful of tetanus culture was added to one, two or three loopfuls of vaccine virus and cultures were made from these mixtures abundant tetanus bacilli developed.

Six vials, each containing ½ c.c. of vaccine virus, then received successively one, two, three, four, five and six loopfuls of tetanus culture. A thorough mixture was made as before, and cultures were taken. Tetanus was found in the vial containing two loopfuls, but was missed in those containing one, three, four and five, and again found in that containing six loopfuls. The conclusion drawn is that in as thick and syrupy an emulsion as vaccine virus there can be little certainty of demonstrating tetanus by ordinary cultural methods unless there is as large an amount of tetanus present as would be expressed by at least six loopfuls of forty-eight-hour culture to ½ c.c. of virus.

F—To learn if tetanus germs applied with vaccine virus used as seed could be demonstrated after the interval of a week, points and pulp were collected from two calves (998 and 1018) so vaccinated. Calf 998 was vaccinated by scarifications and by incisions, calf 1018 only by scarifications. The points collected from the surface of the pulp and from the bases of the curetted vesicles, the superficial pulp and the deep pulp were all tested by cultures, and the pulp was tested also by injection in white mice. Smears made from the cultures showed typical tetanus bacilli in the points collected from the curetted scarifications of 998 and in the deep pulp collected from 1018. All the other cultures were negative and all the mice remained well.

G—To learn if tetanus germs applied as vaccine is usually applied is, or is not a favorable method of developing tetanus, five white rats, which are slightly susceptible to tetanus, and also notably to vaccinia, were vaccinated by scarification with vaccine virus mixed with an equal amount of tetanus culture. All failed to show any effect of the tetanus. Five more were then vaccinated in the same way with a mixture of equal parts of vaccine virus and tetanus toxine—and as before no animal showed any tetanic infection. Four white mice were vaccinated by scarification with a culture of tetanus and all died within forty-eight hours, and all with tetanic rigidity. Four guinea pigs were treated in the same way. Two died within three days, one in convulsions in four days, and one died in five days. Four more white rats were vaccinated with both tetanus culture and vaccine virus, and as before none were affected.

To learn the susceptibility of monkeys to tetanus, one Rhesus monkey was given a hypodermatic injection in the forearm of 1-10 c.c. of 48-hour tetanus culture in bouillon. In 24 hours the monkey could not open its mouth freely, and in less than 40 hours it was dead with the forearm and hand rigidly flexed. A second monkey was then given in similar manner an injection of 1-500 c.c. of tetanus culture. For five days there was marked and increasing rigidity of the flexed arm; after that time the condition improved, although there was some stiffness of the arm for a month. Susceptibility to tetanus having been thus demonstrated, a third Rhesus monkey was given a needle scarification about 1-8 inch in diameter on the left arm and 1-25 c. c. of a mixture of equal parts of glycerinated vaccine virus and tetanus was rubbed in. Three days later two drops of tetanus bouillon were rubbed under the scab. The vaccination was successful, but the monkey showed no evidence of tetanus. A fourth monkey was then vaccinated by scarification with glycerinated vaccine virus, and four days later the crust was removed and 1-30 c. c. of tetanus culture was rubbed into the open wound. The vaccination was successful, and no symptom of tetanus followed. A fifth monkey was scarified in nine spots, so that the epidermis was removed over a total area of about 1.7 square inches, and as much tetanus culture was rubbed in as the abrasions would take up. No symptom of tetanus followed.

The important conclusions may be summarized as follows:

1. The fæces of calves fed on hay may contain tetanus germs.

2. Tetanus germs do not develop in glycerinated virus.

3. If any form of vaccine virus, either dry points or tubes of glycerinated virus, is infected with tetanus, it may convey it.

4. Cultural tests for the presence of the tetanus germ are somewhat more certain than animal tests.

5. Inoculation by scarification is a possible method of inducing tetanus in susceptible animals.

6. It is probable that precaution against the issue of infected vaccine virus consists less in tests of the virus than in care taken during production, and especially in the cleanliness of the methods in use in the stable and in the Laboratory.

The vaccine virus at present used by the Health Department is entirely animal. It will doubtless be remembered that Galbiati began the use of bovine virus in 1803, in Naples, and that his successor, Negri, introduced the practice in Paris in 1864; that in 1870 animal vaccination was brought to this country, and that in 1876 it was adopted as the uniform practice of the Health Department of this city.

The reasons for the preference of animal virus to human virus are that with the former, first, there is less possibility of the communication of disease, especially of syphilis, and, second, it is not necessary to open, or in any way mutilate the vesicles on the arms of children, and, therefore, there is less possibility of a late infection occurring in them.

The animals used are calves. While goats, sheep, pigs, and several other animals are susceptible to vaccinia, and can furnish in an emergency a virus which will produce the typical disease in the human body, they are all inferior to calves and cows in the amount of virus, or the typical character of the vesicles produced, or in the ease with which they can be handled. With reference to the choice between calves and older animals of the same species, decision rests on the fact that the calves have a softer skin and the vaccine vesicles on them run a more typical course. The calves are chosen for their health and good quality of the skin; this means that they receive a careful examination before vaccination. After vaccination they are killed and their organs are examined for possible disease. If disease is found at their entrance into the laboratory, they are not vaccinated. If disease is found at autopsy the virus obtained from them is rejected.

The diseases that are considered of practical consequence are tuberculosis and skin disease, for although it has never been demonstrated that tuberculosis has been conveyed by vaccination, it is easy to avoid grounds for the suspicion that it may be. There have been reported from abroad some cases of skin disease which were thought to have been inoculated with virus coming from calves having skin disease. For safety's sake, therefore, only healthy calves are chosen.

The calves are females, so that the urine being discharged behind the animal the stall may be kept clean. After the animal is cleaned, and that means that the hair all over the body is clipped close with a machine clipper, that the skin is curried, brushed and washed, and that the hoofs are scrubbed, the animal is placed on a bench, on its side, with one hind leg fastened in a vertical position, and the skin over the posterior abdomen and on the inside of the thighs is shaved. This particular part of the skin is chosen because it is found by experiment that in no other part of the body are the vesicles so large and so typical.

The animal is then taken to a separate operating-room, which has a cement floor, glazed brick walls, and the same operating furniture that is found in a hospital operating-room. Here the calf is covered with towels, except that portion of the skin on which vaccination is to be made, and this portion is washed with soap and water and with alcohol. This is, of course, not a notably antiseptic preparation. It has been found that treating the skin so as to make it as nearly as possible aseptic, for it cannot be made by any means entirely aseptic, simply roughens the skin and makes dirt adhere to it more firmly during the week in which the part must be largely unprotected.

On this clean skin is then made a series of superficial incisions, about one-quarter of an inch apart, and covering the entire shaven area. Linear incisions are preferred to scarifications because with the former more typical vesicles result and a larger amount of virus is secured; they are preferable to punctures because the former yield more virus. The incisions in some cases draw blood enough to show a red line, in other cases they do not show red at all; they are made superficial because deep incisions are found to be more apt to become infected, and because they cause more pain to the animal. Into these incisions the seed virus is rubbed. This seed virus is either humanized virus collected by touching sterile pieces of bone to the serum exuding from ruptured vesicles on the arms of children, or, in the great majority of cases, bovine glycerinated virus, which has been preserved two months or longer. It has been found that fresh bovine virus when used as seed produces some sort of infection of the animal with consequent degeneration of the virus, whereas old virus is free from that objection.

No cover is placed over the vaccinated area, for although covers have been contrived, and although there has been much experimenting done in this direction in Germany, as well as in this country, nothing has been found which will stay in place satisfactorily, and in those exceptional cases in which a cover does maintain its place it is not found that the virus is any more free from extraneous substances than when the only cover is the natural crust.

The animals are well cared for and fed on milk, their temperature and general condition is watched closely, and usually on the sixth day after vaccination, sometimes on the fifth, rarely on the fourth, and rarely on the seventh, the virus is collected. For this purpose the calf is again placed on the table in the operating-room. The vaccinated area is cleaned and the vesicles, which have formed, are scraped from their beds with a sharp curette. This pulp is weighed and emulsified by passing it through a mill on which a mixture of 50 per cent. of glycerine and 50 per cent. of water flows. This proportion is chosen because pure glycerine has an antiseptic effect on the vaccine organism, while diluted glycerine does not injure the virus, but kills only the extraneous germs. The proportion of virus to glycerine and water is usually one to three. It is sometimes one to four, and sometimes one to five. Sometimes the pulp is found to be rather watery, and in that case less glycerine and water is necessary. Sometimes it is rather solid, and then more can be added. Proportions as small as one to ten or one to fifteen have still been found efficient, but as a rather dilute virus cannot be considered as certain in its action as a more concentrated one it has been thought wise to keep the percentage of virus in the emulsion high.

This emulsion is drawn into large glass storage tubes, which are sealed at each end by flame, and is preserved in these until needed for use. It is then poured from the tubes into vials, which are used when many persons are to be vaccinated at one time, or poured into small receptacles from which capillary tubes are filled when the vaccine is to be used for one person at a time.

Every lot of virus issued bears stamped on it the number of the calf from which it was taken and the date of collection. Before issue it is tested as to its efficiency by use on five previously unvaccinated children, and after issue watch over its efficiency is maintained by retests made at more or less regular intervals.

There is a second regular test of the virus which consists in making a plate culture on agar of the contents of one capillary tube of the glycerinated product. The colonies are examined under the microscope and their number estimated. It is always found that the fresh virus and the fresh emulsion contain large number of saprophytes. It is impossible by any means yet discovered to get fresh virus without these organisms, but the great majority of them die out in the glycerine emulsion in the course of a few weeks. Some persistent ones may last one or two, or even three or four months, but they are non-pathogenic.

A third regular test is the introduction of the contents of one capillary tube beneath the skin of a white mouse.

If unusual colonies are observed in the plate culture or if there is any pathogenic effect evident in the mouse, the virus is kept for further study and not issued for general use.

Respectfully submitted,

JOHN H. HUDDLESTON,
Assistant Director Vaccine Laboratory.

Department of Health—City of New York.
Southwest Cor. 55th Street and 6th Avenue, Borough of Manhattan,
New York, December 7, 1903.

Dr. Hermann M. Biggs, *Medical Officer :*

Sir—I have the honor to submit the following articles, which embrace the completed work of the bacteriologists at the Research Laboratory for the year 1902.

Respectfully,

WM. H. PARK,
Assistant Director, Research Laboratory.

I.

Infant Feeding.

REPORT UPON THE RESULTS WITH DIFFERENT KINDS OF PURE AND IMPURE MILK IN INFANT FEEDING IN TENEMENT HOUSES AND INSTITUTIONS IN NEW YORK CITY:

A CLINICAL AND BACTERIOLOGICAL STUDY.

By Wm. H. PARK, M. D., Assistant Director of the Research Laboratory, and L. EMMETT HOLT, M. D., of New York.

This investigation was aided by a grant of money from the Rockefeller Institute for Medical Research.

The work, of which the following is a report, is a part of an investigation into the production, transportation and feeding of cow's milk in New York City, which was undertaken in the summer of 1901, and which was extended over two years. The entire investigation contemplated an inquiry into the condition of farms such as were supplying milk to New York, the transportation of milk, its condition on delivery and its effect upon the children in tenement houses and institutions.

Observations upon the results of feeding cow's milk to healthy infants in tenement houses were determined upon, since in this way it was believed we could best study the problem under the conditions actually existing, and also avoid those influences met with in institutions, which in themselves are so deleterious to infants. For comparison, however, a number of institutions were carefully studied during the summer of 1901.

The purpose of this investigation was to gather some facts upon the following points: (1) To make a comparison of the results of infant feeding in tenements in winter and summer; (2) to determine how far such results were affected by the character of the milk used, especially its original bacterial content, its preparation, and whether it was fed after heating or raw; (3) to see to what extent results were modified by other factors, such as the care the infants received and the surroundings in which they lived.

The clinical observations contained in this report were made by the following persons, who were aided by a grant of money from the Rockefeller Institute: Drs. Eli Long, Mary E. Goodwin, Jane Berry, Alma Vedin, Mary Willets and Marie Grund. During the first season, J. S. Mabey was aided by the Institute, but during the second by Mr. Straus. There assisted in the work as volunteers, Drs. J. Sobel, Angenette Parry and Ford. Dr. Sobel reported for two seasons on a group of babies fed from the Good Samaritan Dispensary. To all of these workers the greatest credit is due for the thorough and conscientious way in which they did their work. They were most earnest and painstaking in obtaining as far as possible the facts desired, and much of the value of this report is due to their efforts. The bacteriological investigations were for the most part carried out in the Research Laboratory of the Health Department; but also, to a considerable extent, in the Carnegie Laboratory of the New York University. Drs. Letchworth Smith, Mary E. Goodwin, Katherine R. Collins and Rose A. Bebb carried out this portion of the work.

Observations were made during the summer of 1901, the winter of 1901-2, and the summer of 1902; during each of these seasons the different groups of infants were followed for an average period of about ten weeks. A considerable number were unavoidably lost sight of owing to removal with failure to leave address, and various other causes; but all others who could be kept under observation are included in the report. Excluding all imperfect records and those cases that were observed too short a time to admit of any deductions, there remain 632, of which 98 were observed during the summer of 1901; 211 in the winter of 1901-2; 278 in the summer of 1902, and 45 in the summer of 1903. This special group of 45 is included, although the observations were made after the general investigation had closed.

The plan of investigation was that each of the workers should have a group of children, never more than 50, under personal observation. So far as possible the children were kept under the same general conditions as before. The weights were taken with great care by the physicians, at regular intervals in most cases. Nearly all of the infants were observed in their homes, to which regular visits were made twice a week for the entire period. One group of about 50 was observed by Dr. Sobel at the Good Samaritan Dispensary, to which mothers came daily for the milk for their infants. When necessary one of his assistants went to their homes. In all cases advice was given in regard to matters of hygiene and the general care of the children. It was customary to stop the milk temporarily, whenever acute disturbances of digestion existed.

Bacteriological Investigation of the Milk Used in Feeding—The clinical work was carried on in conjunction with a bacteriological study of the milk used, in order to determine whether any relationship existed between the number and character of the micro-organisms in milk, and the amount of diarrheal disease in the children to whom it was fed. Bacterial counts were made once or twice a week from the milk as given to each child, specimens being taken at times from the raw and at times from the heated milk.

The bacteria were isolated from the milk through plating in a two-per-cent. lactose-litmus-nutrient-gelatin, or agar, and later grown upon the usual identification media. The pathogenic properties of the different bacteria were tested by intraperitoneal and subcutaneous inoculation in guinea pigs with 2 c.c. of a forty-eight-hour broth culture, and by feeding young kittens for several days with 3 to 6 c.c. daily of a twenty-four-hour broth culture by means of a medicine dropper.

With the characteristics of the bacteria thus determined, they were then separated into classes, following as nearly as possible the lines suggested in Chester's Manual of Determinative Bacteriology. Further attempt was then made to identify as many as possible of the varieties with those previously described, using the descriptions of Chester and Migula. With a great many this proved unsatisfactory or impossible because of the incomplete descriptions of literature or the lack of all description.

The varieties isolated represent only the species presenting greatest number in the milk examined, for in no case was more than 0.01 c.c. of a milk, and in most highly contaminated milks, only 0.001 c.c. used in making a plate, and varieties which occurred in too small numbers to be present in this quantity would necessarily be missed. For the purposes of this article it is not considered desirable to burden the reader with the enumeration of the varieties of bacteria found in the different samples of milk and their characteristics. Only a brief summary of the results will be given.

From the milks altogether 239 varieties of bacteria were isolated and studies. These 239 varieties, having some cultural or other differences, were divided into the 31 classes, each class containing from 1 to 39 more or less closely related organisms.

As to the sources of bacteria found in milk, we made sufficient experiments to satisfy us that they came chiefly from outside the udder and milk ducts.

Bacteria were isolated from various materials which under certain conditions might be sources of contamination for the milk, and the cultures compared with those taken from milk. Thus there were obtained from 20 specimens of hay and grass, 31 varieties of bacteria, from 15 specimens of feces, manure and intestinal contents, 28 varieties; from 10 specimens of feed, 17 varieties. Of these 76 varieties there were 26 which resembled closely those from milk, viz., 11 from grass or hay; 26 from manure; 5 from feed.

During the investigation a number of the varieties isolated from milk were shown to be identical with types commonly found in water.

From the few facts quoted above and from many other observations made during the course of the work, it would seem that the term "milk bacteria" assumes a condition which does not exist in fact. The expression would seem to indicate that a few varieties, especially those derived in some way from the cow, are commonly found in milk, which forms having entered the milk while still in the udder, or after its withdrawal, are so well fitted to develop in milk that they overgrow all other varieties.

As a matter of fact, it was found that milk taken from a number of cows, in which almost no outside contamination had occurred, and plated immediately, contained, as a rule, very few bacteria, and these were streptococci, staphylococci and other varieties of bacteria not often found in milk sold in New York City; the temperature at which milk is kept being less suitable for them than for the bacteria which fall into the milk from dust, manure, etc. A number of specimens of fairly fresh market milk averaging 200,000 bacteria per c.c. were examined immediately, and again after twelve to twenty-four hours. In almost every test the three or four predominant varieties of the fresher milk remained as the predominant varieties after the period mentioned.

The above experiments seem to show that organisms which have gained a good percentage in the ordinary commercial milk at time of sale will be likely to hold the same relative place for as long a period as milk is ordinarily kept. After the bacteria pass the 10 or 20 million mark, a change occurs, since the increasing acidity inhibits the growth of some forms before it does that of others. Thus some varieties of the lactic acid bacteria can increase until the acidity is twice as great as that which inhibits the growth of streptococci. Before milk reaches the curdling point, the bacteria have usually reached over a billion to each c.c. For the most part specimens of milk from different localities showed a difference in the character of the bacteria present in the same way that the bacteria from hay, feed, etc., varied. Even the intestinal contents of cows, the bacteriology of which might be expected to show common characteristics, contained besides the predominating colon types, other organisms which differed widely in different species and in different localities. Cleanliness in handling the milk and the temperature at which it had been kept were also found to have had a marked influence on the predominant varieties of bacteria present.

Pathogenic Properties of the Bacteria Isolated—Intraperitoneal injection of 2 c.c. of broth or milk cultures of about 40 per cent. of the varieties tested, caused death. Cultures of most of the remainder produced no apparent deleterious effects even when injected in larger amounts. The filtrates of broth cultures of a number of varieties were tested, but only one was obtained in which poisonous products were abundantly present. Death in guinea pigs weighing 300 grams followed within fifteen minutes after an injection of 2 c.c.; 1 c.c. had little effect.

As bacteria in milk are swallowed and not injected under the skin, it seemed wise to test the effect of feeding them to very young animals. We therefore fed forty-eight hour cultures of 139 varieties of bacteria to kittens of two to ten days of age, by means of a glass tube. The kittens received 5 to 10 c.c. daily for from three to seven days. Only one culture produced illness or death. A full report on the identification of the varieties of bacteria met with in this investigation can be found in an article by Dr. Smith in the 1902 Annual Report of the Department of Health.

After two years of effort to discover some relation between special varieties of bacteria found in city milk and the health of children, the conclusion has been reached that neither through animal tests nor the isolation from the milk of sick infants have we been able to establish such a relation. Pasteurized or "sterilized" milk is rarely kept in New York longer than thirty-six hours, so that varieties of bacteria which after long standing develop in such milk did not enter into our problem. The harmlessness of cultures given to healthy young kittens does not of course prove that they would be equally harmless in infants. Even if harmless in robust infants, they might be injurious when summer heat and previous disease had lowered the resistance and the digestive power of the subjects.

This failure to discover definite pathogenic bacteria, as well as the numerous varieties of bacteria met with, have forced us to rely on the clinical observation of infants to note what difference, if any, occurred in those fed on raw and Pasteurized milk from the same source, and upon different milks of unknown origin varying in the number of bacteria contained. In the following pages, observations upon food are combined with those upon other factors which influenced the health of the infants.

Selection of the Children for Observation—The original aim was to include only infants who were entirely bottle-fed, but it was found that the great majority of all infants in the tenements receive during the first six months occasional breast feedings at night, and nearly all are given some solid food after they are six months old, or as soon as they are able to hold it in their hands. The purpose of the investigation being to obtain relative results with different forms of milk and not absolute results with one form, it is believed that the conclusions reached are not affected by the fact that many of the infants received breast feeding at night. Indeed including such infants has the advantage of studying representatives of a very large class. In each season some infants who were entirely breast-fed were observed for purposes of comparison.

In selecting the children the only conditions made were that they should not be ill or suffering from marasmus when observations were begun, and that they should be of suitable age. Of the entire number 340 were six months old or under, 265 were from seven to twelve months; 47 were a little over twelve months. With the exceptions stated, every child available was included by the physicians until the proper number was made up. The district in which most of the children live was the lower east side of New York, as densely populated as any part of Manhattan Island.

An unexpected difficulty was encountered in beginning the investigation in the scarcity of bottle-fed infants in the region where the families were selectd. One of the physicians reported that in a densely populated neighborhood where every street was swarming with children, hardly half a dozen bottle-fed infants could be found on a block. While this may not have been true of the entire district, it was the observation of all the workers that the proportion of bottle-fed infants in tenement houses was surprisingly small. This is a very different impression from what one gains from visiting dispensaries where great numbers of bottle-fed infants are seen. But the dispensaries draw patients from very large districts and gather the cases that are not doing well, so that the aggregate seems very large. This excess in proportion of the bottle-fed infants at the dispensaries over that in the houses is in itself striking testimony to the advantages of breast feeding.

The Character of the Food Employed—It was at first intended to make no change in the food the child was receiving, but it was found necessary in order that observations might also be made upon the comparative effects of heated and unheated milk in summer to place a number of infants upon a modified raw milk provided for them, which was a part of a larger supply distributed to others after Pasteurization. This was rendered all the more necessary since it was discovered that during the summer the sterilization of milk in some form was almost universally practiced in the tenements of New York. In the summer of 1902 especially, it was rare to find an infant fed upon raw milk; an incidental testimony to the value of the praiseworthy efforts of the Health Department, and the agitation in the public press in favor of clean milk and the necessity for sterilization in hot weather. When gastro-intestinal disturbance of any severity developed, the infants were deprived of milk for a day or two and put on barley water or other suitable food.

In the district where the observations were made the following forms of milk were extensively used: (1) Condensed milk; (2) milk purchased at small stores with groceries and other provisions and known as "store milk;" (3) bottled milk; (4) milk from central distributing stations, chiefly from the Strauss milk depots and Good Samaritan Dispensary.

Condensed Milk.—That used was usually burned in cans, *i. e.*, the sweetened variety; seldom were the best brands purchased. It was generally prepared at each feeding by adding hot water which, in most cases, had been boiled.

Store Milk.—This is the poorest grade of milk sold in New York, but varies at the different stores. It is kept in large cans in the small stores and is sold to customers at an average price of four cents a quart. It averages about 3.75 per cent. of fat. It is customary for milk to be purchased twice a day, and it is carried home and kept in pails or pitchers. In summer it is usually heated at once; if it curdles, it is considered to be unfit for use and is returned. During the hot days of the summer of 1901 it frequently happened that milk obtained from two or three consecutive stores would curdle. Heating is usually done in a saucepan and the temperature is raised to a point where the milk begins to "foam," seldom to a boiling point. In most cases it is kept upon ice. It is usually prepared for the infant at each time of feeding. The only modification practiced is, in most cases, dilution with water or barley water, equal parts being, as a rule, given when infants are about three months old and continued until ten or eleven months, when whole milk is given. The bacteriological examination made of this milk during the summer of 1901 showed it to contain from 4,000,000 to 200,000,000 micro-organisms, an average of about 20,000,000 per c.c.. The form of heating employed killed, it was found, about 95 to 99 per cent. of the bacteria present. In the summer of 1902, owing partly to the cooler season, but chiefly to the new regulations of the Health Department regarding the care and sale of milk, the average was about 3,000,000 per c.c. During the winter the number of bacteria ranged from 100,000 to 5,000,000 bacteria per c.c., and averaged about 400,000 per c.c.

Bottled Milk.—The greater part of the bottled milk used in these tenements was handled by one of the largest dealers in the city. This milk was produced under conditions which were only fairly good. However, it was so well handled during transportation and delivery that it was nearly always in good condition when received by the consumer. This milk averaged about 500,000 bacteria per c.c. It was sold in covered jars at eight cents a quart. The same general plan of modification was practised as with the store milk, and it was also in summer heated and usually in about the same way. As the people who purchased this were not so poor as those using store milk, they were more likely to use ice for keeping it.

Besides this bottled milk, some special milk from the Walker-Gordon and Briarcliff Farms was furnished gratuitously to a limited number of cases for the sake of comparison, but this was not widely enough used to admit of drawing conclusions sufficiently definite to be expressed in figures. This milk averaged about 10,000 bacteria per c.c.

Milk from Central Distributing Stations.—The greater part of this milk was supplied from the Straus Milk Depots, of which there are a number scattered through the city, and from the diet kitchen of the Good Samaritan Dispensary, a small quantity from other diet kitchens. The milk used at these places was generally of excellent quality, usually from an "inspected" or "certified" farm.

but it was mixed with poor cream. It was furnished gratis to those too poor to pay, and at a small charge, usually one cent a bottle, to others. This milk after the addition of cream averaged before Pasteurization nearly 2,000,000 bacteria per c.c.; after Pasteurization, about 500 per c.c.; after boiling, about 5 per c.c. It is supplied in small bottles, each one containing the quantity for a single feeding. The bottles are washed and sterilized at the central stations. The Straus milk was generally Pasteurized; that from the Good Samaritan Dispensary was boiled. With both some attempt at modification was made, three or four standard formulas being used. The common modification consisted in the dilution with boiled water, the addition of lime water, milk sugar, and, in some cases, cream also; or the dilution with barley water and the addition of cane sugar. Regarding the use of these formulas, the quantity for one feeding, and the number of feedings daily, directions were usually given by the physicians in attendance at the Central Stations. As the mothers came daily for their milk, some constant supervision of the cases was thus possible, and many minor disturbances of digestion no doubt controlled by a proper variation in the food.

Infant Foods.—It was a surprise that the proprietary foods were so little used in the tenements, the expense being apparently the chief reason. Although they were given to a number of children observed, they were seldom used for a long time, or as the sole diet, and certainly cut no figure in the results. We have therefore not classified these cases separately.

Breast Feeding.—As already stated, the great majority of infants reared in tenements are breast-fed, at least for the first six months. No effort was made to collect many observations upon these children, but a few were introduced for the sake of comparison. It was thought at first to make a separate division of the children who were partly breast-fed, as it was the impression of some of the physicians who followed the cases that a decided difference existed between those who were partly nursed, usually at night, and those entirely fed. However, the general figures when tabulated did not show any very marked difference. The results seem to have depended rather upon the character of the other food.

In estimating the results obtained by the different methods of feeding two things were considered: first, the gain or loss in weight, and, secondly, the amount of digestive disturbance, particularly diarrhea, which occurred in the different groups of infants. The cases have been divided according to results in four groups: (1) Those which did well. In this group are included the infants who made a substantial and generally a regular gain in weight during the period of observation. this usually amounting to from two to five pounds for the ten or twelve weeks, and those that had no diarrhea worth mentioning—usually both conditions existed together. (2) Those which did fairly, including those in which some diarrheal disturbance was present but not of a serious or prolonged character, and in which the weight was either stationary or the gain very slight. Both these generally went together. (3) Those which did badly, including those in which considerable digestive disturbance, usually diarrhea, was present, or in which there was a loss in weight; generally here also both factors existed. (4) The fatal cases.

The following tables show in a condensed form the results obtained with the different foods employed in winter and in summer.

Table I.—Food and Results—Winter.

	Did Well.	Did Fairly.	Did Badly.	Died.	Totals.
Store milk	47	6	2	..	55
Condensed milk	39	5	2	2	48
Good bottled milk	51	13	1	3	68
Milk from Central Distribution stations	35	20	4	..	59
Best bottled milk	5	..	1	..	6
Breast feeding	7	1	..	1	9
Totals, excluding cases counted twice	156	41	8	6	211

Table II.—Food and Results—Summer.

	Did Well.	Did Fairly.	Did Badly.	Died.	Totals.
Store milk	21	23	20	15	79
Condensed milk	22	20	14	14	79
Good bottled milk	37	23	29	9	98
Milk from Central Distributing stations	84	33	24	4	145
Best bottled milk	9	3	..	..	12
Breast feeding	17	7	7	..	31
Totals, excluding cases counted twice	184	108	88	41	421

Season and Results—Nothing could be more striking than the contrast between the results in winter and in summer. The general summary shows that of the 211 winter cases, 156 did well; 41 did fairly, 8 did badly and 6 died. In other words, what might be considered good results were shown in 93 per cent. of the cases, and bad results only in 7 per cent. Furthermore, in only one of the six deaths was the cause connected with the digestive tract.

Of the 421 summer cases, 184 did well, 108 did fairly, 88 did badly and 41 died. In other words, good results were obtained in 69 per cent. of the cases and bad results in 31 per cent., while in nearly all of the fatal cases death was due to diarrheal diseases. It should be remembered that all children both winter and summer had the advantage of some continuous intelligent oversight, usually one visit a week and often two being made by the physicians. This supervision contributed in no small degree to the results in both groups of cases.

The difference in results in the summers of 1901 and 1902 was not great; the percentage of bad results in 1901 being 37; in 1902, 35. This may have been due to the slightly cooler season of 1902, or the better general quality of the city's milk. The proportion of children on the different varieties of milk varied somewhat in the two years, so that a strict comparison is difficult.

The showing made by the winter cases is most gratifying and was indeed a surprise to all. So large a percentage of good results by all methods of feeding, and apparently so little difference between them was not expected. Artificial feeding in the tenements in winter would seem to be comparatively a simple problem.

To what shall be ascribed the great difference between summer and winter results? There seem to be many factors, but a consideration of the facts accumulated indicate that heat is the primary factor and bacteria and their products a secondary one, except when the contamination is extreme or pathogenic organisms are present.

The effect of continued heat upon the health of infants is shown in the number of cases of diarrheal diseases and the number of deaths during the months of the summer of 1901 in an institution in the country near New York City, where a fairly pure milk was fed raw. During the winter and spring there was almost no dirrhea; with the warm weather of June it increased, reaching its highest point in August. The comparative results with the breast and bottle-fed infants are also evident.

Month.	No. of Infants.	Food.	Deaths.
June	34	Breast milk	..
	25	Cows' milk	..
	38	Breast and cows' milk	..
	128*	Milk and barley food	..
Total	225		

Number of cases of diarrhea, 15; deaths, 0.

* Those on milk and barley food were all over twelve months old.

Month.	No. of Infants.	Food.	Deaths.
July	32	Breast milk	..
	20	Cows' milk	3
	38	Breast and cows' milk	..
	124*	Milk and barley food	..
Total	214		

Cases of diarrhea, 38 ; total deaths, 3 (all bottle-fed).

Month.	No. of Infants.	Food.	Deaths.
August	28	Breast milk	..
	18	Cows' milk	3
	32	Breast and cows' milk	4
	129*	Milk and barley food	2
Total	207		

Cases of diarrhea, 50 ; total deaths, 9.

* Those on milk and barley food were all over twelve months old.

Food and Results—(1) Store Milk—The largest number of bad results were seen, as was expected, with the cheap store milk, where not only was the milk poorer, but the care at home less. The winter observations upon this milk included 55 cases in about half of which some method of partial sterilization was employed; in the remainder it was given raw. Of these 55 infants, 47 did well; 6 did fairly; only 2 did badly and none died. Combining those who did well and those who did fairly, we have what may be considered good results in 96 per cent. of the cases, and bad results in only 4 per cent. There was little apparent difference in results between those taking raw and those taking heated milk.

Store milk was the food of 79 of the summer cases. Of these 21 did well; 23 did fairly; 20 did badly and 15 died; in other words, good results in 56 per cent. of the cases, and bad results in 44 per cent. In nearly all of these cases the milk was heated in some way before feeding; usually it was raised nearly to the boiling point. This had the effect, it was found, of killing about 99 per cent. of the micro-organisms present, but the milk still contained after such heating between 5,000 and 500,000 bacteria to the c.c. An interesting point of tolerance of such milk was noticed in many cases. A number of infants living in bad surroundings, yet who received fairly good care, took only cheap store milk and yet remained well throughout the entire summer. During 1901 some of the store milk was very bad, averaging on hot days over 100,000,000 bacteria per c.c.

(2) Condensed Milk—There were 48 winter observations upon infants taking condensed milk; 39 children did well, 5 did fairly, 2 badly, and 2 died, *i. e.*, good results were seen in 92 per cent. and bad results in 8 per cent. of the cases.

There were 70 summer observations made upon infants taking condensed milk. Only 22 of these children did well, 20 did fairly, 14 badly, and 14 died; or 60 per cent. good results and 40 per cent. bad results.

The results with condensed milk can hardly be attributed to the bacteria, inasmuch as it was almost invariably prepared with boiled water and contained relatively a small number of micro-organisms before heating. These children were often apparently in good condition until attacked with acute disease, when they offered but little resistance and seemed to succumb more quickly than any other class of patients. In one family three healthy infants, triplets, five months old, were taken sick on the same day with vomiting and diarrhea; one died within twenty-four hours, one within two days, and the third within a week. A bacteriological examination of the prepared milk remaining in one bottle showed nothing noteworthy.

(3) Bottled Milk—The better results observed with bottled milk should not be put down as entirely due to the character of the food. The people who purchased it were seldom so poor as those buying store milk; they were usually more intelligent and probably more careful in handling the milk. Often they had ice.

There were 68 winter observations on children fed upon bottled milk; of these 51 did well, 13 fairly, only 1 did badly, and 3 died. None of these deaths were due to intestinal disease. In other words, there were good results in 94 per cent. of the cases, and bad results in 6 per cent.

There were 98 summer observations upon infants fed on bottled milk; of these 37 did well, 23 fairly, 29 did badly, and 9 died. In other words, 61 per cent. of good results and 39 per cent. bad results. In these quite a number received the milk raw, but as in the other observations, as soon as any illness occurred, some form of attempt at sterilization was almost invariably practiced.

It is interesting to compare these results with those seen with store milk just above them in the table. The percentage mortality with the better grade of milk is only about one-half that seen with either condensed or store milk, and yet the large number of infants who did badly brings the proportion of bad results with bottled milk almost up to that with the two preceding varieties. It was noteworthy, however, that among infants included as doing badly there was on the average less sickness than among those fed on store milk. It would seem, therefore, that good bottled milk as now used, while much less dangerous to life than cheap store milk, is still, judging by this proportion of failures, rather unsuccessful as a method of feeding.

(4) Milk from Central Distributing Stations—There were 59 winter observations upon these patients, of which 35 did well, 20 fairly, 4 did badly, and none died. In other words, good results in 93 per cent. of cases and bad results in 7 per cent.

There were 145 summer observations upon infants fed in this way; of these 84 did well, 33 did fairly, 24 did badly, and 4 died. In other words, 81 per cent. of good results, and 19 per cent. bad results. In about one-half of these cases the milk was Pasteurized; in the remainder, with the exception of a group of 42 cases to be mentioned later, in which the milk was given raw, the milk was sterilized.

The great difference between these results and those obtained with the three forms of feeding already considered deserves special attention. The original milk used at the stations was of good quality, but not much better than the bottled milk generally used; with both some form of sterilization was practiced. The difference in results is not explained by the difference in these two factors. There were others of importance which must be sought. A certain amount of constant supervision was exercised over these infants, as some one, usually the mother, came daily to the milk dispensary for the food. Changes could thus be readily made in the milk according to the child's condition. If symptoms of slight indigestion were present, the mother was nstructed to dilute the milk; with more severe symptoms, milk was temporarily stopped, etc. This supervision seems to us of the greatest value and can hardly be secured so well in any other way. Again, a mother sufficiently interested in her baby to come or send daily several blocks for the milk is generally one who values what she receives and also the advice which goes with it. This food, obtained in separate bottles for each feeding, is generally regarded by the tenement population as not exactly milk but as something very special, and therefore entitled to much more consideration than any form of food which they could prepare themselves at home.

Another point of importance is that some systematic attempt at milk modification was made in the milk furnished from central stations. Although this could not be done as accurately as for a smaller number of patients, the results were certainly improved by it. Again what contributed in no small degree to success with this plan of feeding, was that this milk was supplied in separate bottles for each feeding, that the quantity for one feeding was suitable for the child, and that only a proper number of feedings for the twenty-four hours was dispensed at one time. There was not, therefore, the temptation to over-feeding and too frequent feeding, which with other methods are so generally practiced. Finally, the bottles in which it was kept were always properly cleansed, and sterilized, since this was attended to at the central station.

(5) Best Bottled Milk—This was furnished to 18 infants living in the tenements, to discover whether any perceptible difference existed between the results with this milk and the other varieties. While these observations are not numerous enough to admit of any generalizations, they indicate what was previously believed, that, with the cleanest milk from the best cared-for cattle, the smallest number of bad results occurred.

There were 12 infants placed upon this milk in summer; of these 9 did well, 3 fairly; there were none who did badly and no deaths. There were 6 infants upon this milk in winter, of whom 5 did well and 1 did badly.

The difference between very bad, highly contaminated milk, like that purchased at some of the small stores previous to 1902 and the best bottled milk, was in some cases very striking. Protracted diarrhea in infants who were taking store milk was often immediately improved and in several cases promptly cured by simply substituting clean milk, after an interval of no milk, for the previous food. In some severe cases, however, no improvement followed the purer milk.

Age and Results—In 17 cases the ages were not recorded. Of the summer cases 217 were infants under six months; 191 were between six and twelve months, and 47 were over twelve months. The comparative results for the different ages are shown in the following table:

Table III.—Age and Results—Summer.

Age.	Did Well.	Did Fairly.	Did Badly.	Died.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Under 6 months	52	16	19	13
7 to 12 months	34	32	26	8
Over 12 months	49	32	19	..

Of the winter cases 123 were infants under six months, and 74 from seven to twelve months; none was over twelve months.

Table IV.—Age and Results—Winter.

Age.	Did Well.	Did Fairly.	Did Badly.	Died.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Under 6 months	74	21	..	5
7 to 12 months	70	20	10	..
Over 12 months	..	..	..	..

These figures indicate a considerably higher mortality in infants under six months, but a surprisingly large proportion of infants over this age who did badly. In summer, other factors than the milk used must be taken into account, one of the most important being the unwise giving of table food to infants over six months old, a practice which is almost universal in the tenement population. Giving fruits even to infants is also an important cause of illness. This was strikingly seen among the Italians. In this class of the population it was the opinion of some of the physicians who observed these cases that the use of fruit, often unripe, stale or partly decayed, was the cause of more illness in infants and young children than the impure milk.

A separate study has been made of these cases which did badly, and the fatal cases, to determine any other factors beside the food and age which contributed to the results. An attempt was made to discover what sort of care these infants received, what their surroundings were, and whether the results in feeding were due to conditions or diseases entirely outside the digestive tract.

Cases Doing Badly—There were 96 infants who did badly, *i.e.*, they lost weight during the period of observation and had more or less disease of the digestive tract. Eighty-eight of these were summer cases and 8 were winter cases. The previous condition of this group of infants does not throw any special light upon results. This is noted in 86 of the 96 cases. In 52 the previous condition was put down as "good," and in 30 as "not good." It should be remembered that no infants previously in bad condition were included in the observations. The proportion of "good" and "not good" is about the same as in the children taken as a whole.

Care—In the 88 summer cases this was not stated in 14; 30 were reported as receiving good care, 20 as having fair care, while 24 were positively neglected. The importance of the care the children received, as affecting the results of infant feeding, cannot be expressed in figures. What is included here as neglect was often of the grossest kind. As for example, where a mother was away all day at work and the infant left in charge of some old man, or irresponsible child, and where the visitor found bottles dirty, nipples rolling about the floor, sour milk in the feeding bottles, etc. It was practically the unanimous opinion of the physicians who made the observations that intelligent care had more to do with the results of feeding than any other factor. Many individual instances were reported of infants living under the worst surroundings and whose food was a very inferior kind of milk, and yet if the mother was intelligent and the infant well cared for, it throve in spite of the unfavorable conditions. On the other hand, if the infant had no proper care it made little difference how good the milk furnished might be, the results were usually bad. One case will serve as an illustration. An Italian child two months old, who had an intelligent, careful mother, did well for the entire summer on store milk. The following winter the mother was ill for a long time, during which time the child ran down steadily in spite of the fact that it was older and the weather was cold.

Surroundings—While surroundings had a distinct influence upon the results in feeding, they were decidedly of less importance than the care. Since all these infants lived in tenements none could be said to have good surroundings. They were fair in 40 of the summer cases; distinctly bad in 33; in 15 they were not noted. Of the 8 winter cases, 7 had fairly good surroundings. By bad surroundings are meant very crowded apartments, rear tenements or basements. Many infants living in such places were rarely taken into the open air. Where the mothers availed themselves of the opportunities offered for day excursions upon the water, and such fresh air as even the crowded city afforded, a distinct improvement was seen in the condition of the children.

Diarrheal Diseases and Other Forms of Acute Illness—The number of days of diarrhea indicates pretty well the nature of the symptoms from which these infants chiefly suffered. Of the 88 cases which did badly, only 3 had no diarrhea; 19 had diarrhea lasting from one to seven days; 19, diarrhea from eight to fourteen days; 47, dirrhea of more than two weeks' duration. Other complications were present in 11 cases; bronchitis in 5; pertussis in 2; otitis in 1, and pneumonia in 3 cases. Of the 8 winter cases which did badly, none had diarrhea, but three had other complications, viz., one had measles, one bronchitis, and one pertussis.

Fatal Cases—Of the 632 children observed, 47, or 7.5 per cent., died during the three months of observation. The mortality of the 211 winter cases was 2.8 per cent.; of the 421 summer cases, 11.3 per cent. Of infants under one year, neither in the age nor the previous conditions do we find any sufficient explanation of the fatal result. In the 47 observed who were over one year, no deaths occurred. The care which the fatal cases received is significant. Only 16 of the 47 infants who died received good care, and 19 were recorded as positively neglected. In 21 of the cases the surroundings were bad. The causes of death in the fatal cases were as follows:

Disease.	Summer.	Winter.
Diarrheal diseases	32	1
Pneumonia	5	2
Tuberculosis	2	..
Rickets	1	..
Diphtheria	1	..
Marasmus	..	1
Accident	..	1
Unknown	..	1
	41	6

The winter case having diarrhea was fed upon good bottled milk sterilized, and had gastric as well as intestinal symptoms. The marasmus case was a child fed upon condensed milk. In only two of the winter deaths could the result be definitely connected with the feeding, while in summer this was true of 30 of the cases.

Heated Milk vs. Raw Milk for Infants—During each of the summers of 1902 and 1903 a special lot of milk was modified at one of the Straus depots for a group of 50 infants, all of whom were under nine months of age, and distributed daily in the usual way. To one-half the infants the milk was given raw; to the other half, Pasteurized.

The modified milk was made from a fairly pure milk mixed with ordinary cream. The bacteria contained in the milk numbered on the average 45,000 per c.c., in the cream 30,000,000. The modified raw milk taken from the bottles in the morning averaged 1,200,000 bacteria per c.c.; the Pasteurized, about 1,000; taken in the late afternoon of the same day, they had respectively about 20,000,000 and 50,000.

Twenty-one predominant varieties of bacteria were isolated from six specimens of this milk collected on different days. The varieties represented the types of bacteria frequently found in milk. The infants were selected during the first week in June, and at first all were placed on Pasteurized milk. The 50 infants which had been selected were now separated into two groups as nearly alike as possible. On June 15, the milk was distributed without heating to one-half the infants, the other half receiving as before the heated milk. In this way the infants in the two groups received milk of identically the same quality, except for the changes produced by heating to 165 degrees F. for thirty minutes. The infants were observed carefully for three months and medical advice was given when necessary. When severe diarrhea occurred barley water was substituted for milk.

The first season's trial gave the following results: Within one week 20 out of the 27 infants put on the raw milk suffered from moderate or severe diarrhea; while during the same time only 5 cases of moderate, and none of severe diarrhea occurred in those taking Pasteurized milk. Within a month 8 of the 27 had to be changed from raw back to heated milk, because of their continued illness; 7, or 25 per cent., did well all summer on raw milk. On the other hand, of those receiving the Pasteurized milk, 75 per cent. remained well, or nearly so, all summer, while 25 per cent. had one or more attacks of severe diarrhea. There were no deaths in either group of cases.

During the second summer a similar test was made with 45 infants. Twenty-four were put on raw modified milk; 13 of these had serious diarrhea, in 5 of whom it was so severe that they were put back upon heated milk; 10 took raw milk all summer without bad effects; 2 died, 1 from gross neglect on the part of the mother, the other from diarrhea. Of the 21 on Pasteurized milk, 5 had severe attacks of diarrhea, but all were kept on this milk except for short periods, when all food was omitted; 16 did well throughout the summer. One infant, markedly rachitic, died.

The outcome of these observations during the two summers are summarized in the following table:

Kind of Milk.	Number of Infants.	Remained well for entire summer.	Number having Severe or Moderate Diarrhea.	Average Number Days of Milk During Summer.	Average Weekly Gain in Weight.	Average Number days Diarrhea.	Deaths.
Pasteurized milk, 1,000 to 50,000 bacteria per c.c.	41	31	10	3	4 oz.	3.9	1
Raw milk, 1,200,000 to 20,000,000 bacteria per c.c.	51*	17	34	5.5	3.5 oz.	11.5	2

* Thirteen of the 51 infants on raw milk were transferred before the end of the trial to Pasteurized milk because of serious illness. If these infants had been left on raw milk, it is believed by the writers that the comparative results would have been even more unfavorable to raw milk.

Although the number of cases was not large, the results, almost identical during the two summers, indicate that even a fairly pure milk when given raw, in hot weather, causes illness in a much larger percentage of cases than the same milk given after Pasteurization. A considerable percentage of infants, however, do apparently quite as well on raw as on Pasteurized milk.

Observations Upon the Use of Feeding Raw and Heated Milk in Older Children—The children over three years of age who received unheated milk, containing at different times from 145,000 to 350,000,000 bacteria per c.c., showed almost no gastro-intestinal disturbance. The conditions at three institutions will serve as examples.

In the first of these an average grade of raw milk was used which, during the summer, contained from 2,000,000 to 30,000,000 bacteria per c.c. This milk was stored in an ice-box until required. It was taken by the children unheated and yet no case of diarrhea of sufficient gravity to send for a physician occurred during the entire summer. This institution was an orphan asylum containing 650 children from three to fourteen years of age; viz., three to five years, 98; five to eight years, 162; eight to fourteen years, 390.

A second institution used an unheated but very pure milk, which was obtained from its own farm. This milk averaged 50,000 bacteria per c.c. The inmates were 70 children of ages ranging from three to fourteen. In this institution not a single case of diarrheal disease of any importance occurred during the summer.

In a third institution an average grade of milk was used which was heated. This milk before heating contained 2,000,000 to 20,000,000 bacteria per c.c. The institution was an infant asylum in which there were 126 children between the ages of two and five years. There were no cases of diarrhea during the summer.

These clinical observations taken in connection with the bacteriological examination at the laboratory show that, although the milk may come from healthy cattle and clean farms, and be kept at a temperature not exceeding 60 degrees F., a very great increase in the number of bacteria may occur. Furthermore, this may occur without the accumulation in the milk of sufficient poisonous products or living bacteria to cause appreciable injury in children over three years of age, even when such milk is consumed in considerable amount and for a period extending over several months. Milk kept at a temperature somewhat above 60 degrees F. was not met with in our investigations, but the histories of epidemics of ptomain poisoning teach that such milk may be very poisonous. It is also to be remembered that milk abounding in bacteria on account of its being carelessly handled is also always liable to contain pathogenic organisms derived from human or animal sources.

Results with Very Impure Milk Heated vs. Those with Pure or Average Milk Heated—During the summer of 1901 we were able to observe a number of babies fed on milk grossly contaminated by bacteria. In 1902, a systematic oversight of all stores selling milk was instituted by the Health Department, so that the very worst milk was not offered for sale that summer.

Table Showing the Results of Feeding During July and August, 1901, in Tenement Houses, of 112 Bottle-Fed Infants Under One Year of Age, and of 47 Bottle-Fed Infants Between One and Two Years of Age with Milk from Different Sources, and the Number of Bacteria Present in the Milk.

Character of Milk.	Infants Under One Year.					Infants Over One Year.				
	Number of Infants.	Average weekly gain.	Diarrhea. Mild.	Diarrhea. Severe.	Deaths.	Number of Infants.	Average weekly gain.	Diarrhea. Mild.	Diarrhea. Severe.	Deaths.
(1) Pure milk boiled and modified at dispensary or stations; given out in small bottles. Milk before boiling averaged 20,000 bacteria per c. c.; after boiling 2 per c. c.	41	3 oz.	10	8	1*	..	......	..	..	..
(2) Pure milk 24 hours old, sent in quart bottles to tenements, heated and modified at home, 20,000 to 200,000 bacteria per c. c. when delivered	23	4⅙ "	8	5	..	24	4½ oz.	8	2	..
(3) Ordinary milk 36 hours old, from a selected group of farms, kept cool in cans during transport; 1,000,000 to 25,000,000 bacteria per c. c., heated and modified at home before using...	18	4 "	6	6	1†	12	4 "	1	2	..
(4) Cheap milk, 36 to 60 hours old, from various small stores, derived from various farms, some fairly clean, some very dirty; 400,000 to 175,000,000 bacteria per c. c.	21	¼ "	4	13	4‡	7	⅛ "	1	3	..
(5) Condensed milk of different brands. Made up with hot water. As given, contained bacteria from 5,000 to 200,000 per c. c.	9	¼ "	5	2	3	4	3⅞ "	1	3	..
(6) Breast milk	16	2¼ "	5	2	0	..	......	..	..	..

* This infant died from enteritis and toxemia.

† This infant died of pneumonia. There had been no severe intestinal disorder.

‡ One of the four had pertussis, the remaining three died from uncomplicated enteritis.

The observations upon the impure milk of 1901 are of sufficient importance to be given in detail, although already mentioned in this report in the observations upon infants of both summers which were fed on "store milk." A group of over 150 infants was so divided that 20 per cent. were allowed to remain on the cheapest store milk which they were taking at the time. To about the same number was given a pure bottled milk from Briarcliff Farms, sent to their homes free of charge by Mr. Walter W. Law. A third group was fed on the same quality of milk as the second, but sterilized and modified at the Good Samaritan Dispensary. A fourth group received milk from an ordinary dairy farm. This milk was sent to a store in cans and called for by the people. A few infants fed on breast and condensed milk were observed for control.

In estimating the significance of the observations recorded in the tables, one should bear in mind that not only do different infants possess different degrees of resistance to disease, but that, try as hard as the physicians could, it was impossible to divide the infants into groups which secured equal care, and were subjected to exactly the same conditions. It was necessary to have the different groups in somewhat different parts of the city. It thus happened that the infants on the cheap store milk received less home care than the average, and that those on the pure bottled milk lived in the coolest portion of the city. Certain results were, however, so striking that their interpretation is fairly clear. It is to be noted that the number of infants included in each group is small.

There is nothing in the observations to show that fairly fresh milk from healthy cows, living under good hygienic conditions and containing, on some days, when delivered, as many as 200,000 bacteria per c.c., had any bacteria or any products due to bacteria that remained deleterious after the milk was heated to near the boiling point.

On the other hand, it is possible that certain varieties of bacteria may, under conditions that are unsanitary, find entrance to milk and survive moderate heat or may develop poisonous products resistant to heat in sufficient amount to be harmful, even when they have accumulated to less than 200,000 per c.c.

Turning now to the results of feeding with milk which has been heated and which before sterilization contained from 1,000,000 to 25,000,000 bacteria per c.c., averaging about 15,000,000, though obtained from healthy cows living under fairly decent conditions and kept moderately cool in transit, we find a distinct increase in the amount of diarrheal disease. Though it is probable that the excessive amount of diarrhea in this group of children was due to bacterial changes which were not neutralized by heat or to living bacteria which were not killed; yet it is only fair to consider that the difference was not very great and that the infants of this group were under surroundings not quite as good as those on the purer milk.

Finally, we come in this comparison to the infants who received the cheap store milk Pasteurized. This milk had frequently to be returned because it curdled when boiled, and contained, according to the weather, from 4,000,000 to 200,000,000 bacteria per c.c. In these infants the worst results were seen. This is shown not only by the death rate, but by the amount and the severity of the diarrheal diseases, and the general appearance of the children as noted by the physicians. Although the average number of bacteria in the milk received by this group is higher than that received by the previous group, the difference in results between this group and the previous one can harly be explained by the difference in the number of bacteria. The varieties of bacteria met with in this milk were more numerous than in the better milk, but we were unable to prove that they were more dangerous. Probably the higher temperature at which the milk was kept in transit and the longer interval between milking and its use allowed more toxic bacterial products to accumulate.

Observations Upon Milk Feeding in Institutions—During the summer of 1901 observations were made by Dr. Long in nearly all the institutions for children situated in New York City. He found, with three exceptions, that no particular care was taken to secure a supply of pure milk. Samples taken from the supply of the other institutions showed that the milk averaged over 1,000,000 bacteria per c.c. when delivered, and at half of them it averaged over 10,000,000 per c.c. The cream frequently contained 60,000,000 bacteria per c.c. The milk at two places contained at times over 100,000,000. At several special hospitals for young children the milk and cream contained on different days from 26,000,000 to 157,000,000 bacteria per c.c. Formaldehyde was also occasionally found, especially in the cream. Samples of milk were taken weekly from most of the institutions and examined as to the number of bacteria and in some cases also as to the varieties present.

As a rule to the children who were over three years old the milk was given raw, while for those under two years it was heated (sterilized). For those between two and three years, it was sometimes heated, sometimes not. In only two institutions was it possible to trace any epidemic of diarrhea among the infants and older children, and in these, the particulars of which are given below, the results cannot be reasonably attributed to the milk.

The first epidemic of diarrhea occurred at the New York Infant Asylum during June and July, 1901. There were in the institution 86 infants; 30 of these were bottle-fed and 56 were on breast milk. Of the 30 bottle-fed infants, 22 suffered from diarrhea. Of the 56 breast-fed infants, only 7 were affected. The epidemic was mild in character, only 2 infants dying.

This epidemic, which occurred during and after a period of very hot weather, at first glance might be ascribed to the milk. The fact, however, that 7 cases occurred among the breast-fed infants, that the cases occurred from time to time, not simultaneously, and that the milk used had been previously heated, points rather to an infection communicated from the sick to the well than to one conveyed by the milk, unless it was true that the milk had been contaminated in the wards.

In another institution an epidemic of moderately severe diarrhea occurred during the winter, in which at first all the cases came from one ward, and then later from a second ward. In this epidemic, infection through the milk was not conceivable, since the bottle-fed infants in the wards where no illness occurred received milk from the general supply.

General Conclusions—In addition to the statistical reports of their observations, the different physicians who watched the infants in their homes were asked to state their own conclusions regarding the general problem of infant-feeding in the tenements. These general impressions are most suggestive and cannot fail to be of interest to all who are working at this difficult problem.

It was practically the unanimous opinion that the most important factor in securing good results is intelligent care. This covers much; clean bottles and nipples; the willingness and ability to carry out directions as to methods of feeding, quantities, frequency, the stopping of milk at the first signs of serious diarrhea, etc.; proper care of the milk itself while in the house, and methods of sterilizing; suitable clothing and cleanliness of the children, and as much fresh air as possible.

Most of the physicians stated that, leaving out the very worst store milk in summer, the results were much less affected by the character of the milk than they anticipated, and distinctly less than by the sort of care the infants received.

The surroundings alone had much less influence on results than was anticipated. For not only were breast-fed infants found doing well under the most unfavorable surroundings, but those also who received only the bottle as a rule did well, provided they received intelligent care and good milk.

The depressing effects of great atmospheric heat, *i.e.*, a temperature in the neighborhood of 90 degrees F., or over, were very marked in all infants no matter what their food. Those who were ill were almost invariably made worse, and many who were previously well became ill. A bad method of feeding, or rather a feeding without any method, was responsible for many failures when the milk itself was of good quality. Common mistakes were, feeding an infant every time it cried; giving it a full bottle no matter what the age of the child, and letting it take as much as it would; preparing a large bottle of food at one time, and warming it over from time to time until the child had taken the whole of it, or allowing the milk to turn sour in the feeding bottle. Quantities proper for single feedings were almost invariably disregarded. Proper washing of feeding bottles was seldom seen in a tenement house. Such matters as these are closely connected with intelligent care, which has been already considered.

The importance of the matters just mentioned raises the question of how much can be accomplished by the distribution of printed slips of directions. It was the observation of the physicians that comparatively little can be accomplished by these alone. Such printed circulars are often treated by the tenement-house mother very much as most of us treat the printed advertisements which are left at our doors—seldom read and soon thrown away. Mothers are often anxious and willing, but ignorant and stupid. Many cannot read and many more have not the wit to apply in practice what they read. When, however, such printed advice was preceded or accompanied by personal explanation, it was found of great assistance. Personal contact is the only sure way to influence these people, and this must be frequently repeated to influence them permanently; as an aid to this, printed slips are useful. Printed directions, however, should be as simple as possible in statement, few in number, and touch only the most vital matters, telling the mother always what she is to do, not what she is not to do.

Summary—The observations here recorded were made upon the groups of infants for periods of about three months only, and the conclusions drawn relate especially to the more immediate effects of the milk.

1. During cool weather neither the mortality nor the health of the infants observed in the investigation was appreciably affected by the kind of milk or by the number of bacteria which it contained. The different grades of milk varied much less in the amount of bacterial contamination in winter than in summer, the store milk averaging only about 750,000 bacteria per c.c.

2. During hot weather when the resistance of the children was lowered, the kind of milk taken influenced both the amount of illness and the mortality; those who took condensed milk and cheap store milk did the worst, and those who received breast milk, pure bottled milk, and modified milk did the best. The effect of bacterial contamination was very marked when the milk was taken without previous heating; but, unless the contamination was very excessive, only slight when heating was employed shortly before feeding.

3. The number of bacteria which may accumulate before milk becomes noticeably harmful to the average infant in summer differs with the nature of the bacteria present, the age of the milk, and the temperature at which it has been kept. When milk is taken raw, the fewer the bacteria present the better are the results. Of the usual varieties, over 1,000,000 bacteria per c.c. are certainly deleterious to the average infant. However, many infants take such milk without apparently harmful results. Heat above 170 degrees F. (77 degrees C.), not only destroys most of the bacteria present, but, apparently, some of their poisonous products. No harm from the bacteria previously existing in recently heated milk was noticed in these observations unless they had amounted to many millions, but in such numbers they were decidedly deleterious.

4. When milk of average quality was fed sterilized and raw, those infants who received milk previously heated did, on the average, much better in warm weather than those who received it raw. The difference was so quickly manifest and so marked that there could be no mistaking the meaning of the results. The bacterial content of the milk used in the test was somewhat less than in the average milk of the city.

5. No special varieties of bacteria were found in unheated milk which seemed to have any special importance in relation to the summer diarrheas of children. The number of varieties was very great, and the kinds of bacteria differed according to the locality from which the milk came. None of the 139 varieties selected as most distinct among those obtained injured very young kittens when fed in pure cultures. A few cases of acute indigestion were seen immediately following the use of Pasteurized milk more than thirty-six hours old. Samples of such milk were found to contain more than 100,000,000 bacteria per c.c., mostly spore-bearing varieties. The deleterious effects, though striking, were not serious nor lasting. At the present time there is in New York City no general sale from stores of "Pasteurized" or "sterilized" milk, so that it is here very rare for such milk to be used thirty-six hours after heating.

6. After the first twelve months of life, infants are less and less affected by the bacteria in milk derived from healthy cattle. According to these observations, when the milk had been kept cool the bacteria did not appear to injure the children over three years of age, at any season of the year, unless in very great excess.

7. Since a large part of the tenement population must purchase its milk from small dealers, at a low price, everything possible should be done by Health Boards to improve the character of the general milk supply of cities by enforcing proper legal restrictions regarding its transportation, delivery and sale. Sufficient improvements in this respect are entirely feasible in every large city to secure to all a milk which will be wholesome after heating. The general practice of heating milk which has now become a custom among the tenement population of New York is undoubtedly a large factor in the lessened infant mortality during the hot months.

8. Of the methods of feeding now in vogue that by milk from central distributing stations unquestionably possesses the most advantages, in that it secures some constant oversight of the child, and since it furnishes the food in such a form that it leaves the mother least to do, it gives her the smallest opportunity of going wrong. This method of feeding is one which deserves to be much more extensively employed, and might, in the absence of private philanthropy, wisely be undertaken by municipalities and continued for the four months from May 15 to September 15.

9. The use, for infants, of milk delivered in sealed bottles should be encouraged whenever this is possible, and its advantages duly explained. Only the purest milk should be taken raw, especially in summer.

10. Since what is needed most is intelligent care, all possible means should be employed to educate mothers and those caring for infants in proper methods of doing this. This, it is believed, can most effectively be done by the visits of properly qualified trained nurses or women physicians to the homes supplemented by the use of printed directions.

11. Bad surroundings, though contributing to bad results in feeding, are not the chief factor. It is not, therefore, merely by better housing of the poor in large cities that we will see a great reduction in infant mortality.

12. The observations indicate that close percentage modification of milk, although desirable in difficult cases, is not necessary to obtain excellent results with the great majority of infants, and that a certain adjustment of a healthy infant to its food is usually soon secured.

13. While it is true that even in the tenements the results with the best bottle-feeding are nearly as good as average breast-feeding, it is also true that most of the bottle-feeding is at present very badly done, so that as a rule the immense superiority of breast-feeding obtains. This should, therefore, be encouraged by every means, and not discontinued without good and sufficient reasons. The time and money required for artificial feeding, if expended by the tenement mother to secure better food and more rest for herself, would often enable her to continue nursing with advantage to her child.

14. The injurious effects of table food to infants under a year old, and of fruits to all infants and young children in cities, in hot weather, should be much more generally appreciated.

II.

The More Common Varieties of Bacteria Met With in the Milk Supplied to New York City Determined from Those Occurring in 71 Samples of Milk Selected from Various Places and at Different Times.

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The organisms were isolated from milk by means of agar or lactose-litimus-gelatine plates, grown upon the various média mentioned in the table, stained with Loffler's methylene blue and by Gram's method, and examined in the hanging drop. The pathogenic quality of some of the cultures was tested by inoculating guniea pigs intraperitoneally with 2 c.c. of 48-hour broth culture, or by feeding young kittens with 3-6 c.c. of 24-hour broth culture by means of a medicine dropper.

The organisms were then separated into classes, following as nearly as possible the lines suggested in Chester's Manual of Determinative Bacteriology (Macmillan, 1901). An attempt was then made to identify the various varieties, using the descriptions of Chester and Migula, but with a few exceptions this proved so unsatisfactory that it was decided to rest content with the more general classification of Chester.

The varieties in the table represent for the most part only the more common species present in the milks examined, for in no case was more than 0.01 c.c. of milk used in making a plate, and varieties which occurred in small numbers might have been missed in fishing, if indeed they had found a place in the plates at all.

None of the organisms in the table are strict anærobes.

The term "chromogenic" seems to be limited by Chester to organisms producing pigment on agar or gelatine only, and this interpretation has been adopted here.

The work of comparison of the organisms was facilitated by using a system of cards. The plan of one of these is given. As soon as a pure culture was obtained from a plate it was entered upon one of these cards, which was gradually filled out with + or — signs as the data required were obtained. The results, as recorded on any two of the cards could be easily compared by overlapping them so that the columns of the upper half and then those of the lower half could be made to correspond.

Sample of Card Used.

Aerobe		Gelatine	Colonies	No.
Anaerobe				
Growth at 37°				
Max. Growth° ?				
Glucose	Fermentation.	Agar		Source— Date—
Lactose				
Growth in closed arm		Bacillus		
Acid		Coccus		
Alkaline		Diam. greater than μ		
Gas		Motility		
Odor		Threads or Chains		
Chromogenic		Spores		
Gram.	Stains		Agar Tube	Name
Nitrate Reduc.		Turbid	Broth	
Indol		Pellicle		
		Sediment		
		Liquefaction	Gelatine Stab	
Pathogenic		Surface		
		Needle		
			Potato	Class
		Color		
		Coagulated	Milk	
		Digested		
		Slimy		

In order to make the table more intelligible to those not familiar with the classification of Chester, representative organisms and groups have been named below for each class, which are, in a general way, characteristic of the classes to which they are attached.

Class.	Cultural Characteristics Represented in a General Way by—
Streptococcus III	Streptococcus pyogenes.
" IV	Streptococcus aurantiacus.
Micrococcus III	Micrococcus pyogenes albus.
	Micrococcus liquefaciens.
" IV.	Micrococcus concentricus.
	Micrococcus cerevisiæ.
" V.	
" VII.	Micrococcus pyogenes aureus.
" VIII.	Micrococcus aurantiacus (Cohn).
" IX.	Micrococcus roseus (Bumm).
Bacterium II.	Septicæmia hemorrhagica group.
" III.	Acidi lactici group.
	Bacterium lacticum.
	Bacterium rhinoscleromatis.
" IV.	Bacterium ambiguum group.
" V.	Bacterium arborescens.
	Bacterium fulvum.
" VI.	Bacterium luteum.
" VII.	Bacterium erythrogenes.
	Bacterium latericium.
" VIII.	Bacterium fuscescens.
" IX.	Bacterium immobile (Kruse).
" XIII.	Bacterium mycoides.
" XIV.	Bacterium simile (Schroter).
Bacillus I.	Coli and typhoid group.
	Hog cholera group.
" II.	Bacillus muripestifer.
" III.	Bacillus cloacæ.
" V.	Bacillus murisepticus (Karlinsky).
" VI.	Bacillus arborescens.
" VII.	Bacillus aurescens (Ravenell).
" VIII.	Bacillus subflavus (Zimmerman).
" IX.	Bacillus carneus (Kruse).
" XI.	Bacillus fuscus.
" XIII.	Bacillus fluorescens liquefaciens group (Flugge).
" XV.	Potato bacillus.
	Hay bacillus group.
" XVI.	Bacillus punctiformis.

	Colony (on Lactose Litmus Gelatine Unless Otherwise Stated).	Motility.	Threads or Chains.	Spores.	Agar Tube.	Broth Tube.		
						Turbid.	Pellicle.	Sediment.
Streptococci— Class III., Chester. Non-Chromogenic. Grow at room temperature. Gelatine not liquefied—								
Locust Farm, II..	Deep, round, gran	—	+	—	Faint transp	+	—	+
Sheppard Groc., 3.	Oval, brown	—	+	—	White	..	..	..
N. Y., 19	Round, brown, granular.	—	+	—	White, delicate	..	..	..
33A	(Agar.), small, circular, white	—	+	—	Delicate	—	—	+
M. V., 15	Oval and round, brownish	—	+	—	White col	..	..	..
M. V., 24	Like a dew drop	—	+	—	White	..	..	..
A12	Small, round, gran	—	+	—	Thin, transparent	+	—	+
M. V., 16	Small, grayish	—	+	—	White col	..	..	..
Class IV., Chester, Chromogenic. Produce pigment on gelatine or agar—								
C51	Small, gran., brown	—	+	—	Faint, whitish	+	—	+
Micrococci— Class III., Chester. Without pigment. Grow on ordinary culture media at room temperature 20° C. Gelatine liquefied—								
Winters, I-2	Dark, circular, irreg., margin	—	—	—	Creamy, profuse	+	—	+
Bellevue, I	(Agar) dark brown centre	—	—	—	Creamy, spread	+	—	+
M. V., 5	Sponge like	—	—	—	White	..	..	..
Briar., 51	Large, irregular	—	—	—	Dull, flat, irreg	+	—	+
Briar., 41	Small, deep, light	—	—	—	Abund., smooth	—	—	+
Slawson, 6	Dark brown homog., irreg	—	—	—	Creamy, spread	+	—	+
A5	Yellowish brown, gran	—	—	—	Shiny, white	+	—	+
M. V., 43	Round, gran	—	—	—	Brownish white	..	+	..
Class IV., Chester. Without pigment. Grow on ordinary culture media and at room temperature 20° C. Gelatine not liquefied—								
Heitz, 27	Gray, coarsely gran	—	—	—	Thick, porcelain	+	—	+
647 E. 16, 42	(Agar) round, pearly surface	—	—	—	Moderate	—	—	+
Brautigan, 33	Small, deep, round, gran	—	—	—	Abundant, creamy	+	—	+
Heitz, 14	Deep, dark, coarsely gran	—	—	—	Creamy, white	—	—	+
A21	Dark brown, coarsely gran	—	—	—	Abund., white	+	—	+
A23	Dense, round, gran., acid	—	—	—	Abund., white	+	—	+
8C	(Agar.) circular, white	—	—	—	Delicate, beaded	+	—	+
15th St. and 1st Ave., 33	(Agar.) deep, small, circ., white	—	—	—	Delicate, transp	+	—	+
Sheppard groc. 7	Brown, gran., lighter border	—	—	—	....	..	..	..
K1A	Dark, round, gran	—	—	—	Faint, white	—	—	+
Woodland, II2	Deep, dark brown, acid	—	—	—	Delicate, transp	+	—	+
C53	Dark brown, circ	—	—	—	Mod., white, shiny	+	—	+
M. V., 49	Aster, like colony	—	—	—	....	..	+	..
N. Y. I., 9	Light yellow, circ., gran	—	—	—	White	+	+	..
N. Y. I., 22	Brown, co rsely gran	—	—	—	Delicate, white	..	..	..
N. Y. I., 34	Yellowish-brown, wrinkled	—	—	—	White	..	+	..
Class V., Chester. Doubtfully chromogenic, i. e., growth on gelatine or agar light yellow to yellowish white. Gelatine liquefied—								
Briar., 49	Surf., coarsely gran., dark	—	—	—	....	+	—	+
Anger, 5	Deep, yellow, gran., circ	—	—	—	Thin, yellowish	—	—	+
K3	Light brown, finely gran	—	—	—	Abundant, yellow	+	—	+
A11	Gran., irreg., liq	—	—	—	Creamy	+	—	+
A13	Lge., surface, liq	—	—	—	Shiny, white	+	—	+

Gelatine Tube.				Potato.				Milk.						Ferment Tube.							
Liquefaction.	Deep Funnel.	Surface Growth.	Needle Track.	Visible.	Luxuriant.	Wrinkled.	Color.	Coagulated.	Digested.	Slimy.	Acid.	Alkaline.	Odor.	Glucose Fermentation.	Lactose Fermentation.	Growth in Closed Arm.	Chromogenesis.	Gram's Stain.	Indol Produced.	Pathogenesis—Kittens.	
—	—	—	+	+	—	—	—	+	+	—	+	—	—	—	—	+	—	+	+	—	Non-pathogenic, guin. pig.
—	—	..	..	..	..	..	..	+	..	..	+	..	..	—	..	..	—	+	..	..	
—	—	..	..	..	..	..	..	+	..	..	+	..	..	—	..	..	—	+	..	..	
—	—	—	+	—	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	..	
—	—	..	..	+	—	—	d. w.	—	—	—	..	..	..	—	..	—	—	+	..	..	
—	—	..	..	+	..	—	d. w.	—	—	—	..	..	..	—	..	+	—	+	..	..	
—	—	—	+	—	—	—	—	—	—	—	..	..	+	—	—	..	—	+	—	..	
—	—	+	..	+	—	—	d. w.	—	..	..	..	..	..	+	..	..	—	—	..	..	
—	—	..	..	—	—	—	—	+	—	—	+	—	+	—	—	—	br.	+	—	..	
+	+	+	+	+	—	—	w.	+	+	—	±	..	—	—	..	..	—	+	—	—	
+	+	+	+	+	—	—	cr.	+	+	—	+	..	+	—	..	..	—	+	—	..	
+	+	+	+	+	+	—	w.	+	+	..	..	..	..	—	..	..	—	+	..	..	
+	+	+	+	+	+	—	d. w.	+	—	—	+	—	—	—	..	..	—	+	+	—	
+	—	+	+	+	—	—	y	—	—	—	+	—	—	—	—	—	—	+	+	—	Non-pathogenic, guin. pig.
+	+	+	+	+	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	..	
+	—	+	+	+	—	—	w.	—	—	—	+	—	—	—	—	—	—	+	—	..	Pract. same as Duodenum Kitten V. and Grass III.
+	—	..	..	+	—	—	d. w.	+	+	..	..	..	..	—	..	+	—	—	..	..	
—	—	—	+	+	+	—	w.	+	+	—	+	—	—	—	—	+	—	+	+	..	
—	—	+	+	+	—	—	y.	+	+	—	+	—	—	—	..	+	—	+	+	..	
—	—	+	+	+	—	—	—	—	—	—	+	—	+	—	—	..	—	+	+	—	
—	—	+	+	+	—	—	—	—	—	—	+	—	—	—	..	—	—	+	+	—	Like Sutton 2.
—	—	+	+	+	—	—	w.	—	—	—	±	..	+	—	—	..	—	+	+	..	
—	—	..	+	+	—	—	w.	—	—	—	+	—	+	—	—	+	—	±	+	..	
—	—	+	+	+	+	—	d. w.	+	+	—	+	—	—	—	..	+	—	+	—	..	Much like Shep. 21.
—	—	+	+	—	—	—	—	+	—	—	+	—	—	—	..	+	—	+	—	..	
—	—	..	..	+	—	—	w.	+	..	..	..	..	..	—	..	..	—	+	..	..	Much like 214.3, Grass IV. and Kit. Ileum II.
—	—	+	+	+	—	—	—	—	—	—	+	—	—	—	—	—	—	+	—	..	
—	—	+	+	+	—	—	w.	—	—	—	+	—	—	—	—	+	—	+	+	..	
—	—	+	+	—	—	—	—	—	—	—	+	—	+	—	—	—	—	+	+	—	
—	—	..	..	+	—	—	y. w.	+	+	..	..	..	..	—	..	+	—	—	..	..	
—	—	..	..	+	+	—	dw.	+	..	..	..	..	..	—	..	..	—	—	..	..	
—	—	..	..	..	..	..	..	+	..	..	..	..	..	—	..	..	—	..	..	..	
—	—	..	..	—	+	—	y.	+	+	..	..	..	..	+	..	..	—	+	..	..	
+	+	+	+	+	+	—	d. w.	+	..	..	+	—	..	—	..	—	y. w.	+	..	..	
+	—	+	+	+	—	—	y.	+	—	—	+	—	—	—	..	+	y. w.	+	+	..	
+	—	+	+	+	—	—	d. w.	+	+	—	+	—	—	—	—	+	y.	+	—	..	
+	+	+	+	..	..	..	..	+	+	—	+	—	+	—	—	..	y.	+	+	..	
+	+	+	+	..	..	..	..	—	+	—	±	..	+	—	—	..	y. w.	+	+	..	

	Colony (on Lactose Litmus Gelatine Unless Otherwise Stated).	Motility	Threads or Chains.	Spores.	Agar Tube.	Broth Tube. Turbid.	Broth Tube. Pellicle.	Broth Tube. Sediment.
Micrococci, Class V.—Continued—								
Winters, II-a	Spreading, liquefier	—	—	—	Spreading, profuse	+	—	+
Woodland, II-3	Surface liquefier	—	—	—	Spreading, profuse	+	—	+
A14	Dark brown gran	—	—	—	Abund., whitish	+	—	+
Sheppard Groc., 23	Round, yellow, gran	—	—	—	Yellowish	+	..	..
M. V., 21	Yellowish-brown, gran	—	—	—	Yellowish white	+	+	..
Briar., 38	Deep yellowish, finely gran	—	—	—	....	+	—	+
M. V., 51	Yellowish homog., circ.	—	—	—	....	+	—	+
L 1 A	Dark brown	—	—	—	Mod. creamy	+	+	+
K 1 C	Brown, gran., round.	—	—	—	Mod. shiny	+	—	+
K 1 D	Deep dark brown, gran	—	—	—	Mod. shiny	+	—	+
Class VII., Chester. Distinctly chromogenic. Pigment on agar or gelatine. Pigment yellowish-orange. Gelatine liquefied—								
Winter's I-a	Pale brown, surface	—	—	—	Abund. shiny	+	—	+
N. Y. I., 25	Dark brown, gran	—	—	—	Lemon-yellow	..	..	..
M. V., 10	Dark brown, gran	—	—	—	Lemon-yellow	..	..	..
Class VIII., Chester. Distinctly chromogenic. Pigment yellowish-orange. Gelatine not liquefied—								
49 d	Yellowish, gran., surf	—	—	—	Faint whitish	—	—	+
Locust Farms III.	Deep, gran., round	—	—	—	Mod. creamy	+	+	+
Class IX., Chester. Distinctly chromogenic. Pigment reddish, pinkish, flesh-colored—								
Heitz, 12	Deep, dark, gran	—	—	—	Creamy, pinkish	+	..	+
Bacteria— Class II., Chester. Grow on ordinary media at room temperature. Gelatine not liquefied. Decolorized by Gram.—								
Tannenbaum I	Yellowish-brown, gran., irreg. margin	—	+	—	Abundant, creamy	+	..	+
E 4	Raised, yellowish, granular	—	..	—	Abundant, shiny white	+	+	+
E 9	Dark brown, acid	—	+	—	Abundant, white, smooth.	+	+	+
N. Y. I., 11	....	—	..	—	Whitish	+	+	..
N. Y. I., 6	Brown colony with light border	—	..	—	Grayish-white, limited	+	..	+
N. Y. I., 5	Brown, margin lighter	—	..	—	Grayish-white, limited	—	..	+
Winter's II-C	Dark brown acid	—	—	—	Delicate, transparent	+	—	+
Group a-R. R	Dark brown acid, with granules	—	—	—	Delicate, frosted.	—	..	+
L 1	Dark brown, granular	—	..	—	Faint whitish, feathery	—	—	+
Sheppard, 18	Thick, yellow centre, irreg. margin	—	..	—	....	..	..	..
N. Y. I., 29	Round, flat, yellowish, gran	—	..	—	....	..	..	..
Slawson, c	Light brown	—	..	—	Delicate, transparent	—	—	+
Wendland, 22	Deep, small, yellow, finely gran	—	..	—	Small surface colo	+	..	+
Decker, 19	Light yellow	—	+	—	Spreading, thin	—	—	—
J 1	Round, dark brown	—	..	—	Slight white, shiny	+	—	+
J 6	Light brown, finely gran	—	..	—	Slight dirty white	+	—	+
A 6	Small, dark brown, acid	—	+	—	Abundant, raised, whitish	+	+	+
647 E. 16, 42a	Small, circ. surf. col	—	+	—	Moderate	+	—	+
Auger, 1	Colorless, entire, margin granular.	—	+	—	Spreading, dirty, creamy	—	—	+
A 7	Brownish, non-liq	—	+	—	Moderate whitish, shiny	+	—	+
Decker, 20	Deep, dark granular	—	+	—	Porcelain, confluent	+	—	+
Winter's I-4	Paler brown, deep-circ	—	+	—	Spreading, translucent	+	—	+
Beakes, 28	Brownish, gran	—	..	—	Moderate thin, bluish	+	—	+
Heitz, 30	Small surf., light, gran	—	..	—	Dense porcelain	+	—	+
Heiss, 1	Pale brown, deep	—	..	—	Delicate spreading	+	+	+
Cent. Newt., B.	Light brown, concentric rings	—	—	—	Spreading creamy	+	—	+
402 E. 16, 9a	Small, round, deep, alk. or neut	—	..	—	Moderate, heaped up	+	—	+
264 1st Ave., 8c.	Small, round, deep, alk. or neut	—	+	—	Moderate, heaped, shiny	—	—	—

Gelatine Tube.				Potato.				Milk.						Ferment. Tube.							
Liquefaction.	Deep Funnel.	Surface Growth.	Needle Track.	Visible.	Luxuriant.	Wrinkled.	Color.	Coagulated.	Digested.	Slimy.	Acid.	Alkaline.	Odor.	Glucose.	Lactose.	Growth in Closed Arm.	Chromogenesis.	Gram's Stain.	Indol Produced.	Pathogenesis—Kittens.	
+	+	+	+	+	—	—	y.	+	+	—	+	—	+	—	—	+	y. w.	+	—	..	
+	+	+	+	+	—	—	y.	+	+	—	+	—	—	—	—	—	y.	+	—	..	
+	+	+	+	+	—	—	d. w.	+	+	—	+	—	—	—	—	+	br.	+	+	..	
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+	—	..	..	+	+	—	y.	—	..	..	..	..	..	—	..	+	y. w.	—	..	.	
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+	—	+	+	+	—	—	d. w.	—	—	—	+	—	—	—	—	—	y. w.	+	—	..	
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—	—	+	+	+	+	—	y.	+	+	—	+	—	+	—	—	+	y.	+	+	—	Non-pathogenic, guin. pig.
+	+	+	+	+	+	—	br.	+	+	—	+	—	—	—	—	—	pink	+	—	—	Non-pathogenic, guin. pig.
—	—	+	+	+	+	—	d. w.	+	+	—	+	—	+	+	+	+	—	—	—	..	
—	—	+	+	+	+	—	w.	+	+	—	+	—	+	+	+	+	—	—	+	..	
—	—	+	..	+	..	—	y. w.	+	+	—	.	—	+	+	+	..	—	—	+	..	
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—	—	..	..	+	—	—	g. w.	+	..	..	+	..	..	—	..	..	—	—	..	..	
—	.	..	..	+	..	..	..	+	..	..	±	..	..	—	..	..	..	..	..	..	
—	—	+	+	+	—	—	w.	+	—	—	+	—	—	—	—	+	—	—	—	—	
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—	—	—	+	+	—	—	w.	+	—	—	+	—	—	—	—	..	—	—	—	..	
—	—	..	..	+	—	—	br. w.	+	+	..	..	..	..	..	..	..	..	—	..	..	Might be Grass IV. 16.
—	—	..	..	..	..	..	..	—	+	..	±	..	..	—	..	.	..	—	..	..	
—	—	+	+	—	—	—	—	—	—	—	+	—	—	—	—	+	—	±	—	—	Much like Feed V.
—	—	—	+	.	—	—	—	—	—	—	+	—	—	—	—	+	—	—	—	—	Non-pathogenic guin. pig.
—	—	+	+	+	—	—	d. w.	—	—	—	+	—	—	—	..	—	—	±	—	—	
—	—	+	+	+	—	+	y.	—	—	—	+	—	—	—	—	—	—	—	—	..	
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—	—	+	+	+		—	gn.	—	—	—	±	..	—	—	..	+	—	—	—	..	
—	—	+	+	+	+	—	gn.	—	—	—	±	..	—	—	..	—	—	—	+	—	
—	—	+	+	+	—	—	gn. w.	—	—	—	±	..		—	—	..	—	..	+	..	Much like J3.
..	..	..	+	+	—	—	y.	—	—	—	±	..	—	—	..	—	—	—	+	..	
—	—	+	+	—	—	—	—	—	—	—	±		—	—	—	—	—	±	—	—	
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—	—	+	+	+	—	—	d. w.	—	—	—	±	..	—	—	..		—	—	+	..	
—	—	+	+	+	+	—	d. w.	—	—	—	±	..	—	—	..		—	—	+	..	

	Colony	Motility.	Threads or Chains.	Spores.	Agar Tube.	Broth Tube. Turbid.	Pellicle.	Sediment.
Bacteria, Class II.—Continued.								
Heitz, 13	Surf. liquef., light, irreg. margin	—	+	—	Thin, porcelain	+	—	+
Brautigan, 36	Small, deep, gran., yellowish-brown	—	+	—	Moderate, thin, bluish	+	—	+
Karp, 15	Whitish, coarsely gran	—	+	—	Thin, porcelain	+	—	+
A 8	Deep, light brownish, gran	—	+	—	Moderate, shiny, whitish	+	—	+
K2A	Yellowish-brown, rosettes, concentric granules	—	+	—	Moderate, shiny, whitish	+	+	+
L1C	Yellowish-brown, finely gran., like rosettes	—	..	—	Moderate, shiny, white	+	+	+
L2A-a	Radiating clubs, yellowish-brown	—	..	—	Moderate, spreading, discr.	+	—	+
Auger, 4	Light gray surface	—	+	—	Del., spreading, porcelain	+	+	+
A 25	Dense, round, gran	—	+	—	Mod., bluish-white, shiny	+	+	+
Karp, 17	Surf., homogen., margin entire	—	+	—	Thick, granular	+	—	+
XV	Circ., pale brown, branching border	—	+	—	Smooth, white, thin	—	—	+
Class III., Chester. Grow on ordinary media at room temperature. Gelatin not liquefied. Stained by Gram.								
Decker, 68	Surf. light brown, finely gran	—	—	—	Scant, creamy	+	+	+
Sutton, 6	Pale brown, rosette form, irreg. margin	—	—	—	Irreg., spreading, porcelain.	+	—	+
Heitz, 11	Deep, light	—	+	—	Spreading, shiny	+	—	—
Decker, 67	Deep, dark opaque	—	—	—		+	..	+
Group C-R. R.	Coarsely gran., brown	—	+	—	Delicate, gran	+	—	+
Group B-R. R.	Dark brown acid, gran	—	—	—	Delicate, frosted	+	—	+
Slawson, a	Light brown	—	—	—	Delicate, transparent	+	—	+
Auger, 34	Surf. light gray, finely gran	—	+	—	Thin, spreading, delicate	+	—	+
Century Newt., a.	Round, dark brown, acid	—	+	—	Delicate, filmy	—	—	+
Slawson, g	Dark brown, without granules	—	—	—	Delicate, filmy	—	—	+
Beakes, 27	Small, opaque brown, surrounded by gran	—	+	—	Faint, thin, gran	+	+	+
Heitz, 28	Surf. mod., granular margin	—	—	—	Delicate	+	—	+
Karp, 60	Surf. gran., irreg. margin	—	—	—	Thin, bluish, transparent	+	—	+
N. Y. I., 24	Dark gray, shiny	—	—	—	Pearly-gray, spreading	..	+	..
Class IV. Chester. Without endospores. Aerobic and facultative anaerobic. Without pigment. Grow at room temperature Gelatin liquefied.								
E 1	Round, dark brown	—	+	—	Raised, shiny, white	+	+	+
Decker, 65	Large, branching, liquefier	—	..	—		+	..	+
H 6	Light brown, round, finely gran	—	..	..	Smooth, creamy	+	—	+
Briarcliff, 6	Surface large, spreading, thready.	—	+	—	Spreading, wrinkled	—	—	+
Condensed, I	Dark brown, circular	—	—	—	White, glistening	+	..	+
285-3	Surface, pale, fringed margin	—	—	—	Whitish	+	—	+
Decker, 66	Large, spreading, gran., liq., acid.	—	—	—	Spreading, porcelain, cr.	+	+	+
94 S M. V.		—	..	—		+	..	..
N. Y. I, 26	Raised centre	—	..	—		—	+	..
49-a	Deep, dark brown, gran	—	+	—	Abundant, raised, white	+	+	+
Class V., Chester. Without endospores. Aerobic and facultative anaerobic. Produce pigment on gelatin or agar. Pigment yellowish. Gelatin liquefied—								
Slawson, e	Round, pale brown	—	—	—	Scant spread., yellow	+	—	+
M. V., 50	Brown, gran	—	—	—	Yellowish brown	+	..	..

Gelatine Tube.				Potato.				Milk.						Ferment Tube.							
Liquefaction.	Deep Funnel.	Surface Growth.	Needle Track.	Visible.	Luxuriant.	Wrinkled.	Color.	Coagulated.	Digested.	Slimy.	Acid.	Alkaline.	Odor.	Glucose Fermentation.	Lactose Fermentation.	Growth in Closed Arm.	Chromogenesis.	Gram's Stain.	Indol Produced.	Pathogenesis—Kittens.	
..	..	..	+	+	+	—	d. w.	—	—	—	±	..	—	—	..	—	—	—	+	..	
—	—	+	+	+	+	..	w.	—	—	—	±	..	—	—	—	—	—	—	—	—	
—	—	—	—	+	+	—	d. w.	—	—	—	—	—	—	—	..	—	—	—	.	—	
—	—	.	+	—	—	—	—	—	—	—	—	.	—	—	—	..	—	—	—	..	
—	—	+	+	+	+	—	gn.	—	—	—	—	+	—	—	—	—	—	—	—	..	
—	—	+	.	+	—	—	br.	—	—	—	—	+	—	—	—	..	—	±	—	..	
—	—	.	+	.	—	—	w.	—	—		.	.	—	—	—	..	—	±	—	..	
—	—	+	+	+	+	—	br.	—	—	.	±	..	—	—	..	—	—	—	—	—	
—	—	.	+		+	—	pk.	—	—	+	±	..	—	—	—	..	—	—	—	..	
—	—	—		+	+	—	y.	—	—		±	..	—	—	..	—	—	—		—	
—	—	+	.	.	—	—	y.	—	—	+	—	.	—	—	—	.	—	—	—	..	
—	—	+	+	+	+	—	d. c.	—	—	—	±	..	—	—	..	—	..	+	..	..	Pathogenic guinea pig.
—	—	+	+	—	—	—	—	—	—	—	±	..	—	—	—	—	—	+	—	..	Practically the same as Kitten Jejiunum VII. and Grass XII, 52.
—	—	+	.	+	+	—	g. gr.	—	—	—	±	..	—	—	..	—	..		—	—	
—	—	+	—	+	+	..	d. cr.	—	..	+	+	—	—	—	..	—	..		..	..	Might be same as Kitten Duod. IV.
—	—	+	+	+	—	—	—	—	—	—	+	..	+	—	..	—	..	.	—	..	
—	—	+	+	+	—	—	—	—	—	—	+	..	—	—	—	—	..	+	—	..	Probably same as Feces (baby III., V., VI., VII., VIII., IX., X., XI., XII., and Grass II., 2.
—	—	+	+	—	—	—	—	—	—	—	+	..	—	—	—	.	—	.	.	..	
—	—	+	+	+	+	—	d. cr.	—	—	—	±	..	—	—	..	—	..	+		—	
—	—	+	.	.	—	—	w.	—	—	—	.	..	—	—	—	.	—	.	.	..	
—	—	+	+	—	—	—	—	+	—	—	+	..	—	—	—	.	—	.	—	..	
—	—	—	+	+	—	—	w.	—	—	—	+	..	.	—	—	—	—	+	.	—	
—	—	—	+	+	—	—	—	+	—	—	+	..	—	—	—	+	—	+	+	—	Non-pathogenic guin. pig.
—	—	—	+	.	—	—	—	..	+	—	—	..	—	—	—	+	—	—	—	—	Non-pathogenic guin. pig.
—	—	+	—	+	+	—	d. y.	+	..	..	..	..	..	—	..	..	..	±	..	..	
+	+	+	+	+	—	—	d. w.	+	+	—	+	—	+	+	—	.	—	—	.	..	
+	—	+	+	+	+	—	dr.	+	..	..	+	—	.	.	..	.	—	—	..	..	May be same as Feces XII.
+	+	+	+	+	—	—	br.	+	.	—	+	—	+	—	—	+	—	+	—	..	
+	..	+	+	+	+	..	cr.	+	+	—	+	—	+	—	..	+	—	+	+	..	
+	..	+	+	+	—	—	w.	—	—	—	—	—	—	—	—	+	—	+	—	..	
+	—	+	+	+	+	—	y.	+	+	—	±	..	.	—	..	..	—	—	+	—	Much like Grass X. 27, 28.
+	..	+	+	+	+	—	br.	.	—	—	+	..	+	—	..	—	—	—	—	—	
+	..	..	..	+	—	—	br.	..	.	..	..	..	..	—	..	..	—	—	.	.	
+	..	..	..	+	—	—	br	..	—	..	..	..	..	—	..	..	—	—	..	..	
+	..	+	+	+	+	—	b. w.	—	—	—	+	—	+	—	—	..	—	—	.	..	
+	..	+	+	+	..	..	..	—	—	—	±	..	—	—	—	—	y.	—	.	.	
+	+	..	..	+	..	..	or.	—	..	..	..	..	..	—	—	—	y.	—	..	..	

	Colony.	Motility.	Threads or Chains.	Spores.	Agar Tube.	Broth Tube. Turbid.	Broth Tube. Pellicle.	Broth Tube. Sediment.
Bacteria, Class V.—Continued.								
Winters, I-1	Deep circ., brown-irreg., rosette	—	—	—	Spreading thick	+	—	+
Sheppard, 14	Irreg., border brownish	—	..	—	Yellowish white	..	..	..
H 3	Round, light brown, gran	—	..	—	Abund., chr. yellow	+	—	+
Auger, 35	....	—	—	—	Spreading thin, moist	+	—	+
Auger, 37	Deep, coarsely gran	—	..	..	Spreading, creamy	+	—	+
A 4	Brownish yellow, coarsely gran	—	+	—	Mod., brownish white	+	—	+
Class VI., Chester. Without endospores. Aerobic and facultative anaerobic. Produce pigment on gelatin or agar. Pigment yellowish. Gelatin not liquefied—								
A 9	Round and irreg., gran., yellowish	—	—	—	Mod. raised, smooth, yellow	+	—	—
Sutton, 1	Brown, circ., gran	—	—	—	Spreading, irreg., yellow	+	—	+
M. V., 28	Brown centre, yellowish margin gran	—	..	—	White	+	..	..
Briarcliff, 55	Deep, brown, gran	—	..	—	Shiny, mod	—	—	+
Karp, 64	Large, surface branching, yell	—	+	—	Abund., branching	—	—	+
Class VII., Chester Chromogenic. Without endospores. Aerobic and facultative anaerobic. Produce pigment on gelatin or agar. Pigment reddish—								
Briarcliff, 40	Deep, small, dark	—	+	..	Thick, white, shiny, pinkish.	+	+	+
Class VIII., Chester. Without endospores. Aerobic and facultative anaerobic. Produce pigment on agar and gelatin. Pigment of other colors than yellow and red—								
Sheppard, 28	....	—	..	—	Brownish	..	..	..
M. V., 39	Grayish	—	..	—	Brown	..	..	..
Class IX., Chester. Fluorescent bacteria. Gelatin liquefied—								
Wendland, 26	Surf. large, dark, gran	—	..	—	Thick, gran., greenish	+	+	+
Sheppard, 1	Dark green	—	..	—	Greenish	..	..	..
49 C	Surf., yellowish, gran	—	..	—	Abund., greenish	+	+	+
Class XIII., Chester. With endospores. Aerobic and facultative anaerobic. Rods not swollen at sporulation. Grow at room temperatures. Gelatin liquefied—								
Karp, 59	Deep, dark, gran	—	+	+	Profuse, spreading	+	+	+
Briarcliff, 48	Surf. large, edge gran	—	±	+	Dull	+	+	+
Briarcliff, 53	Deep, dark, regular, gran	—	+	+	Spreading, creamy	+	+	+
Briarcliff, 39	Deep, dark, coarsely gran	—	+	+	....	—	—	+
Cent. Morris, A.	Slowly liq., brownish	—	+	+	Yellowish, spreading	+	—	+
Class XIV., Chester. With endospores. Aerobic and facultative anaerobic. Rods not swollen at sporulation. Gelatin not liquefied—								
C 52	Yellow, round, finely gran., rings.	—	+	+	Faint, white	—	—	—
Sutton, 5	Pale, dull brown	—	+	+	Profuse, irreg., creamy	+	—	+
Auger, 3	Surf. irreg., margin yellowish	—	+	+	Thin, whitish	+	—	+
Decker, 21	Deep, dark, round, gran	—	+	+	Spreading, porcelain	+	+	+
Slawson, f	Light brown	—	—	+	Spreading, porcelain	+	—	+
Auger, 9	Small, dark, fine processes	—	+	+	Delicate	—	+	+
M. V., 42	Light, gran., brown	—	+	+	White	+	+	..
Sheppard, 13	Dark gray	—	..	+	Whitish	..	..	..

Gelatine Tube.				Potato.				Milk.						Ferment Tube.							
Liquefaction.	Deep Funnel.	Surface Growth.	Needle Track.	Visible.	Luxuriant.	Wrinkled.	Color.	Coagulated	Digested.	Slimy.	Acid.	Alkaline.	Odor.	Glucose Fermentation.	Lactose Fermentation.	Growth in Closed Arm.	Chromogenesis.	Gram's Stain.	Indol Produced.	Pathogenesis—Kittens	
·	+	+	+	+	+	—	y.	—	—	—	±	—	—	—	..	+	y.	—	—	..	
·	..	..	..	+	..	..	br.	..	+		..		..	—	..	..	y.	—	.	..	
+	..	+	+	+	—	—	y.	—	+	—	±	..	+	—	—	—	br.	—	+	..	
+	·	+	+	—	+	—	y.	+	+	—	+	—	—	—	..	—	v.	+	—	—	
·	·	+	+	·	·	—	y.	+	+	—	±	..	+	—	—	+	y.	+	+	..	Non-pathogenic guin. pig.
+	—	·	·	+	—	—	—	—	—	—	+	—	—	—	—	—	y.	—	..	..	
—	—	+	+	+	—	—	y.	—	—	—	±	..	+	—	—	..	y.	+	+	..	Muchlike Grass XIX.
—	—	+	—	+	+	—	y.	—	—	—	±	..	—	—	—	—	y.	+	—	—	
—	—	±	..	—	—	—	y. w.	—	—	..	..	..	..	—	—	—	..	+	.	..	
—	—	+	+	·	—	—	y.	—	—	—	±	..	—	—	..	—	y.	+	+	—	
—	—	+	+	+	—	—	—	—	—	—	±	..	—	—	..	—	y.	+	+	..	
—	—	+	—	—	—	—	r.	—	—	—	±	..	—	—	—	+	p.	+	+	—	Non-pathogenic guin. pig.
+	..	..	..	·	—	—	br.	+	+	..	..	..	..	+	..	—	br.	—	..	..	
—	..	..	..	+	—	—	w.	+	..	..	..	..	..	—	..	..	..	+	..	..	
·	·	+	·	·	·	—	d. c.	+	+	—	+	—	+	+	—	+	gr.	—	+	—	Pathogenic guin. pig.
+	..	..	..	+	..	..	br.	+	+	—	..	..	..	—	..		gr.	—	..	..	
+	—	·	+	+	·	—	br.	—	+	—	±	..	+	—	—	..	gr.	—	—	—	
+	..	·	+	+	+	—	cr.	+	+	—	±	..	+	—	..	+	—	+	—	.	
+	..	+	+	·	+	—	gr.	+	+	—	±	..	+	—	..	—	..	+	..	..	
+	.	+	+	—	+	—	w.	+	+	—	±	..	—	—	—	—	br.	+	—	—	Non-pathogenic guin. pig.
+	..	·	+	—	+	—	br.	+	—	—	+	—	+	—	..	—	..	+	..		Much like Feeds VII., XI
—	..	+	+	—	—	—	—	—	—	—	±	..	—	—	—	—	y.	—	+	.	
—	—	—	+	—	—	—	—	—	—	—	±	..	—	—	—	—	y.	—	—	..	
—	—	+	+	—	—	—	—	—	—	—	±	..	—	—	—	—	cr.	—	—	—	
—	—	+	+	+	+	—	br.	—	—	—	—	+	—	—	—	—	..	—	+	—	Non-pathogenic guin. pig.
—	..	+	+	+	+	.	gn.	—	—	—	—	+	—	—	—	—	..	—	+	.	" " " "
—	..	+	+	+	—	—	br.	—	—	—	±	..	—	—	—	+	—	+	+	..	
—	..	+	+	+	+	—	cr.	—	—	—	±	..	±	—	—	—	—	+	+	..	
—	..	+	..	+	—	—	..	+	+	—	.	..	..	+	..	+	—	+	..	..	
—	..	..	..	+	—	—	br.	+	+	..	..		..	+	..	+	—	—	..	..	

	Colony.	Motility.	Threads or Chains.	Spores.	Agar Tube.	Broth Tube.		
						Turbid.	Pellicle.	Sediment.
Bacilli—								
Class I., Chester. Without endosporeo. Aerobic and facultative anaerobic. Colonies on gelatin plates, roundish, not amoeboid or proteus like. Gelatin not liquefied. Decolorized by Gram's method—								
Heitz, 31	Small, yellowish	+	+	—	Flat, spreading	+	—	+
A2	Brown. gran. surf., irreg. margin.	+	+	—	Moderate, shiny, whitish	+	+	+
A24	Dark brown, gran	+	+	—	Faint, white	+	—	+
Wendland, 23	Surf., round, gran	+	+	—	Spreading, gran	+	—	+
8a	(Agar) surf., white, ragged margin	+	+	—	Shiny, moist	+	—	+
Wendland, 25	Surf., light, spreading	+	+	—	Creamy, porcelain	+	—	+
E 5	Small, round, pale brown	+	..	—	Faint, transparent	—	—	+
E 3	Round, light brown, m'k'd gran..	+	..	—	Whitish, transparent	+	—	+
M. V., 31	Brown, coarsely gran., concent.	+	..	—	White	..	+	..
214, 1	Light brown, gran., irreg. margin.	+	—	—	Spreading, porcelain	+	—	+
N. Y. I., 30	Dark brown, coarsely gran	+	..	—		..	+	..
N. Y. I., 14	Like rosette	+	..	—	Yellowish-white	+	..	+
Class II., Chester. Without endospores. Aerobic and facultative anaerobic. Colonies on gelatin not amoeboid or proteus-like. Gelatin not liquefied. Stained by Gram's method—								
Decker, 57	Deep, granular, yellow	+	..	—	Dull	+	..	—
Karp, 63	Liquefying, brown, wavy, gran., margin	+	+	—	Delicate, transparent	+	—	+
Karp, 61	Small, light yellow	+	+	—	Delicate, transparent	—	—	+
402 E. 16, 9	(Agar) diffuse surface col	+	+	—	Profuse, shiny, moist	+	—	+
214, 2	Dark centre, lighter margin	+	+	—	Scant, dull, white	+	—	+
Sheppard, 11	Dark brown, radiations from centre	+	+	—	White	+	+	+
Harlem R. I	(Agar) yellow, deep, granular, branching	+	+	—	Branching.	+	..	..
Class III., Chester. Without endospores. Aerobic and facultative anaerobic. Colonies on gelatin plates not amoeboid or proteus-like. Gelatin liquefied—								
Briarcliff, 43	Surf., moderate size, dark	+	+	—	Flat, light, creamy	+	—	+
285. 5	Slightly gran., colon type	+	+	—	Scant, spreading	+	—	+
N. Y. I., 10	Dark brown	+	..	—	White	..	+	..
N. Y. I., 33	Round, grayish-brown	+	..	—		..	+	..
Beakes, 22	Round, finely gran	+	+	—	Abundant, ivory	+	+	+
J 4	Raised surf., yellowish, gran.	+	—	—	Moderate, whitish	+	+	+
N. Y. I., 4	Dark green	+	..	—		+	+	+
Class V., Chester. Without endospores aerobic and facultative anaerobic. Colonies on gelatin plates becoming amoeboid, etc. Gelatin liquefied. Not stained by Gram's method, or indeterminate—								
E 10	Irreg., gran., col., liquefying	+	..	—	Moderate, dirty white	+	—	+
H 10	Irreg., gran, liquefying	+	..	—	Moderate, white	+	—	+
J 10	Irreg., brownish, gran., liquefying	+	..	..	Abundant, white	+	—	+
Class VI., Chester. Without endospores. Aerobic and facultative anaerobic. Colonies on gelatin plates becoming amoeboid, etc. Gelatin not liquefied—								
Decker, 18	Dark, irreg., branching	+	..	—		+	..	+

Gelatine Tube. Liquefaction.	Gelatine Tube. Deep Funnel.	Gelatine Tube. Surface Growth.	Gelatine Tube. Needle Track.	Potato. Visible.	Potato. Luxuriant.	Potato. Wrinkled.	Potato. Color.	Milk. Coagulated.	Milk. Digested.	Milk. Slimy.	Milk. Acid.	Milk. Alkaline.	Milk. Odor.	Ferment Tube. Glucose Fermentation.	Ferment Tube. Lactose Fermentation.	Ferment Tube. Growth in Closed Arm.	Chromogenesis.	Gram's Stain.	Indol Produced.	Pathogenesis—Kittens.	
—	—	+	+	+	+	—	br.	—	+	+	±	..	—	—	..	—	—	—	—	..	
—	—	+	+	+	+	—	pk.	—	—	—	+	—	—	—	—	—	—	—	—	.	
—	—	+	+	+	+	—	pk.	—	—	—	+	—	+	—	—	..	—	—	+	..	
—	—	+	+	+	+	—	br.	—	—	—	±	..	—	—	.	—	—	—	—	—	
—	—	+	+	+	+	—	br.	—	—	—	±	..	—	—	—	+	—	—	±	..	Possibly same as Grass VII., 27 and S. 2 (dys. stool).
—	—	+	+	+	—	—	d. w.	—	—	—	±	..	—	—	..	+	—	±	—	—	
—	—	—	+	+	—	—	w.	—	—	—	+	—	—	—	—	+	—	—	—	..	
—	—	+	+	+	+	—	w.	—	—	—	±	—	—	—	—	—	—	—	—	..	
—	—	+	..	+	—	—	d. w.	—	..	..	..	..	..	—	..	..	—	—	..	..	
—	..	..	..	+	+	—	pk.	+	+	—	—	+	+	—	..	—	—	—	+	—	Much like S. 1 (dys. stool).
—	—	..	..	+	..	..	d. w.	+	..	..	..	..	..	+		..	..	—	..	..	Possibly same as Grass X., 26.
—	—	+	+	+	..	..	y.	—	..	..	..	..	..	+	..	..	..	..	..	..	Possibly same as Feces (baby) I., II., IV.
—	—	+	+	—	—	—	w.	+	+	—	+	—	+	—	..	+	—	+	..	—	
—	—	—	—	+	—	—	—	+	—	—	+	—	—	—	..	—	—	+	+	—	
—	—	—	+	+	—	—	—	+	—	—	+	—	—	—	..	+	—	+	+	—	
—	—	+	+	+	+	—	br.	—	—	—	±	..	—	—	..	+	—	+	+	—	
—	—	—	—	+	—	—	—	—	—	—	±	..	—	—	..	..	—	+	+	—	
—	—	..	..	+	+	—	y.	—	—	—	±	..	..	—	..	..	—	+	..	..	
—	—	+	+	+	—	—	d. w.	—	—	—	+	—	+	—	—	+	—	+	+	—	
+	—	+	+	+	+	—	cr.	+	+	—	+	—	+	—	..	—	—	+	+	—	
+	+	+	+	+	+	—	pk.	+	—	—	+	—	+	—	..	—	—	±	—	—	
+	—	..	..	+	+	—	br.	+	..	..	..	..	..	+	..	..	..	—	..	..	
+	..	..	..	+	..	..	d. w.	+	..	..	+	..	..	—	.	..	..	—	..	..	Might be same as Rabbit Colon I. and II.
+	+	+	+	+	+	—	cr.	—	—	—	+	—	+	—	—	—	—	—	+	—	
+	+	+	+	+	—	—	—	—	—	—	+	—	—	—	—	+	—	—	+	..	Non-pathogenic guin. pig.
+	..	..	..	+	+	—	br.	+	+	..	..	..	.	+	..	..	..	..	..	..	
+	+	+	+	+	—	—	br.	—	—	—	+	—	—	—	—	..	—	—	..	..	
+	+	+	+	+	—	—	d. w.	+	+	—	+	—	—	+	—	+	—	—	+	..	
+	+	+	+	+	—	—	pk.	+	+	—	+	—	+	+	+	+	—	—	+	..	
—	—	+	+	+	+	—	y.	—	..	..	+	..	—	—	..	—	..	±	..	—	

Colony.		Motility.	Threads or Chains.	Spores.	Agar Tube.	Broth Tube. Turbid.	Broth Tube. Pellicle.	Broth Tube. Sediment.
Bacilli—								
Class VII., Chester. Without endospores. Aerobic and facultative anaerobic, chromogenic. Pigment yellowish. Gelatin liquefied—								
Auger, 33	Surface flat, light orange	+	..	..	Abundant, orange	+	—	+
Class VIII., Chester. Without endospores. Aerobic and facultative anaerobic. Chromogen c p gm nt, yellowish. Gelatin not liquefied—								
E 7	Very irreg., branched col	+	..	—	Yel'owish, branching	+	—	+
N. Y. I., 15	Round, yellow.-brown, elevations	+	..	—	Yellowish white, shiny	+	..	+
Class IX., Chester. Without endospores. Aerobic and facultative anaerobic. Chromogenic, pigment reddish. Gelatin liquefied—								
Karp, 56	Light, deep, small	+	..	—	Creamy, flesh color	+	—	+
Class XI., Chester. Without endospores. Aerobic and facultative anaerobic. Pigment brownish, black or gray on gelatin or agar.								
Woodland I. a	Light brown, circ	+	..	—	Brownish color, thro', media	+	—	+
Woodland I. b	Light brown, slowly liquefying	+	—	—	Lux., media, brown	+	—	+
Class XIII., Chester. Without endospores. Aerobic or facultative anaerobic. Cultures show a greenish fluorescence. Gelatin liquefied—								
Beaks, 25	Gran., opaque surf., with wrinkled edges	+	+	—	Abund., greenish white	+	—	+
Beaks, 26	Brown, coarsely gran. center, margin, finer	+	+	—	Abund., greenish	+	+	+
Cent. Morris, A-1.	Pale brown with concent. rings	+	..	—	Abund., spreading, waxy	+	+	+
N. Y. I., 31	Raised yellowish centre, gray irreg. margin	+	..	—	....	+	+	..
285-4	Dark granules, surf., even marg.	+	—	—	Faint, media green	+	—	+
Bellevue III	Large, greenish surface	+	+	—	Spreading, med. green	+	—	+
Bellevue II	Deep, oval, homog., light brown	+	+	—	Spreading, med. green	+	+	+
Heitz, 10	Mod. large surface, coarsely gran.	+	+	—	Faint, media green	—	—	+
A 3.	Round brown gran	+	..	—	Abund., dirty white	+	+	+
A 1	Small, deep, dark brown	+	..	—	Abund., dirty white	+	+	+
Class XV., Chester. With endospores. Aerobic and facultative anaerobic. Rods not swollen at sporulation. Gelatin liquefied—								
Briarcliff, 52	Liq., light gran., large	+	..	+	Abund., dry, wrinkled	—	+	—
Briarcliff, 54	Liq., surf., light flaky	+	..	+	Abund., whitish, wrinkled	+	+	+
Briarcliff, 47	Irreg. surf., edge thready and gran.	+	+	+	Dull, spreading	+	+	+
Briarcliff, 45	Large spreading surf., spiry marg.	+	+	+	Flat, spreading	+	+	—
M. V., 23	Dark brown, deep., coarsely gran.	+	..	+	....	..	..	..
M. V., 25	Brown, concentric rings	+	..	+	Br. white	..	..	..
Class XVI., Chester. With endospores. Aerobic and facultative anaerobic. Rods not swollen at sporulation. Gelatin not liquefied—								
Slawson, d	Depressed, concentric rings	+	..	+	Spreading, porcelain	+	+	+
N. Y. I., 12	Dark green surface	+	..	+	White	..	+	.
Bellevue IV	Brown surface, gran	+	..	+	Delicate, creamy	+	—	+
Briarcliff, 50	Deep, small, yellowish, gran. marg.	+	..	+	Dull, wrinkled	+	+	+
285-2	Deep, brown, round	+	+	+	Spreading, porcelain	+	—	+
Sheppard, 9	Very light gran., surf. col	+	..	+	White, spreading	..	..	..
Sheppard, 17	Greenish brown	+	..	+	White	..	..	..

Gelatine Tube.				Potato.				Milk.						Ferment Tube.							
Liquefaction.	Deep Funnel.	Surface Growth.	Needle Track.	Visible.	Luxuriant.	Wrinkled.	Color.	Coagulated.	Digested.	Slimy.	Acid.	Alkaline.	Odor.	Glucose Fermentation.	Lactose Fermentation.	Growth in Closed Arm.	Chromogenesis.	Gram's Stain.	Indol Produced.	Pathogenesis—Kittens.	
+	+	+	+	+	+	—	y.	+	+	–	+	—	—	—	—	+	or.	—	+	..	Possibly same as Grass VIII., 6. Non-pathogenic guin. p g.
—	—	+	+	+	—	—	d w.	—	—	—	±	—	—	—	—	—	y.	+	—	..	
—	—	..	.	+	+	—	y.	—	+	..	±	..	..	+	..	..	..	..	..	..	
+	—	+	+	+	+	—	br.	+	—	—	+	—	—	—	..	+	pk.	+	+	..	
—	—	+	+	—	—	—	—	—	—	—	+	..	—	—	—	—	br.	—	+	..	
+	..	+	+	+	—	—	y.	+	+	—	±	..	—	—	—	—	br.	—	+	..	
+	+	+	+	+	+	—	y. br.	+	+	—	±	..	+	—	—	—	gn.	—	+	—	Non-pathogenic guin. pig.
+	+	+	+	+	—	—	br.	+	+	—	±	..	+	—	—	—	gn.	—	+	—	" " " "
+	+	+	+	+	+	—	cr.	+	+	—	±	..	—	—	—	—	gn.	—	+	.	
—	—	..	..	+	—	—	br.	+	+	..	±	..	..	—	..	..	gn.	—	..	..	
+	+	+	+	+	—	—	br.	+	+	—	—	+	+	—	..	—	gn.	—	+	..	
+	+	+	+	+	—	—	b.:	+	—	—	+	—	+	—	.	..	gn.	-	—	..	
+	+	+	+	—	—	—	br.	—	—	—	±	..	—	—	..	..	gn.	—	+	..	
+	+	+	+	+	+	—	—	—	—	—	±	.	—	—	..	—	gn.	—	—	..	
+	+	+	+	+	—	—	br.	—	+	—	±	..	+	—	—	.	gn.	—	+	..	Probably same as Feed XXII., 2.
+	+	+	+	+	—	—	—	+	—	—	+	—	—	+	+	+	gn.	—	+	..	
+	+	+	+	+	+	+	d. w.	+	+	—	±	..	+	—	..	+	—	+	+	—	Non-pathogenic guin. pig.
+	+	+	+	+	+	+	br.	+	+	—	±	..	—	—	..	—	—	—	—	—	
+	+	+	+	+	+	—	d. w.	+	+	—	±	..	+	—	..	+	—	+	+	—	
+	+	+	+	+	+	..	d. w.	+	—	—	∓	—	+	—	..	+	—	+	+	—	
+	—	+	+	+	—	—	d. w	..	..	.	..	+	..	—	.	..	..	—	..	..	
—	..	..	..	+	+	..	y. w.	—	..	..	±	..	.	—	..	..	..	±	..	..	
—	—	—	—	+	+	—	br.	+	+	—	+	--	+	—	—	—	—	—	+	..	
—	..	..	..	+	+	—	br.	+	+	..	±	.	..	—	..	..	—	—	..	..	
—	—	—	—	+	+	—	br.	+	—	—	+	..	—	—	—	—	—	[illegible]	+	..	
—	—	+	+	+	+	+	br.	+	..	..	±	..	+	—	..	+	..	.	..	..	
—	—	+	+	+	—	—	—	+	—	—	+	—	+	+	..	+	—	—	+	—	
—	..	..	..	+	+	—	w.	+	+	..	+	..	..	+	.	..	..	—	..	..	
—	..	..	..	+	+	..	pk.	—	+	..	±	..	..	+	..	..	..	—	..	.	

The predominating variety in twelve specimens of 24-hour milk was classified as follows:

	Sample.	Class.	Cultural Characteristics Resemble those of
Jan. 1902..	No. 240 (628 E. 17th)..	[Yeast.]	....
" ..	No. 131 (262 Ave. A)..	Streptococci III.......	Streptococcus pyogenes.
" ..	No. 108...............	Bacteria XIII........	B. fluorescens liq. (Flugge).
" ..	Century Newton.....	Bacteria III...........	Acidi lactici group. Bacterium lacticum (Kruse).
" ..	Slawson	" II.......... .	Septicaemia hemorrhagica group.
" ..	Echo Farm...........	Bacteria III............	Bacillus cloacae.
" ..	Woodlands II........	Microscopical IV.. ...	Micrococcus concentricus. " cerevisiae.
" ..	Beakes.........	Bacteria II.	Sept. hemorrhagica group.
" ..	Harez.	" III......	(See above.)
Feb. 1902.	Dutcher.........	Streptococci III.......	Streptococci pyogenes.
Aug. 1902.	Century In...........	Bacteria II......	(See above.)
" .	Century...............	" IV...........	Bacteria ambiguum group.

The predominating variety in five specimens of milk when received (about 24 hours old) and 24 hours later:

January, 1902.	1st Day.	2d Day.	Resembling.
No. 131 (262 Ave. A)....	Streptococcus III......	Same..........	Streptococcus pyogenes.
No. 240 (628 E. 17th).....	[Yeast]................	[Same]........	Yeast.
Century Newton........	Bacteria III.....	Same.....	Acidi lactic group. Bacterium lacticum.
Century Morristown....	" XIII.........	"	B. fluorescens liq.
Slawson................	" II.....	"	Sept. hemorrhagica group.

Approximate count of the different varieties in four milks at the time of their arrival at the Laboratory, and the changes in 24 hours:

No. 240 (628 E. 17th) January, 1902.		1st Day.	2d Day.
(1) A22...........	Yeast (not classified).....................................	34,500	6,250,000
A23...........	Micrococcus IV..............................	13,800	2,500,000
A24...........	Bacillus I..........................	7,500	1,500,000
A25...........	Bacterium II..................	6,900	1,250,000
A21...........	Micrococcus IV..................	500	10,000

	Century Newton, January, 1902.	1st Day.	2d Day.
(2) CNa	Bacterium III	100,000	80,000,000
CNb	Bacterium II	27,000	2,000,000
	Liquefiers not differentiated	25,000	140,000

	Century Inamere, August, 1902.	1st Day.	2d Day.
(3)	Micrococcus IV	800	Very few.
	Micrococcus V	1,120	36 400
	Bacterium II	1,280	328,000

	Century, August, 1902.	1st Day.	2d Day.
(4)	Bacterium II	40.000	1,274,800
	Bacterium IV	385,000	534,000
	Bacillus I	224,000	2,937,000
	Few miscellaneous types.		

Amount of Material Used for Examination.

Specimens of 24-hour milk examined:

With counts under 100,000	10
With counts over 100,000	19
Not estimated	15
Total	44

Specimens of "old" milk examined (24 hours in Laboratory):

With counts under 100,000	1
With counts over 100,000	8
Not estimated	18
Total	27

Number of cultures examined:

From 24-hour milk	183
From old milk	56
Total	239

These 239 cultures, apparently having some cultural or other differences, were divided into the 31 classes of the table, each class containing from 1 to 39 more or less closely related organisms.

It seems possible that repeated and careful comparative work might reduce the number of apparently distinct varieties at least 50 per cent.

Bacteria were isolated from various materials which, under certain conditions, might be sources of contamination for the milk, and the cultures compared with those taken from milk:

Forty-three cultures (representing about 31 varieties) from 20 specimens of hay and grass.

Forty-one cultures (representing about 28 varieties) from 15 specimens of feces, manure and intestinal contents.

Eighteen cultures (representing about 17 varieties) from 10 specimens of feeds.

Eleven cultures from grass or hay, 26 cultures from intestinal contents or feces or manure and 5 cultures form feed, resembled closely 26 of the cultures from milk.

No work was done upon bacteria isolated from water, but in the attempts at identification a number of the varieties isolated from milk were shown to be identical with types commonly found in water.

From the observations made during the course of the work, it seems as if the term "Milk Bacteria" suggests a condition which does not exist in fact. The expression would seem to indicate that a few varieties of organisms, especially those derived from the cow, are commonly found in milk which, having entered the milk in the udder or after its withdrawal from the udder, are so well fitted to the cultural conditions existing in milk that they overgrow all other chance contaminations. As a matter of fact, it was found that milk taken from a number of cows in which almost no outside contamination had occurred, and plated immediately, showed mostly streptococci, staphylococci and other varieties of bacteria of kinds not frequently found in these 24-hour specimens—the temperature at which milk is kept being less suitable for them than for the forms which fall into the milk from dust, etc.—the latter outnumbering the parasitic forms.

The tables giving an estimate of the varieties found in 24-hour milk and in the same milk after a second period of 24 hours (and which are typical of a number of similar counts) seems to show that an organism which has gained a place in milk in 24 hours will be likely to hold about the same place in proportion to the number of other organisms present at the end of a second 24 hours.

A large number of the specimens examined showed the presence of more or less closely related varieties which were identified with organisms described by various authors as milk bacteria, but these same or very similar organisms were found also in hay, grass, feed, manure, and the intestinal contents of various animals, and it seems probable that the same cultural characteristics are common to bacteria which are quite widely distributed. For the most part specimens of milk from different locations showed a difference in the character of the bacteria present, in the same way that the bacteria from hay, feed, etc., varied, and even the intestinal contents of domestic animals, the bacteriology of which might be expected to show many common characteristics, contained beside the predominating colon types other organisms which differed widely in different species of animals and in different localities.

With so great a variety in the bacteriology of the agencies through which milk may become contaminated, it seems reasonable to suppose that the nature of the bacteria in a given specimen of milk will depend on the bacteriology of the particular sources of contamination to which the specimen has been exposed, and the particular temperature, etc., to which the specimen has been subjected.

Milk Contamination.

The Amount of Bacterial Contamination of City Milk—Is It Practicable to Lessen It?

By Wm. H. Park, M. D., Assistant Director, Research Laboratory.

The investigations, the results of which are here given, were undertaken with the object of determining how much contamination necessarily takes place in milk during milking, and how much bacterial growth afterward in its transit from the dairy to the city. The results show that it is perfectly practicable for the farmer and shipper, without appreciable increase of expense, to furnish commercial cow's milk with far less bacterial contamination than that now supplied.

From a careful study of the question, I think that the milk now consumed is unnecessarily contaminated, and that this is largely due to the present almost complete ignorance of persons, commercially interested, who do not appreciate the fact that bacteria arising from contamination by stable and barnyard dirt are capable, unless inhibited by cold (with the present allowance of time for transportation), of an enormous development which may render good milk unfit for food. Although this study applies to the conditions existing in New York City only, I hope that the facts brought out may be of general use.

The Source of New York Milk.

Nearly all the New York milk is transported to the city by railroads, most of it traveling a distance of 50 to 350 miles. The milk is delivered in the city about 2 A. M., consequently when it is shipped at a point distant 350 miles from New York it must start on its journey as early as 8 A. M. on the previous day. Under existing conditions the milk which reaches New York must, therefore, have been kept 12 to 36 hours. Twelve hours more must elapse before the last of the milk is used. The milk is usually delivered at New York in 40-quart cans, or in quart jars. The dealers in the city have no control over the extent of bacterial growth which exists in their milk, though they may prevent further contamination and exclude further development by the application of cold.

The problem in New York and other cities of great size is, therefore, to furnish milk in a condition suitable for food after it has been kept from 24 to 48 hours. Milk even staler than 48 hours is now sold, but this is totally unnecessary and should not be allowed.

The present dangerous condition of the milk of great cities, especially in hot weather, arises partly from the fact that the great growth of the cities has so widened the area from which milk is obtained. The cleanliness, cooling, and interval of time consumed in transportation, which sufficed for milk to be drunk in the neighborhood, are utterly insufficient for milk which is consumed at a distance of 300 miles from the place of milking. The number of bacteria present in the milk of healthy cows depends almost entirely on four things: (1) The original amount of germicidal substance in milk; (2) The amount of bacterial contamination on or after milking; (3) The length of time which has elapsed since milking; (4) The temperature at which the milk has been kept. We have no control over the natural germicidal qualities of milk, but we can insure cleanliness in procuring milk. The degree to which milk is cooled and the length of time it is kept, can also be almost completely controlled.

There is frequently an inexcusable lack of cleanliness in the methods of procuring milk and of care in sufficiently cooling and keeping it during its transportation. Even in the matter of sending milk to the railroad many farmers take twenty-four hours more than is necessary, keeping back one-half of their milk in order to save the trouble and expense of making more than one trip each day to the station. In considering what can be done to lessen the bacterial contamination of New York's milk supply, we may first note the comparatively small number of bacteria in milk which has been obtained and kept under suitable conditions, then the moderate number in milk which has been procured under ordinary dirty conditions, but which has been properly cooled and quickly transported, and finally the large number in the milk sold in New York under present conditions.

These data are given in the following observations:

I.

The number of bacteria present at the time of milking and 24, 48 and 72 hours afterward in milk obtained and kept under correct conditions.

No preservatives were present in any of the following specimens:

TABLE I.

Milk obtained where every reasonable means was taken to insure cleanliness. The long hairs on the udder were clipped; the cows roughly cleaned and placed in clean barns before milking; the udders were wiped off just previous to milking; the hands of the men were washed and dried; the pails used had small (six-inch) openings, and were thoroughly cleaned and sterilized by steam before use. Milk cooled within one hour after milking to 45 degrees F., and subsequently kept at that temperature. The first six specimens were obtained from individual cows; the last six from mixed milk as it flowed at different times from the cooler. Temperature of barns 55 degrees F.

*Number of Bacteria in 1 c.c. of Milk.**

From six individual cows.

5 Hours After Milking.	After 24 Hours.	After 48 Hour	After 72 Hours.
500	700	12,500	Not counted.
700	700	29,400	"
19,900	5,200	24,200	"
400	200	8,600	"
900	1,600	12,700	"
13,600	3,200	19,500	"
Average. .6,000	1,933	17,816	

*Number of bacteria obtained from development of colonies in nutrient agar in Petri plates. The nutrient medium contained 2% peptone and 1.2% agar, and was faintly alkaline to litmus. One set of plates were usually left four days at about 20° C. and one set 24 hours at 37° C., and then 24 hours at 20° C. From 5 to 30% more colonies developed as a rule in the plates kept at room-temperature than in those kept for 24 hours at 37° C. The milk was diluted as desired with 100 or 10,000 parts of sterile water, and 1 c.c. of the diluted milk was added to 8 c.c. of melted nutrient agar. Plates containing over 1,000 colonies were found to be inaccurate, in that they gave too low totals. Apparently a considerable number of bacteria failed to develop colonies when too many were added to the nutrient agar. Nutrient gelatine was found to be more troublesome and not to yield more accurate results than nutrient agar.

From mixed milk of entire herd.

6,900	12,000	19,800	494,000
6,100	2,200	10,200	550,000
4,100	700	7,900	361,000
1,200	400	7,100	355,000
6,000	900	9,800	445,000
1,700	400	8,700	389,000
Average..4,333	2,766	10,583	329,000

Twenty-five samples taken separately from individual cows on another day and tested immediately averaged 4,550 bacteria per c.c. and 4,500 after 24 hours. These 25 specimens were kept at between 45 degrees and 50 degrees F.

II.

Milk taken during winter in well ventilated, fairly clean, but dusty barns. Visible dirt was cleaned off the hair about the udder before milking. Milker's hands were wiped off but not washed. Milk pails and cans were clean, but the straining cloths dusty. Milk cooled within two hours after milking to 45 degrees F.

TABLE II.

Number of Bacteria in 1 c.c. of Milk.

At time of Milking.	After 24 Hours.	After 48 Hours.
12,000	14,000	57,000
13,000	20,000	65,000
21,500	31,000	106,000
Average. 15,500	31,666	76,000

These specimens were kept at between 45 degrees and 50 degrees F.

III.

Milk taken from cows in ordinary barns. Ground covered thick with manure, the cows being more or less visibly dirty. The teats were cleaned slightly by running the unwashed hands over them once before milking. Pails and cans were thoroughly cleaned but not sterilized by heat. Milk cooled to 45 degrees F. within two hours after milking.

TABLE III.

Bacteria in 1 c.c. of Milk.

Shortly After Milking in Warm Weather.	Shortly After Milking in Winter Weather.
18,300	11,500
18,300	11,600
21,200	17,800
22,000	18,900
51,200	19,900
51,200	20,200
Average.... 30,366	16,650
Average after 24 hours.... 48,000.	Average after 24 hours.... 31,000.
" " 48 hours.... 680,000.	" " 48 hours.... 210,000.

IV.

The condition of the average city milk is very different and is shown in the following tables.

The twenty samples were taken late in March by Inspectors of the Department of Health of New York City from cans of milk immediately upon their arrival in the city.

The temperature of the atmosphere averaged 50 degrees F. during the previous 24 hours. The temperature of the milk when taken from the cans averaged 45 degrees F. Much of this milk had been carried over 200 miles. From the time of its removal from the cans, which was at about 2 A. M., until its dilution in nutrient agar at 10 A. M. the milk was kept at about 45 degrees F.

TABLE IV.

From New York and Hudson River Railroad.		From Harlem Railroad.	
Number of Sample.	Number of Bacteria in 1 c.c.	Number of Sample.	Number of Bacteria in 1 c.c.
50	35,200,000	48	6,200,000
51	13,000,000	49	2,200,000
52	2,500,000	50	15,000,000
53	1,400,000	51	70,000
54	200,000	52	80,000
55	600,000	53	320,000
56	2,500,000	54	5,000,000
57	100,000	55	140,000
58	3,700,000	56	25,000,000
59	135,000	57	52,000
Average per c.c.	5,933,500	Average per c.c.	5,406,200

It is interesting to note that while the average number of bacteria in the samples is very high, yet in nearly one-half of the specimens the number is low. The high figures were obtained from improperly handled milk.

V.

Milk as sold in the shops in the morning hours gave the following results:

TABLE V.

Column *A* shows the number of bacteria per c.c. in 10 samples of milk supplied to the poorer tenement districts in midwinter. Average temperature of the milk 41 degrees F. (highest 46 degrees, lowest 38 degrees).

Column *B* shows the corresponding number of bacteria in 10 samples taken from different dairy stores throughout the portion of the city inhabited by the more "well-to-do" classes in midwinter.

Column *C* gives corresponding figures for 5 samples from tenement districts early in September. Average temperature of the air during the preceding 24 hours. 78 degrees F. Average temperatures of samples 50 degrees F.

Column *D* contains the results obtained early in September from milk sold in the "well-to-do" districts.

Column *E* shows number of bacteria in 5 samples taken from tenement districts on a hot July day. Average temperature previous 24 hours, 85 degrees F.

Number of Bacteria in 1 c.c. of Milk.

	A.	*B.*	*C.*	*D.*	*E.*
	110,000	30,000	5,600,000	80,000	5,000,000
	140,000	30,000	6,100,000	192,000	21,000,000
	140,000	60,000	15,916,000	355,000	22,000,000
	280,000	60,000	16,320,000	480,000	135,000,000
	320,000	70,000	31,888,000	4,200,000	200,000,000
	560,000	155,000			
	640,000	240,000			
	1,200,000	560,000			
	6,400,000	650,000			
	10,500,000	1,420,000			
Average.	2,029,000	327,500	15,163,600	1,061,400	76,000,000

While the above figures indicate that much of the milk sold in the better class stores is fair, even in summer, they show a serious condition for most of that sold to the poorer classes—those who not only comprise the larger part of the population, but who are also compelled to keep their children in town during the hot weather.

It must be kept in mind that milk averaging 13,000,000 bacteria per c.c. will, when kept at the temperature common in the homes of the poor, soon contain very largely increased numbers unless it is sterilized by boiling.

A study of the present methods of handling milk makes it clear why so much of the milk contains excessive numbers of bacteria, and also, fortunately, how a great improvement can be effected by a few simple changes in the methods of handling milk.

The Influence of Temperature Upon the Rapidity of Bacterial Multiplication in Milk.

Few even of the well informed appreciate how great a difference a few degrees of temperature will make in the rate of bacterial multiplication. Milk rapidly and sufficiently cooled keeps almost unaltered for 36 hours, while milk insufficiently cooled deteriorates rapidly.

The majority of the bacteria met with in milk grow best at temperatures above 70 degrees F., but they also multiply slowly even at 40 degrees F.; thus of 60 species isolated by us, 42 developed good growths at the end of 7 days at 39 degrees F. Our observations have shown that the bacteria slowly increase in numbers after the germicidal properties of the milk have disappeared, and the germs have become accustomed to the low temperature. In fact milk cannot be permanently preserved unaltered unless kept at 32 degrees F. or less. The degree of cooling to which ordinary supplies of milk are subjected, differs greatly in various localities. Some farmers chill their milk rapidly, by means of pipe coils over which the milk flows; others use deep wooden tanks filled with water into which the cans of milk are placed soon after milking. In winter these methods are very satisfactory, for the water runs into the pipes or tanks at about 38 degrees F. In warmer weather they are unsatisfactory, unless ice is used, as the natural temperature of the water may be as high as 55 degrees F. A considerable quantity of milk is not cooled at all at the farms. It is sent to the creamery or railroad after 2 to 6 hours, and is then more or less cooled. These few hours in summer, when the milk is left almost at blood heat, allow an enormous development of bacteria to take place, as is shown in the table below.

TABLE VI.

Showing the development of bacteria in two samples of milk maintained at different temperatures for 24, 48 and 96 hours, respectively. The first sample of milk was obtained under the best conditions possible, the second in the usual way. When received, specimen No. 1 contained 3,000 bacteria per c.c., specimen No. 2 30,000 per c. c.

Temperature Fahrenheit.	Time which Elapsed Before Making Test.			
	24 hours.	48 hours.	96 hours.	168 hours.
32°	2,400	2,100	1,850	1,400
	***30,000**	**27,000**	**24,000**	**19,000**
39°	2,500	3,600	218,000	4,200,000
	38,000	**56,000**	**4,300,000**	**38,000,000**
42°	2,600	3,600	500,000	
	43,000	**210,000**	**5,760,000**	

Temperature Fahrenheit.	Time which Elapsed Before Making Test.			
	24 hours.	48 hours.	56 hours.	168 hours.
46°	3,100	12,000	1,480,000	
	42,000	**360,000**	**12 200,000**	
50°	11,600	540,000		
	89,000	**1,940,000**		
55°	18,800	3,400,000		
	187,000	**38 000.000**		
60°	180,000	28,000,000		
	900,000	**168,000,000**		
68°	450,000	25,000,000,000		
	4,000,000	**25,000,000 000**		
86°	1,400,000,000			
	14,000,000,000			
94°	25,000,000,000			
	25.000,000,000			

* The figures referring to tests of the second sample are printed in heavy type.

Observations on Bacterial Multiplication in Milk at 90° F., a Temperature Common in New York in Hot Summer Weather.

TABLE VII.

Number of Bacteria per 1 c.c.

Milk I.		Milk II.	Milk III.
Fresh and of Good Quality.		Fair Quality from Store.	Bad Quality from Store.
Original number	5,200	92,000	2,600,000
After 2 hours	8,400	184,000	4,220.000
" 4 "	12,400	470.000	19,000,000
" 6 "	68,500	1,260,000	39,000,000
" 8 "	654,000	6,800,000	124,000,000

A sample of milk No. I. removed after 6 hours and cooled to 50 degrees F. contained 145,000,000 at the end of 24 hours. Some of this milk which was kept cool from the beginning, contained but 12,800 bacteria per c.c. at the end of 24 hours.

Time Required for the Transportation of Milk from the Farm to the City.

On inspection of dairy-farms it is found that farmers make but slight attempts to hurry their milk to market, except, perhaps, in the very hottest weather.

Thus, if the milk-train leaves a town daily at 9 P. M., the farmer who finishes milking at 5 P. M., and cooling the milk by 6 P. M., does not send the milk to the station that evening, but waits until the next day, so that he can send the milk from the morning's milking at the same time, and save the trouble of an extra trip. Thus, instead of one-half of his milk being delivered at the city after 12 hours, 36 hours will have elapsed before it reaches the consumer. The same is true of farmers living at a greater distance from the city, who instead of getting their milk to the city after an interval of 24 and 36 hours, get it there after 48 and 36 hours, making it 60 and 48 hours old when it reaches the consumer. As the milk is usually only cooled to about 52 degrees F., the immense development of bacteria permitted through this unnecessary addition of 24 hours to the shipping time is apparent. A glance at the previous table, as well as at the following figures, illustrates this.

Number of Bacteria Present in Milk Taken from Cows in Common Dirty Stalls, 24, 36 *and* 48 *Hours After Milking. Milk Cooled Only to* 52° *F. Three Hours After Milking and Maintained at That Temperature.*

TABLE VIII.

Number of Bacteria per 1 *c.c. of Milk.*

After 3 Hours.	24 Hours.	36 Hours.*	48 Hours.
21,200	70,000	350,000	1,600,000
51,200	64,600	333,000	1,250,000
18,000	61,000	305,000	1,400,000
22,000	76,000	380,000	2,300 000
51,200	64,000	320,000	1,280,000
18,300	81,006	405,000	2,180,900
Average.... 30,366	69,433	348,833	1,668,333

*These figures at 36 hours are estimated from the test of one sample only.

By simply compelling the farmers within a radius of 100 miles from the city to send their afternoon's milk on the train of that evening, and those further off to send the morning's milk on the morning train, a great decrease in the amount of bacteria would be obtained, since no milk would be delivered at a later time than 36 hours after milking.

The Degree of Cleanliness Used in Obtaining Milk and Its Influence.

The present conditions under which much of the milk is obtained are not pleasant to consider. In winter, and to a less extent at other seasons of the year, the cows in many stables stand or lie down in stalls in the rear portion of which there is from one to four inches of manure and urine. When milked the hands of the milkers are not cleansed, nor are the under portions of the cows, only visible masses of manure adhering to the hair about the udder being removed. Some milkers even moisten their hands with milk, to lessen friction, and thus wash off the dirt of their hands and of the cow's teats into the milk in the pails. Some may regard it as an unnecessary refinement to ask that farmers should roughly clean the floors of their stalls once each day, that no sweeping should be done just before milking, and that the udders should be wiped with a clean damp cloth and the milkers should thoroughly wash and wipe their hands before commencing milking. The pails and cans should not only be carefully cleansed, but afterwards scalded out with boiling water. The washing of the hands would lessen the number of ordinary filth bacteria in the milk, and diminish risk of transmitting to milk human infectious diseases like scarlet fever, diphtheria, and enteric fever, by the direct washing off of the disease germs from infected hands. It would also inculcate general ideas of the necessity of cleanliness and of the danger of transmitting disease through milk. The value of cleanliness in limiting the number of bacteria is demonstrated by the figures contained in the tables.

Summary and Conclusions.

Because of its location and its hairy covering, the cow's udder is always more or less soiled with dirt and manure unless cleaned. On account of the position of the pail and the access of dust-laden air it is impossible to obtain milk by the usual methods without mingling with it a considerable number of bacteria. With suitable cleanliness and gentle handling during milking, however, the number is far less than when filthy methods are used, there being no reason why fresh milk should contain in each c.c. on the average, more than 12,000 bacteria in warm weather and 5,000 in cold weather. Such milk, if quickly cooled to 46 degrees F., and kept at that temperature, will at the end of 36 hours, contain on the average less than 50,000 bacteria per c.c., and if cooled to 40 degrees F. will average less than its original number.

With only moderate cleanliness such as can be employed by any farmer without adding appreciably to his expense, namely, clean pails, straining cloths, cans or bottles, and hands, a fairly clean place for milking, and a decent condition of the cow's udder and the adjacent belly, milk when first drawn will not average in hot weather over 30,000, and in cold weather not over 25,000 bacteria per c.c. Such milk if cooled to and kept at 50 degrees F., will not contain at the end of 24 hours over 100,000 bacteria per c.c. If kept at 40 degrees F., the number of bacteria will not be over 100,000 after 48 hours.

If, however, the hands, cattle and barns are filthy, and the pails are not clean, the milk obtained under these conditions will, when taken from the pail, contain very large numbers of bacteria, even up to a million or more per c.c.

Freshly drawn milk contains a slight and variable amount of bactericidal substances which are capable of inhibiting bacterial growth. At temperatures under 50 degrees F. these substances act efficiently unless the milk is filthy for from 12 to 24 hours, but at higher temperatures their effect is very soon completely exhausted, and the bacteria in such milk will then rapidly increase. Thus the bacteria in fresh milk which originally numbered 5,000 per c.c. decreased to 2,400 in the portion kept at 42 degrees F. for 24 hours, but rose to 7,000 in that kept at 50 degrees F., to 280,000 in that kept at 65 degrees F., and to 12,500,000,000 in the portion kept at 95 degrees F.

As we have seen, the milk in New York City is found on bacteriological examination to contain as a rule excessive numbers of bacteria. During the coldest weather the milk in the shops averages over 300,000 bacteria per c.c., during cool weather about 1,000,000, and during hot weather about 10,000,000. The milk in other large cities is, from all accounts, in about the same condition.

The above statement holds for milk sold at the ordinary shops, and not that of the best of the special dairies, where, as previously stated, the milk containly only from 10,000 to 30,000 bacteria, according to the season of the year.

The question as to whether enormous numbers of bacteria in milk during hot weather are actually harmful has been considered in the report on feeding milk to tenement children, which precedes this.

Our knowledge is as yet insufficient to state just how many bacteria must accumulate to make them noticeably dangerous in milk. Some varieties are undoubtedly more harmful than others, and we have no way of restricting the kinds that will fall into milk, except by enforcing cleanliness. Slight changes in the milk which to one child would be harmless, would in another produce disturbances which might lead to serious disease. A safe conclusion is that no more bacterial contamination should be allowed than it is practical to avoid. Any intelligent farmer can use sufficient cleanliness and apply sufficient cold, with almost no increase in expense, to supply milk 24 to 36 hours old which will not contain in each c.c. over 100,000 bacteria.

The most deleterious changes which occur in milk during its transportation are now known not to be due to skimming off the cream, or to the addition of water, but to the changes produced in the milk by multiplication of bacteria. During this multiplication, acids, and distinctly poisonous bacterial products, are added to the milk, to such an extent that much of it has become distinctly deleterious to infants and invalids. It is the duty of Health Authorities to prevent the sale of milk rendered unfit for use through excessive numbers of bacteria and their products.

The culture-tests to determine the number of bacteria present in any sample of milk require at least 48 hours, so that the sale of milk found impure cannot be prevented. It should, however, be the purpose of the authorities gradually to force the farmers and the middlemen to use cleanliness, cold and dispatch in the handling of their milk, rather than to prevent the use of the small amount tested on any one day.

If the milk on the train or at the dealer's were found to contain excessive numbers of bacteria, the farmers would be cautioned and instructed to carry out the simple necessary rules, which would be furnished. If they failed to correct the evil, the Health Authorities would, by refusing permits to the sellers, or in other ways, prevent the further sale of such milk. Thus the present lack of interest of dealers and farmers regarding the bacterial purity of their milk would be overcome.

If the authorities decide to establish a standard of bacterial purity for milk, what should it be?

We must recognize that much of the present impurity of milk in hot weather is due to the ignorance of the farmers and carriers, also that it will be well, if possible, to have their cordial co-operation in bettering the quality of the milk. It seems to the writer, therefore, that at first it would be more important to establish the principle that excessive bacterial multiplication in milk is harmful, and to get the co-operation of all those who deal with milk to do their best to limit this multiplication, than to fix any definite number of bacteria as the limit above which milk must be destroyed. Some figures, however, must be adopted by the authorities, even at first, beyond which milk cannot be allowed to be distributed. I think 500.000 per c.c. for milk entering New York and 1,000,000 per c.c. for milk delivered to the consumer might be a practical standard. If no milk worse than the above was brought in or distributed there would be a vast improvement over previous years, and, as a matter of fact, no dealer could afford to try and approach the limit, for if he did he would frequently go beyond it. Thus even by enforcing a standard allowing at least five-fold the number of bacteria which should be present in milk, a great improvement in our milk supply and a compulsory education of the farmer in the need of cleanliness, the preservative effect of cold, and a few of the elementary laws governing the transmission, the multiplication and the products of bacteria, would be secured. The difficulties which would be met with in distributing knowledge, in carrying out the tests, and in enforcing better methods would undoubtedly be great in cities of the size of New York; but the size of a city increases the need even more than the labor of the work; and wholesome, clean, unfermented milk is certainly of sufficient importance to make it worth while to undertake far more difficult tasks than this will prove to be.

On May 8, 1901, the Department of Health of New York City adopted measures to prevent, after a reasonable time, the introduction into New York City of milk which contains unnecessary numbers of bacteria. It will be of great interest to watch the results of this action. Already in 1902 it is noticeable that no milk is found in the stores as bad as the worst milk of 1900 and 1901.

To those farmers sending milk to the city containing over 1.000.000 bacteria per c.c. the following circular is sent:

CIRCULAR OF INFORMATION FOR FARMERS RELATING TO THE COLLECTION AND CARE OF MILK.[1]

Issued by the Department of Health of New York City.

The Department of Health of New York City has determined to adopt stringent measures against the introduction into New York of milk which contains an unnecessary and dangerous number of germs or bacteria.

The investigations of the Department have shown that under proper conditions and with reasonable care milk reaches the city in excellent condition, containing but a comparatively small number of germs. Where large numbers of germs are present in it, experience has shown that it is always the result of an unusual lack of cleanliness, or some serious defect in the methods of collection, handling, or care of the milk.

This circular is issued by the Department for the information of farmers and dairymen so that they may in their own interests observe those precautions which are necessary to preserve the milk in good condition and thus prevent its being condemned.

DIRECTIONS.

1st. The greater the cleanliness observed in collecting milk. the smaller will be the number of germs which drop into it.

2d. The quicker the temperature of the milk is reduced and the lower it is kept the slower the growth of bacteria in it will be.

3d. The quicker the milk is transported to the consumer the less time there is for the multiplication of germs and the better will be the condition of the milk when delivered.

A Detailed Consideration of these Three Factors which influence the Condition of Milk.

1st. *The Barns*—The barns should be kept clean, so that the cattle will not become filthy from lying in manure. If the cows are milked in the barns, no sweeping should be done a short time before milking, otherwise the dust raised, which is full of germs,

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[1] This circular is to be distributed to all farmers who send milk to New York City.

will settle into the milk. If possible, a separate clean shed should be used for milking. The barns and the dairy building, if there is one, should be some distance from the dwelling house, to limit the danger of transmitting through the milk any contagious disease which may occur among the inmates of the house. Barns should be well ventilated and dry, so as to keep the cattle healthy.

2d. *The Water*—The water used for cleaning the pails, cans, and for all other purposes in connection with the milk should be from a source at some distance from the house and barn, so that there shall be no danger of pollution by sewage.

3d. *The Cows*—The majority of the germs which enter milk come from dirt which is shaken from the cow's udder and belly during milking. In order to have clean milk, it is necessary to prevent this; therefore previous to milking, the udder and the adjacent belly should be cleaned of dirt. All visible manure from these portions and from the tail should be removed, and the udder and the skin of the belly surrounding it should be wiped with a damp cloth. This largely prevents it from being shaken off during milking.

The milk should not be used from cows whose udders are diseased, or who are themselves unhealthy in any way.

4th. *The Milkmen*—All who come in contact with the cows or the milk should be free from contagious disease, and should not come in contact with any case of contagious disease, such as diphtheria, scarlet fever or measles. These and other diseases may be transmitted by the infection of the milk.

Before milking, the milkmen should thoroughly wash their hands with clean soap and water and dry them on a clean cloth, in order to remove all dirt and germs from them. This should be done after the cow's udder, belly and tail have been cleaned. Milkmen should never moisten their hands with milk, in order to lessen the friction in milking, as this tends to cause dirty milk to drip into the milk-pail.

5th. *The Pails, Cans, Straining Sieves and Cloths*—These should all be absolutely clean. They are very frequent sources of extensive contamination of the milk. They should all be cleaned immediately after use, first with lukewarm water, and then sterilized by being scalded with boiling water. After being thoroughly washed they should be placed upside down, to prevent dust from falling into them, as this contains great numbers of germs. Straining sieves and cloths should be covered over to protect them from dust.

6th. *Cooling*—Milk should be cooled quickly to 45° F., or less. The simplest way is by placing the cans in a large wooden tank containing cold water Except in winter, the water should be cooled and kept cold by the addition of ice, so as to be at 40° F., or less, and the cans should be immersed up to their necks and left to stand at least one hour, or until shipped to the creamery or train. If any milk in the cans stands at a level higher than the surrounding water, it is scarcely cooled at all for many hours.

The milk having been obtained in a cleanly manner and quickly cooled, should be delivered cold at the creamery or train. A full can of milk retains its cold for some time, but in summer should not be exposed to the warmth of the air for over one hour. If it is to be kept for a longer period at the station, some arrangements for keeping it cool must be made. Milk should never be allowed to stand in the sun.

7th. *Transportation*—Milk should be shipped to the city as quickly as possible. Many farmers hold the evening's or morning's milk over an entire day, to avoid the inconvenience of early delivery. This causes great injury to the milk. Dairymen have come to believe that as long as the milk is delivered in the city in such condition that it will remain sweet until delivered to the consumer, nothing more is required. Such milk when sold often contains enormous numbers of germs, is unwholesome, dangerous, and capable of causing much sickness and death, especially in the summer. The high death-rate from diarrhea among infants in the summer in the city is wholly due to such milk. Milk known to be over 36 hours old, or containing large and unnecessary numbers of germs, will not in future be allowed to enter New York.

The Transmission of Contagious Diseases Through Milk.

No farmer or dairyman should allow any one who has a contagious disease, or who has been in contact with any person having scarlet fever, typhoid fever, measles, diphtheria, or consumption, to have access to the cattle, or to have any connection with the milk or milking, or with the milk utensils. Epidemics and outbreaks of contagious disease are often produced through the infection of the milk in this way, and if cases of disease in New York are traced to any dairyman, and proof is found that disease has been transmitted through negligence on his part, the Department of Health will take summary action in relation to this.

IV.

The Period of Development, the Time of Greatest Accumulation, and the Persistence of Diphtheria Antitoxin in the Blood of a Series of One Hundred Horses.

James P. Atkinson (Assistant Chemist).

From the Research Laboratory of the Department of Health of the City of New York.

The maximal capacity of horses to develop antitoxin varies very greatly and depends to a certain extent only upon the amount of toxin injected and the frequency of the injections. This variation is of interest both to the biologist and to the producer of antitoxic sera for medical purposes. The following statements and tables are based on the experience derived by us from the injection of about two hundred horses with diptheria toxin.

There seems to be a maximal antitoxic limit for each horse, beyond which it cannot be pushed, no matter what the amount of the diphtheria toxin injected. After reaching this maximal limit, which by our methods is attained on the average four months after the toxin injections begin, the blood serum may continue for a while, if the injections are continued, to contain antitoxin of the maximum amount, but sooner or later the quantity of antitoxin surely diminishes. It is seldom that a horse whose power of developing antitoxin, after having been pushed to the maximum, has diminished, can be stimulated to develop again the maximum amount of antitoxin. Probably horses 7 and 83 are only apparent exceptions to this rule as the notes below the table will show, since the injections were not pushed in the first months as high as required to develop the greatest amount of antitoxin. But in these cases, also, the horses' ability to develop antitoxin diminished after a time, until two hundred units per cubic centimeter was the best that could be obtained. The effect of a long rest in the pasture on a good antitoxin horse whose power of developing antitoxin has run down has been tried by us. Such horses rarely produced again their former maximum amount.

The Health Department of the City of New York has from March, 1897, until May, 1902, made use of one hundred horses for the production of diphtheria antitoxin. A consideration of the earlier horses is omitted because the methods used to develop the antitoxin were then variable.

These horses were carefully selected, and were all young, healthy animals of medium grade, and did not represent any special breed or locality.

In the majority of the horses the toxic effects of the first three or four toxin doses injected were more than neutralized with diphtheria antitoxin. The size of the first injections varied considerably, the earlier horses receiving three hundred to fifteen hundred guinea-pig fatal doses of toxin with but little antitoxin, the later horses receiving five thousand to forty thousand guinea-pig fatal doses of toxin fully neutralized. With each succeeding injection the antitoxin amount was gradually diminished.

The toxin injections were increased each time by as much as was considered safe, usually twenty-five to fifty per cent., and repeated as soon as the temperature fell to the normal, about every five to seven days.

The following table is a summary of our data:

TABLE I.

Horses producing diphtheria antitoxic sera (100 consecutive horses tested)..	Below 300 units per cc.......	300–400 units per cc.......	400–500 units per cc.......	500–600 units per cc.......	600–700 units per cc.......	700–800 units per cc.......	800–900 units per cc.......	1000–1100 units per cc.......	1200–1300 units per cc.......
Number of horses producing diphtheria antitoxic sera (maximum strength)...	51	12	11	9	7	7	(Horse 182) 1	(Horse 112) 1	(Horse 137) 1
Average of guinea-pig fatal doses given to produce maximum antitoxic strength.	666,316*	1,027,067	1,260,000	1,338,666	725,564	1,367,362†	412,000	1,082,500	354,200
†Period of injections	3 months*	3.85 months	4.55 months	4.55 months	5 months	4.64 months	2½ months	10 months	2½ months
Average length of time horses continued to produce diphtheria antitoxic sera of 300 units per cc. or greater........	....	1 bleeding only except in the case of horse 174, which gave two bleedings of 300 units per cc........	2 months	3 months 27 days	6 months 24 days	5.3 months‡	14 months§	23 months 18 days	5 months 6 days
Per cent. of different grades of sera........	51	12	11	9	7	7	1	1	1

Per cent. of horses producing serum	below 300	units per cc.,	51.
" "	over 300	"	49.
" "	" 400	"	37.
" "	" 500	"	26.
" "	" 600	"	17.
" "	" 700	"	10.
" "	" 800	"	3.

Fourteen of the 51 horses recorded as giving sera below 300 units per cc. died before a test for strength had been made of their sera, but they are placed in the list because at the time of death it was too early to expect a serum containing 300 units per cc.

*The small amount of toxin injected, and the short period during which the injections were carried out, were due to our having gotten rid of the horses when they failed to increase in antitoxin.

†Horse 184 required 5,214,000 guinea-pig fatal doses, and horse 193 required 1,131,500 guinea-pig fatal doses to develop the greatest immunity. The other five horses of the 700-800 unit grade averaged 648,140 guinea-pig fatal doses to develop the greatest immunity. Horses 184 and 193 bring up the average of the time required to develop the greatest immunity of their grade from 3.3 to 4.64 months.

‡One of these horses is still producing antitoxin above 300 units.

§Still producing antitoxin above 300 units.

‖The early death of 137 was caused by an accident, and was not due to the toxin injections. 137 was still producing high-grade antitoxin.

It will be seen by the table that 49 per cent. of these horses were capable of developing antitoxic sera of 300 units per cubic centimeter or more, and that 26 developed antitoxic sera of over 500 units per cubic centimeter, the so-called high-grade sera.

Eleven horses which failed to develop 300-unit sera received enormous total toxin injections, varying from 1,195,250 guinea-pig fatal doses to 3,005,500 guinea-pig fatal doses, which covered a period of three to six months; average, four and one-half months.

The horses incapable of developing sera containing 300 hundred units per cubic centimeter were replaced by others with the hope of getting stronger sera. This, together with the early deaths of 14 horses, accounts for the short period they were kept and for the smallness of the average of total guinea-pig fatal doses they received

It is interesting in Table I to note the great variation in the average number of guinea-pig fatal doses and the average period of injections required to produce the maximum strength in the different grades of horses. The figures are somewhat misleading where single horses are concerned, for the reason that they may have been bled and their injections for several weeks stopped before reaching the maximum amount of antitoxin.

A few notes on some of the horses that have given the largest amount of antitoxin may be of general interest.

Horse 112 was such a remarkable antitoxin producer that a table showing the series of toxin injections, the number of bleedings and the strength of the sera obtained, beginning with the first series of toxin injections and ending at the point of greatest immunity, is given as the clearest way of setting forth these facts.

TABLE II.

Chart of the Series of Toxin Injections and Bleedings and Strengths of the Sera Obtained from Horse 112.

Total number g. p. f. d. at time of bleeding	180,000 g. p. f d.	330,000 g. p. f. d.	450,000 g. p. f. d.	767,000 g. p. f. d.	1,057,000 g. p. f. d.	1,187,000 g. p. f. d.	1,847,000 g. p. f. d.
Dates of bleedings..	X.—15 1896.	XI.—18 and XII.—5	XII.—30 and I.—5, '97	II.—9 and II.—19	III.—26	IV.—19	V.—25 and VI.—1
Strengths of sera in units per cc.......	500 units	700 and 450 units	800 and 700 units	700 and 600 units	600 units	700 units	1,000 and 600 units

Had it not been necessary to bleed horse 112 so early and so constantly, the point of greatest immunity would undoubtedly have been reached much sooner and with many less guinea-pig fatal doses. For fifteen months after developing its maximal antitoxic strength horse 112 continued to yield sera above 300 hundred units per cubic centimeter. The strength of the serum then fell to about 200 units per cubic centimeter, above which it did not rise again.

Horse 137 after the initial bleeding (1,200 units per c.c.) never gave a stronger serum than 600 units per cubic centimeter, but held at that strength until its death. Two horses not included in this series are worthy of mention.

Horse 83, after receiving 361,000 guinea-pig fatal doses, gave a 500 to 600 unit serum (period of injection two and one-quarter months).

After receiving 2,904,000 guinea-pig fatal doses additional, the serum did not increase in strength more than 100 units per cubic centimeter.

After a rest of one and one-fourth months the horse was given 1,115,000 guinea-pig fatal doses. The strength of the serum rose to 850 units per cubic centimeter. As in the case of horse 112, had it not been necessary to constantly bleed horse 83 the maximal antitoxic strength probably would have been reached much sooner. No. 83 furnished antitoxic sera usually above 500 units per cubic centimeter through a period of twenty-two months.

One of the first horses treated, No. 7, was bled at intervals for four years and gave a serum varying between 300 and 500 units. The injections in this horse were not pushed to the limit. This horse is not included in Table I.

We may conclude from the above data that from carefully selected young horses of medium grade—

1. About one-half will develop sera of 300 units strength per cubic centimeter or greater, and that about one-fourth will develop sera of 500 units strength per cubic centimeter or greater.

2. That the average development of maximum strength may be expected three to five months after the first toxin injection, according to the rapidity with which the toxin is pushed.

3. That horses capable of producing a high grade antitoxin serve a longer period of usefulness than horses capable of producing a medium grade antitoxin.

(In conclusion, I wish to thank Dr. William H. Park, Director of the Research Laboratory, for his kindly criticism, and Dr. George P. Biggs, Assistant Pathologist, for his help in supplying me with much of the data.)

V.

Persistence of Varieties of the Bacillus Diphtheriæ and of Diphtheria-Like Bacilli.*

Anna W. Williams, M. D. (Assistant Bacteriologist),

(From Research Laboratory, Department of Health, New York City.)

The fact that there are many varieties of the diphtheria bacillus has been fully established.

But that such varieties are true sub-species with constant characteristics, one variety not readily if ever changing into another, has not been demonstrated. On the contrary, of late the idea seems to be gaining ground among some investigators that all of the various forms of diphtheria-like bacilli are the result of more or less transitory variations of the same species, and hence that the virulent forms are the result of a rapid adaptation to environment and consequent pathogenesis of the non-virulent forms both typical and atypical.

This question of the relationship of the specifically virulent diphtheria bacillus to non-virulent, diphtheria-like bacilli has been discussed since the descriptions of a bacillus called the pseudo-diphtheria bacillus were published by Löffler[1] in 1887 and von Hofmann-Wellenhof[2] in 1888. Löffler's prediction that still more bacilli resembling the true diphtheria bacillus would be found, just as many bacteria similar to the cholera spirillum had been reported, has certainly come true. Many forms under the name "pseudo-diphtheria bacillus" have been described, many under the name "xerosis," and many as non-virulent diphtheria bacilli. The descriptions of Löffler and von Hofmann and of those immediately following have left us in some doubt as to which organism was meant by the pseudo-diphtheria bacillus. Each observer was probably describing a different variety of diphtheria-like bacilli, different characteristics were noted, and hence the difficulty when trying to compare results. In Park and Beebe's[3] work of 1895 a complete tabulation of the results of the studies on the so-called pseudo-diphtheria bacillus up to that time is given, and the reason for the confusion in which the descriptions left us is plainly shown.

These observers give the name "pseudo-diphtheria bacillus" to a group of organisms with certain definite cultural and morphological peculiarities, different from those of the diphtheria bacillus, and for this reason as well as from their further observations that such bacilli were not found in typical diphtheria and that no case of infection from them was noted, they consider them an entirely distinct species from the diphtheria bacillus. The typical non-virulent bacilli they consider diphtheria bacilli which have lost their virulence. This belief is based first upon their own observations, second upon those of Escherich and others that bacilli of different

*Read March 29, 1902, at the Second Annual Meeting of the American Association of Pathologists and Bacteriologists at Cleveland, Ohio.

degrees of virulence were isolated from diphtheria cases, and third upon the well-known work of Roux and Yersin in which they state that they found diphtheria bacilli of all degrees of virulence up to their most virulent forms, that non-virulent bacilli were more frequent towards the end of the disease, that they had deprived virulent diphtheria bacilli of their virulence, and raised the virulence of slightly virulent bacilli, though they had not been able to give virulence to bacilli which had lost all virulence. Park and Beebe state that the typical non-virulent diphtheria bacilli are probably incapable of causing diphtheria, for the twenty-four cases in which they were found by them never developed any lesions, nor were they the origin of any case of diphtheria, so far as could be ascertained. The observations of Escherich seem to show that diphtheria bacilli have more stable properties than one is led to believe from the work of Roux and Yersin. He found that most bacilli from cases of diphtheria were fully virulent, that they retained their virulence throughout the course of the disease, that the same degree of virulence was possessed by bacilli from different cases which were apparently infected from the same source, and that the virulence was retained for a long time on artificial culture media. He found only occasionally non-virulent typical forms which he regarded as diphtheria bacilli which had lost virulence, and the bacillus he describes as pseudo-diphtheria bacillus, and which is probably the same as that described by Park, he considered a distinct species on account of morphological and cultural differences.

Until 1896 no one had brought forward evidence to show that fully non-virulent forms could be made virulent. In this year Trump[4] states that he converted a non-virulent bacillus which he said was similar to those described by Hofman, Löffler, Escherich and others as pseudo-diphtheria bacilli (though it produced acid), into one capable of killing guinea-pigs with all the symptoms of true diphtheria, by successive passages through guinea-pigs plus a non-fatal dose of diphtheria toxin. From the description of the bacillus it should be classed with the non-virulent forms of the diphtheria bacillus. Hewlett and Knight[6] state (1897) that they changed a typical virulent diphtheria bacillus into a non-virulent bacillus of the pseudo type by heating for seventeen hours at 45° C. They only succeeded with one culture, though they tried others. They say also that they changed a pseudo-diphtheria bacillus, similar to Park's, into a typical virulent diphtheria bacillus by culture and passage through guinea-pigs. They obtained similar, but not such marked results with other cultures.

Richmond and Salter[7] (1898) and Salter[8] (1899) state that they have changed five pseudo-diphtheria bacilli into typical diphtheria bacilli specifically virulent for guinea-pigs by passage through a number of goldfinches, and that a substance produced by the pseudo-diphtheria bacillus in broth cultures unites with diphtheria toxin as Ehrlich's protoxoid does. Their conclusion is that there are diphtheria bacilli of every grade of virulence from the Hofmann's (their description agrees with

Park's pseudo) or pseudo-diphtheria bacillus capable of killing only certain birds, up to those that kill certain of the rodents.

Peters[5] distinguishes two morphological species of pathogenic diphtheria bacilli, each of which kept its special morphological character for two years on artificial culture media, except that the short form became more like the "Hofmann's bacillus" and lost its virulence. He thinks that there is no proof that the Hofmann's bacillus is an attenuated form of the diphtheria bacillus.

Axenfeld[9] was not able through long cultivation to change one form into another, therefore he considered such forms sub-species. Bergey[10] found some non-virulent forms culturally and morphologically different from the virulent forms; he was not able to give virulence to these non-virulent forms, neither did he find that these latter gave immunity against the former; for these reasons he considers them distinct members of a large group of bacilli at the head of which stands the diphtheria bacillus.

In the work of Wesbrook, Wilson and McDaniel[11], on "Varieties of Bacillus Diphtheriæ," the study is based upon the morphology of the individual bacillus found in smears of throat cultures and pure cultures. They give as a reason for the study of the individual bacillus that in "pure cultures in most instances, especially where they have been derived from typical clinical cases of diphtheria, it is the exception to get even a moderate degree of uniformity in the general shape, size, staining reactions, etc., of the individual bacilli; whilst to get complete uniformity is not to be hoped for," and therefore each culture is probably a mixture of several varieties having been derived from several parents. They make a provisional classification based upon the morphology of the individual bacilli, into three groups, called granular, barred and solid, two of the groups into seven types and the other into five, two of the types corresponding with those in the other groups not having been seen. In a study of the types found in the smears from a series of direct cultures derived from clinical cases of diphtheria the authors state that there is generally a sequence of types in the variations which appear throughout the course of the disease, the granular types predominating at the outset of the disease, and these giving place wholly or in part to the barred and solid types shortly before the disappearance of diphtheria-like organisms. In one case the converse was seen. In a serial study of the pure cultures, while the types met with in the original culture remain the predominating types, yet "it appears that the granular types when predominating or unmixed with the barred or solid types in the original cultures have, however, a tendency, as in throat cultures taken in series, to become more and more mixed with or replaced by barred or solid forms altogether in the later examinations. * * * Certain of these stocks, however, in which one of the solid types is the only diphtheria-like organism seen in the original throat culture, and in which the immediate succeeding cultures show only solid types, are found to contain later in the series some of the barred or granular types and seem to show a gradual transition from solid types through barred to granular types."

The inference drawn from this work is that the diphtheria bacillus may be rather easily, especially in the throat, converted into non-granular solidly staining forms of the "pseudo-diphtheria" type, and that the converse may occur, and that therefore all diphtheria-like bacilli must be considered a possible source of danger.

Cobbett[12] considers the pseudo-diphtheria bacillus as perfectly innocuous to man, but that the relation between the pseudo-diphtheria and the diphtheria bacillus remains undecided. He did not meet with bacilli of low virulence. He found a few non-virulent and the others were all highly virulent. No Hofmann's bacillus possessed any virulence. He thinks that the reason why the pseudo-diphtheria bacilli appear so infrequently during the acute stage is that they are overlooked then because one discovers the virulent bacilli so easily and does not trouble to look any more, and they are found more easily later because the diphtheria bacilli are disappearing and are hard to find; consequently a long and careful search is made, and the pseudo-diphtheria bacilli are seen for the first time.

Ohlmacher[13] states "that most of the common charateristics of the diphtheria bacillus are unstable" and that the pseudo-diphtheria bacillus is but a modified variety of Löffler's bacillus. He made his experiments in 1894, and reports them in January of the present year. He says that by one passage through a white rat he changed "a long granular or barred bacillus" into "a short, plump, uniformly staining rodlet, an example of the short, solid type of diphtheria bacillus of Westbrook, and of Gorham, which, by many authorities, is classed as the pseudo-diphtheria bacillus." From the second variety, which was originally "a short, plump, solid rodlet, with an occasional short granular example," he says he obtained, by one passage through a guinea pig, "a long barred, or granular, 'typical' diphtheria bacillus." From a third variety of "the extreme atypical morphological type" he says he obtained, by one passage through a guinea pig, "a long barred or granular 'atypical' diphtheria bacillus." Recently, the work of Wiison, Westbrook and McDaniel has been corroborated by Gorham[14].

All of this work (including the reports of observers not mentioned in this paper) in regard to the relationship of the different diphtheria-like bacilli to the true diphtheria bacillus may be summed up and tabulated as follows:

Statements in favor of the belief that one form may be changed readily into another.	*Statements opposed to this belief.*
1.—The morphological and cultural characteristics of all diphtheria-like organisms from pseudo to typical virulent forms have some points of resemblance.	The morphological and cultural characteristics of some varieties have many points of difference.

Statements in favor of the belief that one form may be changed readily into another.	*Statements opposed to this belief.*
2.—Diphtheria bacilli possess many grades of virulence, from the fully virulent to the non-virulent.	Intermediate grades of virulence are rare.
3.—Non-virulent bacilli, both typical and non-typical, have been found more frequently in the convalescing stage of diphtheria than in the acute stage.	There are other reasons than that of change of one form to another to account for this.
4.—Non-virulent, atypical bacilli have been the only diphtheria-like organisms found in light anginas.	Diphtheria bacilli and other organisms have also been found.
5.—A sequence of forms in the course of diphtheria and in successive generations of pure cultures, from granular through barred to solid forms, and the converse, has been observed.	This remains to be further corroborated.
6.—Solid forms, approaching the atypical non-virulent forms, have been found to be specifically virulent.	Among large numbers of virulent diphtheria no solid varieties have been found.
7.—The virulence of the diphtheria bacillus has been decreased artificially with a change in form and cultural characters, and slightly virulent diphtheria bacilli have been made more virulent.	Artificial decrease of virulence of the diphtheria bacillus has not been made to a great extent, neither have slightly virulent bacilli been made highly virulent.
8.—Non-virulent atypical bacilli have been changed to typical, specifically virulent diphtheria bacilli.	Non-virulent atypical bacilli have retained their characteristics on various artificial culture media under different conditions and in passage through animals.
9.—Virulent typical diphtheria bacilli have been changed to solidly staining, non-virulent, diphtheria-like bacilli.	Virulent typical diphtheria bacilli retain their characteristics on various artificial culture media under different conditions.
10.—The solidly staining non-virulent pseudo-form produces a substance which acts as Ehrlich's protoxide.	This remains to be corroborated.

The central idea in the statements of those who believe that diphtheria-like bacilli are simply transitory variations of the species Bacillus diphtheiræ is that both the diphtheria bacillus and those bacilli which resemble them have many unstable properties, their form, their cultural characteristics, their pathogenicity all varying within a wide limit, so that one form may assume readily the properties of another form. The separatists, on the other hand, have found that certain forms possess such stable properties that one is not converted into another, and hence they regard them as distinct species.

In the work reported in this paper I shall attempt to show from studies of the diphtheria bacillus and of diphtheria-like bacilli, extending irregularly over a period of seven years, that not only are there distinct species in this group, but that each species has distinct sub-species or varieties, with characteristics which continue to persist under different conditions; thus, varieties as well as species remain separate, and when grown under similar conditions the species show no tendency to become converted one into the other, while the varieties gradually change, approaching a common norm.

An outline of the work is as follows:

I.—A study of the diphtheria and diphtheria-like bacilli found in a series of clinically typical diphtherias at the Hospital for Contagious Diseases—

(1) Serial smears of cultures directly from throats and noses.

(2) Pure cultures isolated from these cultures.

II.—A study of the diphtheria and diphtheria-like bacilli found in healthy and diseased throats in a town during an epidemic of diphtheria—

(1) Smears of cultures directly from throats.

(2) Pure cultures isolated from these cultures.

III.—A study of diphtheria and diphtheria-like bacilli found in sore throats during an epidemic of diphtheria at a home for destitute children—

(1) Pure cultures.

IV.—A study of pure cultures of diphtheria and diphtheria-like bacilli from sources other than those given above—

(1) On various artificial culture media grown under various conditions.

(2) In living tissues of guinea-pigs, white rats and goldfinches.

(3) In symbiosis with other bacteria.

I. A study of the diphtheria and diphtheria-like bacilli found in a series of clinically typical diphtheria at the Willard Parker Hospital. This study was undertaken in order to help solve the following questions:

First—Do the varieties of specifically virulent diphtheria bacilli change throughout the course of the disease?

Second—Are pseudo and non-virulent forms met more frequently at the end than at the beginning of the disease?

It may be well to say a word about what is meant by *variety* in this paper. The term is applied to a pure culture as a whole and not to individual bacilli, and by it is meant that certain pure cultures possess some persistent morphological and cultural characteristics so different from those of other pure culture that the culture has a distinct individuality. Such a pure culture may be composed of bacilli of many different forms, but since separate colonies form this culture produce cultures having the same distinct individuality as the original culture, each bacillus, if it could be separated and made to grow by itself, would presumably produce the same. This is contrary to Wesbrook's idea that each "so-called pure" culture is a mixture of types, if he uses types as synonymous with variety, as he appears to do. That a pure culture is a mixture of "types" if types means forms is true, but that it is a mixture of varieties in the biological sense is not shown by these studies.

In the cases studied at the Willard Parker Hospital, cultures on Löffler's blood serum were made every other day from the nose and throat until the disappearance of all "suspicious" bacilli. Smears from 24-hour growths were examined and the "types" found noted according to Wesbrook, Wilson and McDaniel's scheme. Pure cultures of the different varieties of diphtheria-like bacilli found in the first serum cultures were isolated, also from the tubes containing the last suspicious bacilli, each day's tubes containing 24-hour culture having been kept in the ice-box after examination until the next cultures were examined.

In using Wesbrook's classification for indicating the "types" found in smears from the mixed cultures directly from the patient, it was often difficult and sometimes impossible to make the form fit. Though these authors have undoubtedly pictured the principal definite forms met in smears from cultures containing other bacteria, the variations in form of the diphtheria bacillus, especially when grown with other bacteria, are so numerous that qualifying words usually must be added to their letters. For instance, there are thick and thin, long and short Cs and Ds, granular, barred and deeply staining C^1s and D^1s, with intermediate and irregular forms innumerable.

All that can be said in tabulating the results according to Wesbrook's scheme is that the letters indicate the nearest approach to his types.

EXAMINATION OF SMEARS FROM PRIMARY BLOOD SERUM CULTURES MADE FROM TIME TO TIME THROUGHOUT THE DISEASE AND UNTIL THE DISAPPEARANCE OF DIPHTHERIA BACILLI FROM THE THROATS.

Types Present (According to Wesbrook, Etc.)

Case.	No. Culture.	Throat.	Nose.
No. 1	1	C—D, C^2, majority C	No diphtheria-like bacilli.
	2	C—C^2 " "	" " " "
	3	No diphtheria-like bacilli	" " " "
	4	" " " "	" " " "
No. 2. Died the day after the sixth culture.	1	C, D, C^1, D^1, + and — granules	C, C^1, D^1, D (C^1 and D^1 = + and — granules).
	2	C, D, C^2, D^1, C^1, + and—granules	C, D, C^1, D^1 (C^1 and D^1 = + and —granules).
	3	C, D, and strings of 3 and 4 C^1, D^1, + and — granules	Same as throat.
	4	A, C, D, C^1, C^2, D^2, D^1, A^1, + and — granules	About as throat.
	5	D^2, C, D, F^2, D^1 (contaminated culture with large bacilli and many cocci)	D, C, D^2, D^1, C^2, C^1, + and — granules.
	6	C, D single and in strings, C^1, A, D^1	C, C^1, D, single and in strings, D^1, D^2.
No. 3	1	D^2, C^2, A^2, C	E^2 (long), C, C^2, D^2, A, A^2.
	2	C^2, C, D, A	C^2, E^2, D^2, C.
	3	C, C^2 (C single and in strings of 2 and 3), D	C, C^2 (few strings of C), D.
	4	C, D, E, C^1, A	D, E^2.
	5	C, C^1, D, E.	C, E^2, D, C^2.
	6	C, D, many in 2 and 3 strings, C^2, D^2, A, F, few with irregular granules, A^1, + granules	No diphtheria-like bacilli except E^2.
	7	No diptheria-like bacilli	No diphtheria-like bacilli except E^2.
No. 4	1	C^2 (short), occasional short bacillus with irregular granules	E^2 (long) and same bacillus as in throat, few.
	2, 3, 4	Occasional short irregular bacillus with irregular granules	E^2 (long and thick), occasional short thick bacilli with irregular granules.
	5	Occasional C^2, C^1, C	D^1, E^2, B^2.
	6	Few C^1, C, D^2	B^2, E^2, D^2, occasional A^2.
	7	C, C^2, D, D^2, A (few)	D, D^2, E^2, C (few).
	8	No diphtheria-like bacilli	No diphtheria-like bacilli.
No. 5	1	C^1, D^1, + and — granules, coccus forms, C, D, C^2, D^2	C, D, C^1, D^1, coccus forms, + and — granules.
	2	C^2, C^1, D^1, with granules D, C	C^1, D^1, + and—granules, C^2, A^2, C, D, A.
	3	C^1, D^1 + and — granules, C, D, in strings, A	C^1, D^2, + and — granules, C, D, in strings, A.
	4	C^1, D^1, C	D, C, C^1, D^1, A, D^2.
	5	C, D, C^1, A	C^1, C, D, D^1.
	6	C (in 2 and 3), A, C^2, D^2, D, F, C^1 (few)	C, C^2, A, D, F, C^1, few.
	7	No diphtheria-like bacilli	C, D^1, D (few).
	8	" " " "	No diphtheria-like bacilli.

Case.	No. Culture.	Throat.	Nose.
No. 6...	1	C^2, C..........................	E^2, E^1.
	2	No diphtheria-like bacilli.........	E^2, D^1.
	3	" " " "	E^2.
No. 7...	1	C, D, A, D^2 (3 and 4 in strings of C and D)......	No diphtheria-like bacilli.
	2	D, D^2, C (scarlet fever? removed from ward)..................	" " " "
No. 8..	1	C, D, C^2	E^2, D^1, C^2.
	2	C, C^1, C^2, D^1, D^2, A	E^2, C^2, E^1.
	3	C, A, C^1, C^2....	E^2.
	4	D occasional (contaminated culture)	E^2.
	5	D^2, D^1, E^2	E^2, E^1.
	6	C, D, D^1......	E^2.
	7	C, D, D^2, C^1...	E_2.
	8	C, D, A, C^1........	E_2.
	9	C, C^2, D, D^2, A..........	E_2.
	10	C^2, C, D^2, D, few	E_2, occasional.
	11	No diphtheria-like bacilli.........	E_2. "
No. 9...	1	C, D, E.........................	E^2, occasional C and E^1.
	2	C, D, C^2, D^2, C^1.	E^2.
	3	C^1 (darkly stained), C, D.........	E^2.
	4	Contaminated....................	E^2.
	5	No diphtheria-like bacilli.	E^2.
No. 10..	1	C, D, E, A.......................	No diphtheria-like bacilli.
	2	No diphtheria-like bacilli.........	" " " "
	3	" " " "	" " " "

Case No.	Culture No.	Pure Cultures Obtained from the W. P. H. Cases Above Recorded. (a.) Throat.	(b.) Nose.
No. 1...	1	C, D — on serum. Decidedly spreading colonies on agar and short bacilli. Rapid and abundant growth in broth with formation of decided pellicle within 24 hours. $\frac{1}{50}$ cc. broth culture = death in 5 days of a 240 grm. guinea-pig.	
	2	Same as first culture.	
No. 2...	1	C^1, D^1, C, D and many small forms between D and E, though more irregular on serum. Small, non-spreading colonies on agar, many coccus forms with few larger thick bacilli and occasionally clubbed ends. Moderate growth in broth with formation of delicate pellicle after 3–4 days. $\frac{1}{50}$ cc. ascitic broth culture = death in 4 days of a 230 grm. guinea-pig..	Same as throat culture.
	5	Same as first culture (isolated by the ascitic broth method)...........	Same as throat culture.

Case No.	Culture No.	Pure Cultures Obtained from the W. P. H. Cases Above Recorded. (*a.*) Throat.	(*b.*) Nose.
No. 3	1	C, C^1, D — on serum. Moderately spreading colonies on agar composed of moderately thick bacilli with few segments. Good growth in broth with moderate pellicle in 24 hours. $\frac{1}{50}$ cc. ascitic broth culture = death in 6 days of a 235 grm. guinea-pig	Same as throat culture; also culture of solidly-staining pseudo-diphtheria bacillus (E^2).
	6	Same as first culture	5. Same as first culture.
No. 4	1	C, A, A^1, D — principally on serum. Non-spreading colonies on agar composed of thick bacilli with few segments. Slight growth in broth with no pellicle. $\frac{1}{50}$ cc. ascitic broth culture = death in 4 days of 245 grm. guinea-pig	Same as throat culture; also culture of solidly-staining pseudo-diphtheria bacillus (E^2).
	7	Same as first culture.	Same as first culture.
No. 5	1	C, C^1, D^1 + and granules irregular and large on serum. Non-spreading colonies on agar consisting of thick long bacilli with many segments. Slight growth in broth, slight pellicle. $\frac{1}{50}$ cc. ascitic broth culture = death in 5 days of 245 grm. guinea-pig	Same as throat culture.
	6	Same as first culture	7. Same as first culture.
No. 6	1	Similar to culture from No. 1	E^1, A regularly barred bacillus with delicate growth on agar and in broth producing acid. 1 cc. = death in guinea-pig not controlled by antitoxin.
No. 7	1	C, D, C^1, D^1 on serum. Slightly spreading colonies on agar with short bacilli and large granules. Broth, good growth and moderate pellicle in 24 hours. $\frac{1}{50}$ cc. ascitic broth culture = death in 4 days of 250 grm. guinea-pig.	
	2	Same as first culture.	
No. 8	1	C, C^1, D similar to culture from No. 3	Solidly staining pseudo (E^2).
	5	Same, no pseudos	Solidly staining pseudo (E^2).
	10	Same, no pseudos	Solidly staining pseudo (E^2).
No. 9	1	C, A, C^1, D singly and in strings, on serum non-spreading colonies on agar with long segmented bacilli with Indian-clubbed ends, slight grown in broth with no pellicle. $\frac{1}{50}$ c c. ascitic broth culture = death in	Solidly staining pseudo (E^2).
	3	Same as first culture	Solidly staining pseudo (E^2).
No. 10	1	Similar to culture from No. 3.	

In studying these cases from the letters we see that different "types" appear irregularly throughout the course of the disease, but no sequence can be observed. When pure cultures were isolated from the tube containing these different "types" it was found that exactly the same variety of bacillus and only this variety was obtained as from the earlier cutlture, showing that the new forms, which one finds in serial mixed cultures, are due, at least in part, to the influence of the other bacteria, and it is only when we study a pure culture that we can obtain a true idea of the variety to which the individual bacillus belongs.

In this series of cases no pseudo-forms appeared in the throats throughout the course of the disease that were not there at the beginning. Two of the cases had the solidly staining pseudo-diphtheria bacilli (type E^2) in the nose as the only diphtheria-like bacilli present there throughout the disease; one had this same variety as well as the typical diphtheria bacillus, and a fourth had a segmented pseudo-form (types E^1 and E^2); but in none of these cases did these pseudo-forms appear in the throat cultures, though they may have been present in the throat in small numbers. In regard to the appearance of solidly staining pseudo-forms towards the end of diphtheria I would say further that in an examination of hundreds of control smears made in the routine work for pronouncing diphtheria cases at Willard Parker Hospital free from diphtheria bacilla, only occasionally were pseudo-forms observed, and in all of the cases where the typical bacilli persisted for some time and were isolated two and sometimes three times to test their virulence, the same variety continued to be present unmixed with new atypical forms.

In this first series of cases the typical diphtheria bacilli from the original nose cultures showed according to the letters slight differences from those from the throats of the same cases; pure cultures, however, showed that the same variety was in both nose and throat. Two cases, cultures from which were sent to the laboratory at this time, may be of interest in this connection. The first was a throat case which had also a vaginal discharge. The same variety of virulent diphtheria bacilli was isolated from cultures from each locality. The second case had throat symptoms and a membrane on a finger wound. In this instance, too, the same variety was isolated from both cultures.

The pure cultures isolated from all of these cases were obtained in two ways: First, by making agar plates directly from the original serum tubes, and second, by the ascitic broth method. From the different agar plates made by these methods all the varieties of diphtheria-like colonies were planted on serum. If only one variety was apparent, cultures were made from at least three different colonies of this variety from each plate. That one variety only of the specifically virulent diphtheria bacillus was obtained from each case by these methods does not exclude the possibility of other varieties being present. It is quite possible that in a longer study of the individual colonies more than one distinct variety might be met with in the same case, but it is certain that in these cases the one variety isolated was the greatly predominating one throughout the disease and the probabilities are that it was the only one.

Some of the pure cultures (Nos. 1 and 4 from the throats and No. 6 from the nose) had such distinct characteristics that their recognition was especially easy and there could have been no question, even to the most superficial observer, in regard to their maintaining the same type throughout the course of the disease. In some of the other cultures the characteristics were not so peculiar, but they were not more or less peculiar at the end of the disease.

All of the pure cultures were kept at 36° C. on agar and transplanted every two to four weeks for five months, and two of the pseudo variety were grown on serum and in broth. At the end of that time, when transplanted upon other culture media, their individual characteristics were unchanged.

The results obtained from this serial study of smears and cultures from diphtheria cases may be summarized as follows: 1. In a series of ten cases of clinically typical diphtheria only one variety of the specifically virulent diphtheria bacillus was obtained from the throat of each case throughout the course of the disease and until suspicious bacilli disappeared. 2. From different parts of the same patient only one variety of specifically virulent diphtheria bacillus was obtained. 3. Pseudo varieties were found no more frequently at the end than at the beginning of the disease. 4. Pure cultures continued to show the same characteristics for many culture generations.

We infer from these observations that specifically virulent diphtheria bacilli do not change readily, if ever, into any form of non-virulent diphtheria-like bacilli in throats or noses of people during an attack of diphtheria. The cases studied serially are few, it is true, but when we remember that most of them were not severe, and that in light cases especially we might expect to find changes in the type of bacillus approaching atypical non-virulent forms if such changes occurred with any frequency, this inference seems a fair one.

II.—In the second group of cases studied in this connection, cultures were made principally from healthy throats. In a small town, during an epidemic of diphtheria, cultures were made from the throats of eighteen dairymen, fifty school children and forty-five children in a foundling home. All of the typical bacilli found and most of the atypical forms were isolated. The results from original smears and pure cultures are tabulated (using Wesbrook's letters) as follows:

	Type Present (According to Wesbrook, etc.)	Variety of Culture Isolated.	Virulence on Guinea Pigs.
Culture from throats of 50 school children in Montclair, N. J.	No. 5.—E^2, D^2	Solidly staining pseudo E^2 and occasional D^1	Non-vir.
	No. 48.—A, A^2, B, C, B^2, atypical.	Atypical B, A, C, B^2	Non-vir.
Cultures from throats of 45 children in Foundling Home, Montclair, N. J.	No. 4.—E^2	E^2.	Non-vir.
	" 7.—D, E, very short	E, D, short	"
	" 9.—A, A^2, B, C, B^2, atypical.	Similar	"
	" 10.—E^2	E^2	"
	" 15.—E^2	E^2, E^1	"
	" 16.—E^2	E^2	"
	" 17.—F, E^2, E^2	1, C, D, C^1 2, E, D, C^1 E^2	"
	" 18.—E^2	E^2, E^1	"
	" 23.—E^2, long	E^2, long	"
	" 25.—C, D, D^2, C^2	C^1, C, A, D	"
	" 26.—C, D, E	1, E, E^2, D 2, A, C, D	"
	" 30.—E^2, C^2	E^2	"
	" 31.—E^2, C, F, B, B^2, atypical	Similar	"
	" 32.—E^2	E^2	"
	" 33.—E^2, C, D	C, A, D	"
	" 38.—D, C	C, A, D	Virulent.
	" 40.—C, D, A, F	C, D	"
	" 44.—E^2	E^2	Non vir.
Culture from dairy, 18 throats	No. 1.—E^2, D^2, C^2	E^2	Non-vir.
	" 2.—C^2, D, C, D^2, D^1, C^1	D, C, C^1	Virulent.
	" 3.—C, D, C, D^2, D^1, C^1	D, C, C^1	"
	" 6.—E^2, D^2, C^2	E^2	Non-vir.
	" 8.—E^2, C^2	E^2	"
	" 17.—B^2, B^1, C, atypical.	Similar atypical.	"
	" 18.—C,^{2} D, C. D^2, D^1, C^1	D, C, C	Virulent.

The method employed for isolating the pure cultures was the same as that already described.

No case of diphtheria occurred among the school children or in the home before the epidemic, or up to three months later, in the home, and yet, these later cases contained an unusually large percentage of morphological typical diphtheria bacilli and of atypical bacilli. In some of the cases more than one variety of the morphologically typical non-virulent diphtheria bacilli were found in the same throat, accompanied, in one instance, by a typical virulent variety, and in two others by the solidly staining pseudo variety (type E^2). One reason why so many different varieties may be found in a normal throat is that no one is apt to overgrow the other, as is the case where one variety is pathogenic for a throat. Cultures Nos. 48, 31 and 9 (all the same variety) had peculiar characteristics:

they were long, slender bacilli, with very distinct granules and on agar plates grew in characteristic colonies. The very short granular varieties (Nos. 17 and 26) had also a distinct individuality. All of these cultures, grown on serum and agar and transplanted every two to four weeks for six months and some for one year, retained the characteristics of the original cultures. The non-virulent typical and atypical forms grown on serum were at first transplanted every week. After three months, inoculations into guinea pigs showed, as did inoculations of the original cultures, no pathogenicity for these animals. The virulent forms, however, retained their virulence.

The results noted in this group of cases may be summarized as follows:

1. In normal throats different varieties of diphtheria-like bacilli may be found in the same throat.

2. Many throats in a single institution may contain many diphtheria-like bacilli with no case of diphtheria resulting.

3. There are many distinct varieties of diphtheria-like bacilli, all of which in serial pure cultures retain the characteristics of the original culture.

The deduction from this set of observations is that non-virulent non-typical forms do not change readily, if at all, into virulent forms in healthy throats.

III.—The third group of cultures studied came from a home for destitute children during an epidemic of diphtheria. A death occurred from diphtheria. Another followed in two weeks. No record was kept of the variety of diphtheria bacillus found in these two cases. A few days after the second death a boy, who had slept in the same room with this patient at the beginning of the attack, developed an ulcerated throat. Cultures were made from his throat and from the throats of four other children who had very slight anginas. From the ulcerated throat one marked variety of virulent diphtheria bacillus was obtained and no other diphtheria-like organisms seemed to be present. From one of the light anginas an entirely different variety of morphologically typical diphtheria bacilli was isolated, which was non-virulent for guinea pigs. One of the other cultures contained pseudo-diphtheria bacilli (type E^2) and the other had no diphtheria-like oganisms. The cases with the two morphologically typical varieties were kept together. The two varieties persisted in the two throats for some time, the non-virulent one longer than the virulent, until finally both disappeared without change of type. The throat containing the non-virulent variety became immediately well. In the meanwhile other cases of ulcerated throats developed, all containing the same variety of virulent bacilli as that isolated from the first case. Cultures were taken from most of the children; some of the throats contained only pseudo-forms, but none of these developed diphtheria. One case of decided sore throat (not ulcerated) had, besides the virulent variety similar to the first, a pseudo form (type E^2), and a variety growing like a streptothrix in broth and on agar, but containing on serum as predominant bacilli forms approaching types D^2 and D. Both the pseudo and the streptothrix-like varieties were non-virulent for guinea-pigs. The case containing the non-virulent morphologically typical bacilli had an ulcerated throat later, and cultures from it contained the same variety of virulent bacilli as that obtained from all the other cases.

These cases seem to be a very marked example of the spread of one variety of diphtheria bacillus among a number of people living together. These children all attended school and played together. There is no reason why other varieties should not have been present, except that they did not happen to be in that neighborhood at that time; also, no new children were brought into the home during the epidemic. These cases also explain why some of the most virulent organisms are found in mild cases—the retention of virulence by the organism and the slight susceptibility of the patient. The children were given antitoxin and the virulent bacilli quickly disappeared from the throats. The one virulent variety isolated from all these cases is a very interesting one on account of its marked peculiarities. These are its many large coccus forms when grown on agar, its very delicate colonies macroscopically on agar, its very scanty growth in broth, and the formation of large Indian-clubbed ends when grown on agar at room temperature.

This variety has been grown on agar, Löffler's serum, and in broth at different temperatures since its isolation on November twentieth, 1901, but no change in morphology or virulence has occurred. The summary of the study of this group of cases is as follows:

1. In cases of diphtheria apparently contracted from the same source the same variety of virulent diphtheria bacillus was found in each case. 2. This variety remained the only variety of virulent diphtheria bacilli found until its disappearance. 3. No gradations in pseudo types were found. The same type found in the first examination continued to be present in later ones. 4. Pure cultures continued to show characteristics similar to the original cultures.

The inference from these observations is that not only does a variety of the diphtheria bacillus retain its characteristics for some time in the same throat, but it may be transferred to other throats without losing its individuality.

IV.—*Final Group*—In the study of the pure cultures of diphtheria and diphtheria-like bacilli from sources other than those given above, the following points have been noted:

1. Original cultures:
    1. Their morphological and cultural characteristics on various artificial culture media.
    2. Their toxicity in liquid media
    3. Their virulence from solid media.

2. Later culture generations:

Persistence of original characteristics under the following conditions:

1. On various artificial culture media.
    a. At different temperatures.
    b. Transplanted at different times.
2. In living tissues of guinea-pigs, white rats and goldfinches.
3. In symbiosis with other bacteria.

During the past seven years about two hundred cultures of virulent diphtheria bacilli, ten cultures of non-virulent morphologically typical diphtheria bacilli, and fifty or more cultures of diphtheria-like bacilli have been isolated at various times. No attempt has been made to group the diptheria-like bacilli, but among the specifically virulent diptheria bacilli two broad groups have been recognized in which those varieties having the distinct characteristics of the one group differ widely from those having the distinct characteristics of the other, while between these extremes there are many gradations in type. So many gradations are there that almost every culture from a different source may be said to possess individual characteristics, though there are such slight differences between some of them that they may be classed as one variety.

To the first group belong the segmented varieties and to the second the non-segmented varieties.

The segmented and non-segmented varieties correspond respectively to Westbrook's barred and granular types.

When first isolated the individual characteristics of some of the cultures were very marked. It was found that some of the segmented varieties showed immense Indian-clubbed ends and many segments on agar, and that their growth in broth was extremely scanty. Such broth cultures gave very little reaction in guinea-pigs except in large amounts, though the bacilli themselves when inoculated from serum cultures were decidedly virulent. In ascitic broth, however, where they grew rapidly and abundantly, they showed a high degree of toxicity. After ascitic broth was used to test toxicity, all of the specifically virulent diphtheria bacilli—about one hundred cultures—segmented and non-segmented varieties, were found to be highly toxic for guinea-pigs. The largest dose of a two or six day culture in ascitic broth which was required to produce death in this animal was one-fiftieth cubic centimeter, the average dose being one one-hundredth cubic centimeter. The dose of a decanted six-day culture containing one-half of one per cent. carbolic acid was the same. These observations agree with those of Escherich and Cobbett, who found no decided grades in virulence among the diphtheria bacilli isolated by them. So far all of the non-virulent morphologically typical diphtheria bacilli have been non-segmented varieties.

From the pure cultures of virulent diphtheria bacilli ten of the most distinctive, five segmented and five non-segmented varieties, have been more closely studied. They have been grown at about 35 degrees C. on agar, broth, and Löffler's serum transplanted at different times. One series, grown on agar and broth, was transplanted every two to six weeks. Another series grown on serum and agar was transplanted every one or three days, one in broth every day, every two or three days, and every week. For months two of the cultures were grown at 40 degrees C., transplanted every week. Six were grown at 43 degrees-45 degrees C. alternating with 35 degrees C. These six were also grown at room temperature and transplanted every two weeks, three were grown on hard-boiled eggs for eight culture generations, transplanted every week. Among these ten, four cultures are selected for detailed description as showing the greatest differences of one variety from another. The first two are non-segmented, and the second two, segmented varieties.

Number Eight is the oldest culture studied. It was isolated in the summer of 1895 and the stock culture has been carried on in broth, reinoculated from the pellicle every two to four days at first and for the past year every day.

When first isolated its characteristics were its moderately long cylindrical form on blood serum, its rapid and spreading growth on agar with the production of short forms, its rapid growth in broth with the formation of a heavy pellicle and no clouding of the broth. Its virulence in broth averaged one two-hundredth cubic centimeter. The bacillus has now the same characteristics except that it has longer and more slender forms on serum and its granules are very small. After growing on agar for one year at 35 degrees C. and being transplanted every two to six weeks, its characteristics remain the same. Grown on broth for a year and being planted every two to six weeks instead of every day, its characteristics remain the same, with the exception of an apparent slight loss of virulence.

Number Fifty-six, isolated February thirteenth, 1901. Its principal characteristics immediately after isolation were its short growth, moderately spreading colonies, and heavy pellicle on broth. Its average virulence was one-seventy-fifth cubic centimeter in broth. There has been practically no change in this variety after growth in broth and on agar and serum with varying reinoculations up to the present time. At one time the serum and agar cultures became contaminated with a streptothrix which was grown with it for some time, but no change was seen in the bacillus. Its short, thick forms and large granules present a marked contrast to number eight.

Number Thirty-one, isolated on the tenth of January, 1901. Its marked characteristics at first were its long, thick Indian-clubbed ends with irregular granules on serum; its much larger forms, especially the long, thick Indian-clubbed ends with irregular granules on agar; on agar too the growth was delicate, the colonies non-spreading and coarsely granular; in broth it produced slight growth in the bottom of the tube with no clouding and no pellicle. From serum to serum fewer Indian-clubbed ends appear, but when transplanted to agar from this medium the same characteristics develop. From agar to agar, reinoculating every day, there are also fewer of the very large forms, but when transplanted to other media again the earlier characteristics appear. In broth as in agar the growth becomes gradually more abundant and finally a pellicle is formed, but when transplanted to other media the original characteristics appear. Virulence in broth originally was very slight, but in ascitic broth one-seventy-fifth centimeter proved fatal. The average virulence remains the same.

Number Fifty-seven, isolated February thirteenth, 1901. Its principal characteristics at first were its long segmented form and small irregular granules on serum, its thick form with many segments and long Indian-clubbed ends on agar, also its delicate growth, small, non-spreading, coarsely granular colonies; its slight growth in broth with no pellicle and only a very slight finely granular growth in the bottom of the tube. From serum to serum the forms have become shorter and not so segmented. From agar to agar transplanted every day the morphology has changed decidedly, the bacilli are shorter and more slender with tiny granules. The culture transplanted on agar, and in broth every two to six weeks, has retained its original characteristics except that the growth is more abundant. When the changed culture, however, is allowed to remain from two to six weeks again before transplanting the original morphological characteristics reappear.

This culture and number thirty-one grown on the hard-boiled yolk of hens' eggs for some time showed distinct morphological changes. The bacilli were all exceedingly small with comparatively large granules; in fact, they appeared almost like diplococci, the two granules being so close together. When grown on the other media again they assumed their original characteristics.

These four varieties after being in the body of an immune host (white rat) for forty-eight hours showed no morphologic changes. Grown at room temperature on agar and serum every two weeks, they show larger, more irregular forms than at 35 degrees C. At 43 degrees C. they show smaller forms than at 35 degrees C., but in both instances growing at 35 degrees C. again restores the original forms.

Though some of these cultures have changed on some of the media, each one has changed in its own way, and each culture still has its distinct individuality. After many culture generations, especially when transplanted at short intervals, the different varieties tend to approach each other, or rather to run in lines parallel with a common norm, which seems to be a medium-sized, non-segmented bacillus producing granules in early cultures on serum and growing well on all of the ordinary culture media. The non-virulent morphologically typical bacilli must be classed with the virulent varieties as one species, though there is little doubt that more minute study would show distinct species in this group. The atypical pseudo-forms, however, which show no tendency to approach the norm of the typical forms, must be classed as distinct species. All of the pseudo and non-virulent morphologically typical varieties when inoculated into the peritoneum of guinea-pigs in immense doses cause death. Attempts have been made to give more virulence to some of these varieties by successive peritoneal inoculations, but in no instance has any increase of virulence or decided change in morphological or cultural characteristics been noted. Two of the non-virulent, morphologically typical varieties have also been grown in symbiosis with virulent streptococci in broth for ninety culture generations transplanted every three to four days, but when separated no change in virulence or other characteristics was noted. Two other varieties of non-virulent morphologically typical bacilli have been inoculated into goldfinches with no result. In large doses they appear to be perfectly innocuous to these birds as well as do four varieties of pseudo bacilli, contrary to the results of Richmond and Salter.

Since there are so many different forms or varieties of diphtheria-like bacilli it is quite possible that some of them are so nearly related to the diphtheria bacillus that under certain conditions they readily develop its characteristics. This seems to be the only way to explain the apparent discrepancies in the results obtained by different observers. Such closely related varieties, however, do not appear to exist about New York City and its vicinity at the present time. So we may safely say that as many non-virulent diphtheria-like organisms retain their characteristics, under various artificial and natural conditions, they may be regarded from a public health standpoint as harmless. These studies seem to demonstrate that the morphologically typical diphtheria bacillus is a distinct species from the atypical diphtheria-like bacilli and so-called pseudo forms, and that it has many true morphologic varieties or sub-species which, while showing transitory ontogenic variations, due to change in environment and life habit, have more or less persistent phylogenic characteristics which reappear when the organism is placed in a previous environment.

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DESCRIPTION OF PLATE.

Plate VIII.

Fig. 1. B. Diphtheriæ, No. 8. Twenty-four hours Löffler's serum culture. Long, slender, non-segmented forms. Very small forms on agar. Seven years on artifical culture media. X 1,410 diameters.

Fig. 2. B. Diphtheriæ, No. 31. Forty-eight hours agar culture. Thick medium clubbed rods and moderate number of segments. One year on artificial culture media. X 1,410 diameters.

Fig. 3. B. Diptheriæ, No. 56. Twenty-four hours Löffler's serum mixture culture. Short, thick, non-segmented forms. Very small forms on agar. One year on artificial culture media. X 1,410 diameters.

Fig. 4. B. Diphtheriæ, No. 57. Forty-eight hours agar culture. Many segments; long, medium clubbed ends. One year on artificial media. X 1,410 diameters.

Fig. 5. B. Diphtheriæ, S. Twenty-four hours agar culture. Coccus forms. Segmented granular forms on Löffler's serum. Only variety found; cases of diphtheria at Children's Home. X 1,410 diameters.

VI.

Report of Studies on the Etiology of Vaccinia and Variola.

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The studies reported in this paper may be divided, according to the methods employed, into two parts, first bacteriological, and second histological.

The direct object of the bacteriological studies has been to determine if an organism, in pure cultures, could be obtained which would produce typical vaccinia or variola, while that of the histological studies has been to determine the nature of the "vaccine bodies."

I.—BACTERIOLOGICAL STUDIES.

Starting with the assumption that living organisms produce these diseases, one of the two following statements must be true:

1. The specific organisms must be a single species, or a combination of species, growing readily on ordinary media.

2. The specific organisms must be a single species, or a combination of species, growing with difficulty or not at all on ordinary media.

After the repeated failures of numerous experimenters to produce these diseases by various easily growing organisms isolated from the diseased areas, it seems almost useless to consider any organism or combination of organisms growing readily on ordinary media as the specific cause. If, therefore, the specific cause is an organism or combination of organisms growing with difficulty or not at all on ordinary media, it either can be seen and is unrecognized because of characteristics, which render it so far impossible to identify it as a distinct organism, or it cannot be seen because of its minute size.

Bearing these possibilities in mind, the work was planned as follows:

1. Studies of serial and isolated smears and hanging drops from eruptions on rabbit, calf, monkey and man, from corneas of rabbits, from fresh and old glycerinated vaccine virus, ad from filtered lymph.

2. Cultures made from all of these materials, but especially from the inoculated corneas of rabbits and old active glycerinated vaccine virus, using ordinary and special media. The ordinary media was used as controls. The special media used were: (1) Ascitic-broth in celloidin capsules inserted into the peritoneal cavity of the rabbit, (2) wounded peritoneum and subcutaneous tissue of vaccinated and non-vaccinated rabbits, (3) rabbits' skin in the peritoneau cavity of the rabbit, (4)) fœtal rabbits' skin taken with aseptic precautions, (5) fertilized hen's eggs.

It has been demonstrated that the growth of the specific organism in experimental animals occurs almost if not quite exclusively in epithelial tissues, especially in the epithelium of the skin and cornea; hence the study of material gathered from these sources and the endeavor to obtain a sterile living epithelium for a culture medium.

Until recently, rabbits were supposed to be non-susceptible or only slightly susceptible to experimental vaccinia, no typical reaction occurring after vaccination. Since Guarnieri's[6] work on rabbits' corneas many experiments have been made with this animal and in 1901 Calmette and Guerin[1] demonstrated that rabbits developed a typical eruption when active vaccine virus is rubbed thoroughly into their freshly shaved skin. This method has been followed by us with perfect success. No cuts are made in the skin other than the very superficial ones caused by the shaving. Isolated papules appear at the end of the second day, becoming larger on the third day, and on the fourth day are vesicular, vesico-pustular and umbilicated. When the virus inoculated is very active, many single and confluent vesicles develop and the definite eruption reaches its height on the fourth day, but with less active or more dilute virus the isolated vesicles which appear continue to develop up to the sixth day, forming large typical vesico-pustules. The lymph from such an eruption is very active and contains decidedly fewer bacteria than that from the calf.

The fact that the rabbit is an animal easily obtained and handled, which readily develops typical vaccinia, makes the work of testing cultures of possible specific organisms much more simple.

1. *Studies of Smears and Hanging Drops.*

The stains used were Löfflers's methylene blue, carbol methylene blue, dahlia, Goldhorn's solution, thionin, carbol-fuchsin, sudan III and Gram's method. The smears were fixed by simply drying in the air, by heat, by a saturated solution of mercuric chloride in one-half per cent. sodium chloride and by 1 per cent. chromic acid.

In the smears from fresh material the only characteristic elements constantly seen have been vaccine-like bodies within or outside epithelial cells. The epithelial cell-inclusions are so varied in form that, in smears, it has been impossible, so far, to distinguish them from cocci or nuclear fragments and degenerated cells. In many smears there have been seen definite oval bodies staining irregularly and containing more darkly stained granules near the ends and sometimes in the center, but successive smears showed no cycle of growth. Often there seemed to be gradation-forms from coccus through oval to large granular, vacuolated and apparently degenerated forms, but such pictures have not been regularly found.

In smears from fresh material, from all sources except the cornea, we have seen tiny granules, in large numbers, showing metachromatism and lying within and between epithelial cells and leucocytes. They have also been seen in the cornea, but not in such large numbers. They seemed to differ from the metachromatic granules of mast-cells and other cells, in that many of them occurred in characteristic pairs. When a very tiny organism was subsequently isolated from a number of specimens of vaccine material, showing on some media just the forms of thesfie metachromatic diplo-granules, it was decided that this organism, which will be spoken of under the cultural work, was the principal source of the granules.

In old glycerinated vaccine virus there have always been seen many faintly staining granules and bacterial forms, especially large single and double coccus forms, often with only the edge stained. No constant differences have been noted between stains from active and inactive virus. Spore stains and Gram's method have given no positive results.

Hanging drops have always shown many vaccine-like bodies and granules, but no constant bacterial forms.

It is very difficult to obtain clear pictures of fresh epithelial cells containing "vaccine bodies." The best results have been obtained from a study of the whole cornea of the rabbit after inoculation with active sterile (?) vaccine.

The animal is killed and the cornea removed as quickly as possible, with aseptic precautions, and placed on a thin agar plate, slits being cut in its periphery to prevent bulging. The inoculated area can be studied with an immersion lens by placing a drop of aqueous fluid or ascitic-broth on the surface of the cornea and over this a thin cover-glass. The whole cornea is translucent and the bodies, slightly refractive, are more or less plainly seen in the epithelial cells. In no instance has apparent division or amœboid motion been observed in these bodies, though many of them have had an active Brownian motion; the active amœboid leucocytes were very distinctly seen.

More minute study is being made of fresh material, especially of inoculated corneas, removed as described under cultural work. Filtered lymph has shown nothing but occasional tiny granules.

It would seem from this study of smears and hanging drops that the only characteristically formed elements constantly seen in material from vaccine and variolous eruptions are the vaccine-like bodies. Such bodies, from our inability to detect in them definite motion, or any cycle of growth or special staining qualities, we can only regard as *possible* parasites.

2. *Studies by Cultural Methods.*

The great difficulty in the cultural work has been to obtain active virus free from extraneous organisms. Only occasionally has material from isolated vesicles been obtained which apparently contained no organisms growing on ordinary media. With old glycerinated vaccine virus the results have been more uncertain. It is true that from this old material sometimes no colonies and generally only an occasional one has developed in poured agar plates, but when material from the same lot has been put into fluid media, especially into ascitic-broth, there has always been, sooner or later, an abundant growth of one or more kinds of bacteria. Agar plates have been streaked with old glycerinated vaccine virus and material from between the colonies has been tested, but this also gave uncertain results, as many bacteria were found which developed very slowly, not appearing as colonies in the first days.

Celloidin capsules, made after the method described by McCrae[2] were filled with old glycerinated virus in ascitic-broth and left in the peritoneal cavity of the rabbit for a week, with no positive results. Further study along this line has been planned, when the attempt will be made to obtain a sterile emulsion of fresh epithelium from corneas, fœtal animals or other sources to be placed in the capsules with the virus.

Wounded peritoneum rubbed with the virus gave an intense local reaction in which the large epithelioid cells showed included leucocytes in all stages of nuclear fragmentation, giving pictures of vaccine-like bodies. No active virus was obtained from such areas. Inoculation of old glycerinated vaccine virus containing very few organisms, and of fresher virus, into the peritoneal cavity of rabbits, vaccinated and non-vaccinated, produced no increase in activity; on the contrary, in the majority of cases the peritoneal contents after such inoculation showed very little, if any, activity. In all experiments made in this way the extraneous organisms in the virus inoculated were not killed, so the hope held out by Calmette and Guerin[1] of obtaining by this method a pure active virus has not been realized.

Inoculated rabbit's skin left in the peritoneum for three days gave no positive results.

One attempt was made to obtain sterile fœtal rabbits. A pregnant rabbit was killed just before term, all the fœtal rabbits were removed under sterile precautions, and were placed in sterile glass dishes with moist filter paper at the bottom and a filter paper cover. After being inoculated the rabbits in these dishes were put in the thermostat at 36 degrees C. Several of the animals lived a few hours and one two days. The old glycerinated virus used for the vaccination contained as usual a few ordinary bacteria which grew so abundantly in the inoculated areas that no special tests were made for a specific organism. Here, too, it seems as if we might obtain interesting results with further study.

No positive results have as yet been obtained from fertilized hen's eggs.

The only cultural method which has given interesting results so far is the inoculated rabbit's cornea. These experiments are still in progress. The technic is as follows: The corneas are inoculated with old glycerinated vaccine virus and, after a varying time, the animals are killed, the eyes removed under aseptic precautions and washed in sterile broth. The whole corneas are then cut out, washed in successive sterile broths, placed on agar plates and kept at 36 degrees C. over night. If there is no apparent growth the next day, the corneas are placed in ascitic-broth, after smears and hanging drops have been made from the inoculated areas, and returned to the thermostat. After twenty-four hours much of the epithelium has become loosened, and, on shaking, the ascitic-broth becomes slightly cloudy with apparent irregularly granular detritus. Microscopically, besides much finely granular material, there are seen a few free vaccine-like bodies, and many epithelial cells and leucocytes in various stages of degeneration, some of the former still containing vaccine bodies.

The ascitic-broth containing these cells, vaccine-like bodies and granules, when rubbed on freshly shaved rabbit skin produces a typical eruption.

The difficulty, again, is to obtain corneas free from extraneous organisms. So far, eight of these cornea-emulsions have been tested and each one has given a typical eruption on the rabbit. Three of them contained no organisms growing on ordinary media, two containing staphylococci and a diphtheria-like bacillus, another had a scanty growth of a large granular cocco-bacillus, while the other two had an abundant growth of a very tiny bacillus made up almost entirely of metachromatic granules. These last two bacteria were isolated and rabbits were vaccinated with the resulting pure cultures. No positive results were obtained from the large cocco-bacillus.

The tiny bacillus was the first one found and it seemed to be so similar in morphological appearance to the majority of the metachromatic granules found in such large numbers in the smears from vaccine and variolous eruptions that its properties were studied more closely.

In pure cultures it seems to correspond to descriptions of Martin's[3] bacillus and agrees also morphologically with the bacillus described by Copeman[4] and Kent[5]. None of these authors, however, give very detailed descriptions, so it is difficult to determine whether the organisms are the same.

Cultures of this tiny bacullus were made from the original ascitic-broth culture into ascitic-broth and other media. These were inoculated into rabbits' corneas and were used for vaccinating a calf and rabbits. With the second and third culture-generations rabbits' corneas were inoculated; with the fourth, fifth and sixth culture-generations rabbits were vaccinated on the skin, and with the fifth and sixth a calf was vaccinated. The corneas gave good macroscopic reactions and microscopically, besides the small bacillus, a few vaccine bodies were found in the epithelial cells. None of the rabbits' skins gave reactions. The calf which was vaccinated on nine different areas developed widely scattered, typical pustules. That these results were due, however, to the transference of the original vaccine organisms, or possibly to their slight growth, and not to the action of the tiny bacillus was shown by the facts that later cultures produced no results, and that cornea emulsions containing no such bacillus produced the typical eruption.

These bacteria have been mentioned principally because some of the eyes inoculated with them serve as controls for the study of the active virus in the corneas.

The chief points of interest in this cultural study of the corneas are, first, that it has given us a method for obtaining active vaccine virus unmixed with discoverable organisms, and second, that it shows that vaccina is not produced by an organism or a combination of organisms growing readily in ascitic-broth.

Cultures and rabbit inoculations from filtered lymph, the preparation of which was under the direction of Dr. Wm. H. Park, gave no positive results.

II.—HISTOLOGICAL STUDIES.

The so-called "vaccine bodies" have been extensively studied in tissue-sections since the first definite descriptions of them as probably being parasites was published by Guarnieri,[6] in 1892. Among the many hypotheses which, since then, have been advanced to account for them are, the suggestions that they are due to degeneration of the protoplasm of epithelial cells, are degenerated centrosomes, degenerated nuclei of the epithelial cells, or a secretion from the nucleus and included fragments of leucocytes. Only Ernst Pfeiffer,[7] before Ewing's article[8] appeared, mentioned red blood cells in this connection. He says in his study of corneal inoculations that some of the early bodies might be mistaken for red blood cells, but they are not red blood cells because they first appear so far from the deep tissues of the cornea and because of their further changes. Some of his drawings, however, show forms very similar to red blood cells.

Hückel,[9] after a lengthly study of sections from the inoculated areas in rabbits' corneas, comes to the conclusion that the bodies are a special degeneration of the protoplasm of epithelial cells.

Recently, Wasielewski,[10] in addition to observations of his own, has given a complete review of the literature in regard to these bodies. He concludes that because the vaccine bodies are the only characteristic bodies constantly found in vaccinia and variola and are not produced in rabbits' cornea in any other way than by the inoculation of active vaccine or variolous lymph and because of their general characteristics they are very probably the cause of these diseases.

The writers' histological studies have been made principally upon rabbits' corneas where the bodies appear in the epithelial cells with great distinctness.

The chief questions considered have been:

1. Have these bodies special characteristics?
2. Are they constantly present after inoculations of active virus?
3. Are they ever present after inoculations of other substances?

The sections have been prepared by Dr. Flournoy, who has made the following notes of the methods used in preparing, for microscopic study, the material from vaccinia and variola. The fixing agents tried were:

1. A saturated solution of mercuric chloride in 0.5 per cent. sodium chloride.
2. Absolute alcohol.
3. Alcohol and acetic acid.
4. Lang's solution of sodium chloride, acetic acid and mercuric chloride.
5. Flemming's (stronger) solution.
6. Zenker's fluid.

Of these, the salt solution saturated with bichloride, Flemming's solution and Zenker's fluid gave the best results. Some work is being done at present with Müller-formol as a fixative for corneas, but as yet no conclusion has been reached as to its applicability for this particular purpose.

The specimens remained for two hours in the bichloride solution and were then brought, without washing, into 70-per-cent. alcohol, then into 80-per-cent., and, after removing the bulb of the eye, into 90-per-cent. alcohol, to which tincture of iodine had been added. They were then placed in 90-per-cent. and 95-per-cent. alcohol, remaining two days in each, and the hardening was completed by leaving them in absolute alcohol over night.

After twenty-four hours in Flemming's solution the pieces were washed in running water for three or four hours, then through graded alcohols for the corneas, twenty-four hours in all, fifteen hours out of the twenty-four being spent in

95-per-cent. and absolute alcohol. For pieces of skin a somewhat longer time was required for after-hardening.

In Zenker's fluid the eye was allowed to remain only two hours. Then the cornea was removed and washed in running water for two hours, when it was placed in 70-per-cent. alcohol, to which tincture of iodine had been added, and into successive alcohols for twenty-four to thirty-six hours.

The majority of the specimens were imbedded in the following way:

From alcohol—

1. For fifteen minutes in a mixture of equal parts of xylol and cedar oil.

2. Thirty minutes in cedar oil.

3. Thirty minutes in a mixture of equal parts of paraffin and cedar oil, kept at 50 degrees.

4. Fifteen minutes in paraffin at 50 degrees.

5. Thirty minutes in a second paraffin bath, from which they were imbedded in fresh paraffin.

A few were cleared in chloroform for twelve to eighteen hours, then left for one to three hours in a saturated solution of paraffin in chloroform at room temperature, then in two baths of paraffin at 50 degrees for fifteen and thirty minutes respectively, and then imbedded in fresh paraffin. The time given in each case is that for pieces of the cornea, and the cedar-oil method especially gave uniformly good results. For pieces of skin the time for each step was somewhat lengthened.

After cutting, the sections were fastened to the slide by means of the usual mixture of equal parts of pure glycerin and beaten egg albumin, to which a few drops of chloroform were added. This was found to be absolutely necessary only after fixation in Flemming's, as the bichloride sections cling fast to the slide even when no fixative has been used.

Before staining, the paraffin was removed from the sections by immersing the slides for two or three minutes in xylol, after first placing them on the floor of the paraffin oven for five to ten minutes or melting the paraffin very carefully over the flame. Without this melting, it was found difficult to completely remove the paraffin. From the xylol, the sections were placed in absolute alcohol for two or three minutes, and then from distilled water into the staining fluid.

For staining, Hückel's modification of Flemming's safranin-gentian violet method, hematoxylin and eosin and Heidenhain's iron hematoxylin method were chiefly used. Heidenhain's modification of the Ehrlich-Biondi triacid stain was also tried but did not give generally satisfactory results.

The safranin method is only applicable to sections fixed in Flemming's solution. These are stained for forty-eight hours in a solution of safranin, 0.3; alcohol, 30.0; distilled water, 60.0 parts.

After washing out the excess of stain they are then left for eight to twelve hours in a mixture of saturated aqueous gentian violet, 5.0, distilled water, 100.0. They are then washed in 0.1 per cent. acetic acid in alcohol till the sections look reddish, then in pure alcohol, are cleared in oil and mounted in balsam.

The iron-hematoxylin stain works well after all the fixatives tried. The method of staining was as follows:

1. Two-per-cent. iron-alum, one hour.

2. Wash in distilled water.

3. Stain for six hours in one-half-per-cent. hematoxylin.

4. Wash thoroughly in distilled water.

5. Decolorize under the microscope with iron-alum solution.

6. Wash in distilled water.

7. Dehydrate in alcohol.

8. Clear in carbol-xylol to which a few crystals of picric acid have been added, this solution counterstaining at the same time.

Sections fixed in Flemming's solution are usually stained somewhat longer in the hematoxylin.

The clearest pictures have been given with the safranin and gentian-violet stains after fixing in Flemming's solution. With this method the bodies and dividing nuclei take a red stain, the nuclei of the tissue cells and leucocytes a violet, and the bodies of the epithelial cells, a light brown-gray. Red blood cells are not supposed to retain the safranin, but in sections of calf skin prepared by this method a number of red blood cells are stained red and many show gradations in color between red and light violet. The nuclei of the leucocytes also, in some sections, show different grades of color from violet, through purple, to red. Since attention has been called to the red-blood-cell theory by Ewing's work, the sections have been looked over carefully, especially the early ones, for evidences of red blood cells. There is no doubt that they appear in the cornea. In sections of twenty-four-hour lesions stained by Goldhorn's method they were found stained with eosin. They were in very small numbers and outside of the cells, between the epithelial cells and in the substance proper of the cornea. In one instance, however, an undoubted red blood cell was found in an epithelial cell. In the same section vaccine bodies staining a dark blue were seen within the epithelial cells and no gradations in color were seen between them and the red blood cells. In sections from twelve and eighteen-hour lesions occasional masses of round bodies, somewhat irregular in size, taking chromatin stains deeply, have been seen, which might be degenerated red blood cells, but there is no positive evidence of this. Sections from later lesions show no corresponding increase of the red blood cells with that of the vaccine bodies. In none of the sections so far studied have there been seen enough red blood cells to account for the large numbers of vaccine bodies present.

The bodies have not been found in the epithelial cells in any numbers until twenty-four hours after the inoculation. In these early lesions they are small and frequently show apparent division forms. In forty-eight hours the majority of them are larger and show many oval and irregular forms. They increase in numbers up to the seventh day and possibly later in some instances. The small forms and division-forms are seen irregularly scattered through the area of infection during this time, but as a rule they are slightly more numerous at the periphery. No nucleus has been demonstrated, though some of the larger bodies have a central area taking chromatin stains more deeply than the narrow zone about it.

Many of the larger forms show granules and vacuoles and have a decidedly irregular outline, but no definite cycle in growth similar to that of known protozoa has been observed. In some of the epithelial cells containing no vaccine bodies the cell protoplasm in one or two places, generally in the perinuclear zone, takes a more intense protoplasmic stain, but no definite gradations in shape or staining qualities between these and the vaccine bodies have been seen.

We have used, as control inoculations into the cornea: (1) inactive vaccine virus, (2) filtered vaccine virus, (3) a very large coccus isolated from vaccine lymph and having forms similar to many of the vaccine bodies, (4) the tiny bacillus and (5) the large cocco-bacillus spoken of in the first part of this report.

After inoculations of inactive virus no bodies or red cells were seen in or about the epithelial cells, though there was a moderate number of leucocytes about the edge of the lesion and a few between the epithelial cells.

With filtered lymph there was a moderate leucocytic reaction and a slight increase in the number of epithelial cells, which occasionally contained a leucocyte. No red blood cells were recognized.

After inoculations with the large coccus there were many leucocytes in the tissues and between the cells on the edge of the lesion. No definite cocci in the epithelial cells could be made out, though there were many in th sub-epithelial tissue. Two bodies staining red by the Flemming-safranin method were seen in epithelial cells near the nuclei and one had the cup-shaped appearance of a red blood cell.

The large cocco-bacillus gave appearances similar to those of the inactive virus.

The tiny bacillus produced a decided macroscopic reaction. After twenty-four hours there was some congestion of the conjunctiva and the epithelium over the inoculated area was slightly raised as in infection with active virus. After inoculation of the second and third culture generations occasional vaccine bodies were found, but none were seen after the inoculation of the fourth serum culture generation, though the clinical picture was about the same and the epithelial cells contained the small bacilli, generally scattered through the body of the cell, but sometimes apparently gathered in small groups at one or more points about the nucleus. Very many leucocytes were in the substance proper of the cornea, some were between the epithelial cells and occasionally one seemed to be in an epithelial cell.

From this study of the corneal sections we see that:

1. The epithelial cells of the cornea may include leucocytes, red blood cells, certain bacteria and variously sized and shaped chromatin-staining bodies, the so-called vaccine bodies.

2. Apart from the above inclusions certain degenerative changes may appear in the epithelial cells.

3. All of these appearances are most frequently seen in the perinuclear zone.

4. The vaccine bodies appear regularly after inoculations of active vaccine or variolous lymph; they do not appear after inoculations of any other substance tried.

The principal observations from these studies may be summarized as follows:

1. The specific virus of vaccinia grows readily in the corneas and the skin of rabbits, producing in the latter situation the typical eruption.

2. Ascitic-broth containing the epithelial cells from corneas which have been inoculated with old active vaccine lymph produces the typical eruption of vaccinia, though no organisms can be demonstrated in the ascitic-broth mixture.

3. Such corneas show, as the only constant characteristic appearance, the chromatin-stained, variously-shaped vaccine bodies.

4. Vaccinia is not due to any organism or combination of organisms growing readily in ascitic-broth.

Thanks are due to Dr. William H. Park for his suggestions and personal interest in this work, and to Dr. John H. Huddleston for supplying the vaccine material used.

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DEPARTMENT OF HEALTH—BOROUGH OF MANHATTAN,
September 2, 1903.

Dr. WILLIAM H. PARK, *Assistant Director, Research Laboratory :*

DEAR SIR—I have the honor to submit to you the following abridged report of the methods of disinfection, together with a table of the work performed by disinfectors in the year 1902, and a list of permanent improvements made.

Disinfectors in carrying out their instructions when disinfecting proceed in the following manner: They paste or calk all cracks and crevices in rooms to be disinfected that might allow the gas to escape; they provide against danger from fire by placing proper metal or earthenware non-conductors of heat under the disinfecting pans or generators. Where sulphur or alcohol is used they provide the proper amount of water and see that it is properly bestowed. They see that the exit doors of rooms are properly closed and sealed, and that the tenants are notified at what time to open them.

NO. 3.

This Blank Is to Be Taken by Disinfector.

DEPARTMENT OF HEALTH.

BOROUGH OF MANHATTAN.

DIVISION OF CONTAGIOUS DISEASES.

NEW YORK,..............................190

To Disinfector :

The following Disinfection and Fumigation are to be performed at premises (........................Floor. Room No.....) in the manner designated.

Name of Family........................ ....Disease............

Character of Premises...................................No. of Families........

DISINFECTION.

Carpets ....Rugs ....

Bedding ....Bolsters............Pillows........

Curtains ....Hangings ....

Clothing ....Books ....

Furniture ....

Remarks ....

....

FUMIGATION.

Pasting ....

....

No. of Rooms.........Cubic feet Air Space.........No. of Pans to be used......

No. of Grains of Paraform..

No. of Ounces of Formalin..

No. of Pounds of Sulphur...

Remarks ....

....

....Medical Inspector.

The instructions given above have been complied with by me.

Disinfection began....................Disinfection finished....................

.....................................Disinfector.

They notify the owner or housekeeper of every building that they enter that a disinfection is to take place at that time. One of the following disinfectants is used in the quantities named:

Sulphur, 4 pounds for every 1,000 cubic feet, 8 hours' exposure.

*Formalin, 6 ounces for every 1,000 cubic feet, 4 hours' exposure.

Paraform, 1 grain to every cubic foot, 6 hours' exposure.

Carbolic acid, 2 per cent. to 5 per cent. solution, or bichloride of mercury, 1-1000, is used where disinfecting solution is ordered.

Disinfectors make and immediately forward to the Disinfecting Station a copy of all that portion of the Medical Inspectors' slip No. 3 pertaining to the removal of infected goods. They, on the day of disinfection, forward the No. 3 slip to the Chief Inspector.

* NOTE.—Formalin means 40 per cent. formaldehyde.

6176-'03 (N) 1143. 114J

DEPARTMENT OF HEALTH,

BOROUGH OF MANHATTAN.

DIVISION CONTAGIOUS DISEASES.

DATE .... HOUR ....

RESIDENCE ....

NAME ....

DISEASE ....

Goods to be Removed for Disinfection and Fumigation.

BEDDING, ETC.	No.	CLOTHING.	No.	MISCELLANEOUS.	No.
Mattresses	.....	Coats	......	Carpets	......
Bolsters	.....	Waistcoats	......	Rugs	......
Pillows	......	Trousers	......	Curtains	......
Comfortables	......	Overcoats	......	....	......
....	......	Hats	......	....	......
....	......	Waists	......	....	......
....	......	Dresses	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......

.... DISINFECTOR.

Disinfection is bacteriologically tested by placing test organisms in the room; these are collected and sent to the Research Laboratory and cultures made of them.

Where disinfection tests are placed in the room they are so disposed that the organisms shall be freely exposed to the gas. The blanks accompanying tests are filled in by the disinfector and left with the test to be forwarded to the laboratory by the Collector. Disinfectors collecting tests forward them, together with the slip belonging with them, to the Bacteriological Laboratory at the foot of East Sixteenth street.

Department of Health.

DISINFECTION TEST.

Name

Street

Disease

Disinfector

Test exposed

Test collected

Date.....................190

Labortory Number

Date of test

Result

348-03-10M. (J. C.) 12 J.

Disinfectors, where washing down with soap or disinfecting solution, follow the directions given without variations therefrom. Disinfectors while at work use every precaution to prevent the liability of the spread of infection.

Stables where horses suffering from glanders have been kept are disinfected in accordance with the instructions given by the veterinarian; these usually call for the washing with disinfectant of the walls near the stall and the tearing out and burning of the woodwork of the stalls where the horse has been confined and the washing in disinfectant or boiling of the harness and utensils that have been liable to infection about the stable.

In cases of special disinfection, such as public buildings, factories, etc., the disinfectors carry out the special instructions given them.

When disinfection is performed in a private house under the direction of the family physician, it is his duty to certify to such disinfection; if the Chief Medical Inspector indorses it, the disinfection is accepted as complying with the regulations of the Department.

Disinfecting Station.

Goods are brought to the Disinfecting Station for disinfection in wagons specially provided for this purpose. The driver of the collecting wagon, when he calls for goods, takes up the slip showing goods ordered sterilized left by the Disinfector and leaves a receipt with the owner for the goods he removes.

Department of Health,

Borough of Manhattan.

No................

Received from..

of ....

the following articles for disinfection and fumigation:

Bedding, etc.	No.	Clothing.	No.	Miscellaneous.	No.
Mattresses........	.....	Coats.................	......	Carpets........	......
Bolsters...	......	Waistcoats..	......	Rugs..	.....
Pillows.................	......	Trousers	......	Curtains...............	......
Comfortables...........	......	Overcoats.............	......	....	......
....	......	Hats..................	......	....	......
....	......	Waists................	......	....	......
....	......	Dresses...............	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......
....	......	....	......	....	......

......................................Disinfector.

When the goods are returned, the driver of the wagon delivering them takes up this receipt and returns it to the Disinfecting Station; drivers and helpers on these wagons do not come in contact with disinfected goods at stations or the wagons that carry them.

Disinfected goods are returned to their owners from the Disinfecting Station in wagons specially provided for this purpose. Drivers and helpers on these wagons handle disinfected goods only and do not come in contact with infected goods or the wagons that carry them.

Goods are not taken to the Disinfecting Station until after gaseous disinfection, so that surface disinfection is insured, the goods always being in the room during its disinfection. In special cases of disinfection by disinfectant solution goods are removed in sterilized canvas bags.

Disinfecting Stations are so constructed that all infected goods are delivered in a room specially prepared for that purpose and separated and apart from all other rooms of the station. From this room a door opens into the disinfecting chamber or chambers.

Goods are taken from the disinfecting chamber through a door that opens into a special room for disinfected goods.

Goods are disinfected by heat, sulphur or formaldehyde. Where heat is used, the chamber is heated dry for 15 minutes with a vacuum of not less than 8 inches, followed by moist heat for 15 minutes; after moist heat the goods are dried by free air circulation through the chamber.

The temperature exceeds 100 degrees C. in every part of the chamber and contents. Steam chambers are furnished with electric thermometers, and also with separate self-registering thermometers in addition to those belonging to the chamber.

Where sulphur is used as the disinfecting agent, not less than 3½ pounds is burnt for every 1,000 cubic feet of space, and this always in the presence of moisture. The exposure is not less than four hours, and, where possible, twelve hours is allowed.

Where formaldehyde is used as the disinfecting agent, if it is generated from formalin, not less than six ounces is used for every 1,000 cubic feet of space; if generated from wood alcohol, not less than three pints of alcohol is used for every 1,000 cubic feet of space. The temperature of the chamber and contents to be disinfected is above 100 degrees F.

If disinfection is carried out in a disinfecting chamber, a vacuum of not less than eight inches is established before the introduction of the gas.

All goods liable to injury from disinfection by heat or sulphur are subjected to formaldehyde gas.

Disinfection of Ambulances and Vehicles Used for Contagious Disease.

All ambulances are disinfected in specially built ambulance disinfecting chambers by formaldehyde gas generated from formalin; 12 ounces of formalin with proper moisture provided is used for every 1,000 cubic feet of space. The temperature of the room is raised to about 100 degrees F.

A record is kept of the time disinfection is commenced, the amount of formalin used, the length of time necessary to generate the gas, the time the heat is turned off the generator, and the time the ambulance is removed. Every infected ambulance is exposed to the action of the disinfectant not lsss than one hour. If the odor of the formalin persists in the ambulance, it is deodorized by using ammonia.

Ambulance surgeons, attendants and drivers wear specially provided outer clothing when in contact with cases of contagious disease. This clothing is disinfected with the ambulance. Every ambulance is supplied with two separate blankets: these are disinfected every time used, and washed at least once a week.

Steamboats.

The cabins of steamboats carrying patients ill with contagious diseases are thoroughly disinfected after every case carried; this disinfection is by formaldehyde gas generated from 40 per cent. formaldehyde solution, 12 ounces, with proper moisture provided, being used for every 1,000 cubic feet of space. The time of the exposure is not less than one hour. The cabin to be heated to about 100 degrees F. during the disinfecting process. Before being occupied again these cabins are thoroughly aired (and deodorized by ammonia, if necessary).

Hospitals.

In case of change of service in hospital wards, the woodwork and walls are washed with a soap solution, followed by a solution of 1-1,000 bichloride of mercury. The ward is then disinfected by gaseous disinfection.

Every hospital ward is provided with suitable basins for antiseptic solutions, and all washable linen, bedding, clothing, etc., is immersed in such solution for not less than one hour before being removed to the laundry for washing, unless they have been previously sterilized by heat, or are removed to the laundry in sterile bags provided for that purpose. The washing at the laundries of the hospitals is done with sterilizing boilers. Clothing of patients brought to the hospitals is immediately sterilized and sent to the clothes room.

On change of service in hospital wards, all bedding is sterilized at the disinfection station connected with the hospital.

The uniformed disinfectors and employees of the Department of Health working in disinfection are instructed to keep their clothing in a neat and orderly condition.

The following list of pictures will give a fairly good illustration of the Department's methods of routine disinfection:

1. Disinfector preparing a room for fumigation.

2. Showing a wagon collecting goods at the house.

3. Showing the receiving side of the disinfecting station, with a wagon unloading goods into the sterilizing oven, and also the front of the crematory furnace.

4. Showing the distributing side of the disinfecting station, with tables full of goods and an oven being emptied of its contents.

5. Showing a distributing wagon being loaded at the station.

6. The Ambulance Disinfecting Station.

7. Borough of Richmond Disinfecting Station.

8. Showing type of sterilizing chamber used in the Boroughs of Bronx, Brooklyn, Queens and Richmond.

9. Showing stalls being removed from stable infected with glanders.

In the past year the following permanent improvements have been made:

Borough of Bronx—

Ambulance Disinfecting Station.
Two new wagons.

Riverside Hospital—

Rebuilding of the old sterilizing chamber.
New system of formaldehyde disinfection.
New clothes-room for storing clothing after disinfection.

Steamer Franklin Edson—

System of formaldehyde disinfection.

Borough of Queens.

New ambulance disinfecting station.
One new wagon.

Borough of Richmond—

New disinfecting station.
One new wagon.

Borough of Brooklyn—

New system of formaldehyde disinfection.
Closing of six cesspools at Kingston Avenue Hospital and diverting of sewage to settling tanks, where it could be properly disinfected.
Four new wagons.

In Brooklyn the improvements in disinfection are mostly due to Dr. H. A. Higley, who has charge of it in that Borough.

Borough of Manhattan—

New floor and general renovation of disinfecting station.

Work Performed by the Disinfectors for the Year 1902.

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.
Number houses visited for disinfection	7,564	9,240	4,875	5,118
Number infected rooms disinfected	16,669	18,913	9,462	8,556
Number times ambulances, etc., disinfected	940	934	339	379
Number pieces infected goods disinfected	15,460	19,871	9,486	20,627
Number pieces infected goods destroyed	2,270	5,060	1,832	3,541

Respectfully submitted,

ROBERT J. WILSON, M. D.,
Assistant Bacteriologist, in Charge of Disinfection.

A Report on the Methods of Using the Pasteur Treatment.

By Follen Cabot, M. D., Assistant Bacteriologist, Late Research Laboratory, Department of Health.

The virus used at the laboratory to produce immunity from hydrophobia originally came from Baltimore. It has now been used at the Research Laboratory for over six years, and is what is known as a "fixed" virus. That is to say, the period of incubation of the disease in the rabbit after it has been inoculated subdurally is always the same.

In carrying on the routine work we always use rabbits for the purpose of obtaining the virus for the Pasteur injections. This virus has no relation to serum, as is sometimes stated. The principle of the Pasteur treatment is to introduce into the bitten person's system small amounts of an attenuated poison of the same kind as that against which we are fighting, and so allow the body to form protective substances.

The virus or "poison" is gradually increased in strength till sufficient injections have been given to give protection to the individual against the virus which the bite of the suspected animal may have infected his system.

By experimental investigation Pasteur found that by giving a course of treatment using this "fixed" virus, considerable immunity could be produced. Most of his work was done with dogs and rabbits. A large part of the experiments carried out by Pasteur have been reproduced at the laboratory with confirmatory results. Experiments have been carried on to test ways of preserving the vaccine and transporting it, and the results have been used in giving treatment to people, thus changing in some degree the original Pasteur method.

The experimental work has established several important points; first, that treatment properly prepared can be sent away from the laboratory to almost any distance to be administered by the family physician. This fact was established after experiments on several hundred animals, including dogs, rabbits and guinea pigs, during the past four to five years. During the past two years treatment has been sent to over fifty patients, both in the city and outside. We have never had a bad result from it. Another point which has been established beyond question is that cauterization of wounds infected by rabid animals is of vast importance. Proper cauterization even as late as 48 hours should always be done, and when employed in 24 hours is perhaps more efficient than Pasteur treatment.

In these experiments I used over two hundred guinea pigs.

In addition to this, much time and study was spent on a dilution method with fresh material for producing immunity from rabies, but it was found unsatisfactory on account of a possible danger of producing the disease by the treatment. This danger does not exist in the Pasteur method.

All of these experiments and writings may be found reported in the following journals: "The Journal of Experimental Medicine, vol. IV., o. 2, 1890"; "Report of Experimental Work on the Dilution Method of Immunization from Rabies"; "The Medical News," March 18, 1899, "Rabies and Its Preventive Treatment, An Analysis of Cases"; "The Medical News," March 18, 1899, "The Preventive Effect of the Cauterization of Wounds Infected with the Virus of Rabies After an Interval of Twenty-four Hours."

In addition to these papers, about a dozen reports and short papers have been written, the last one being entitled "The Best Methods to Prevent Hydrophobia," which will appear shortly in "The Medical News."

The routine treatment by the Pasteur method is carried on as follows: A rabbit having died of rabies as a result of a subdural inoculation of a minute particle of the "fixed virus" from another rabbit, the medulla and spinal cord are removed. The medulla is saved to be used to inoculate other rabbits in the same way, so that the supply of spinal cords may be kept up. The spinal cord thus removed is hung in a sterile bell jar with a vent at the bottom to assist in evaporation. In the bottom of this jar is placed caustic potash to assist in drying the piece of marrow. This jar is then placed in a dark room, ranging in temperature between 68 and 72 degrees F. It must not vary from these points. A room which is regulated by a constant temperature apparatus should be used in this preparation of the rabic virus.

After a cord has been dried for fourteen days and been tested for contamination, it is used, if sterile, for our first injection. The process of preparing it is as follows: In a darkened room in which artificial light is admitted the cord is taken by means of the thread holding it out of the jar with one hand and then by means of a sterile pair of scissors a small section is cut off and placed in a test glass. The amount varies somewhat according to the size of the cord and its condition as to dryness, etc. This point can only be estimated by experience. After this piece of cord is cut off and placed in the test glass it is ground up by a sterile glass rod and normal salt solution added until we have an emulsion. The amount of salt solution to be added can only be estimated by experience. It depends largely upon the condition of the cord. The salt solution has been used only a few months, but since its use the pain of the injection, which was severe, as I can testify, as I took a whole course of 15 days myself, has entirely disappeared, and so have also indurated lumps which appeared at the point of injection. We now inject children without a cry, whereas formerly much trouble with them was common.

The emulsion now having been prepared as described, we are prepared to inject the patient. The point usually selected is the abdominal region, but other parts are occasionally chosen instead.

The clothing having been loosened and the region selected for the injection having been carefully cleaned to avoid infection, we introduce very slowly a subcutanous needle, which has been sterilized, and introduce from a sterile syringe about 3 c.c. of this emulsion from this fourteen-day cord.

The following table will explain the way a course of treatment is carried out:

No. of Injection.	Date.	Amount.	Age Cords.	No. of Injection.	Date.	Amount.	Age Cords.
1........	July 1...	3 c.c....	14 days.	11.......	July 7...	2 c.c....	4 days.
2........	" 1...	3 c.c....	13 "	12	" 8...	1½ c.c..	3 "
3	" 2...	3 c.c....	12 "	13......	" 9...	2 c.c....	5 "
4........	" 2...	3 c.c....	11 "	14.......	" 10...	2 c.c....	4 "
5...... .	" 3...	3 c.c.. .	10 "	15.......	" 11...	2 c.c....	3 "
6........	" 3...	3 c.c....	9 "	16.......	" 12...	2 c.c....	5 "
7	" 4...	3 c.c...	8 "	17.......	" 13...	2 c.c....	4 "
8........	" 4...	3 c.c....	7 "	18.......	" 14...	2 c.c....	3 "
9	" 5...	2 c.c....	6 "	19.......	" 15...	2 c.c....	5 "
10........	" 6...	2 c.c....	5 "	20.......	" 16...	2 c.c....	4 "

The above will give a good idea of an average course of Pasteur treatment. Experience teaches us that the intensity and duration of treatment depend upon: First, the length of time which has elapsed between the time of the injury and beginning of treatment; second, the extent, position and number of bites; third, the after treatment of the wound and the history of the animal.

The dose of the emulsion varies somewhat according to the age of the patient.

In over 175 cases which have been treated at the laboratory and of the 50 others outside, we have not had more than three cases of abscess formation, none of them dangerous. This, however, is always a possibility, and only strict cleanliness and great care in preparing the vaccine prevents such complication.

Besides the cases treated we have had fully as many more who have not been treated, but who have come in for an opinion.

It has seemed best for various reasons in these cases not to give the Pasteur injections. Most of the cases were advised not to take it because the animal which caused the injury was undoubtedly free from rabies. In no case, however, was treatment refused any one who wanted it after the facts had been explained. In none of those who were advised not to take the treatment did hydrophobia develop.

In only one of the cases treated, where treatment was begun within two weeks from the date of injury, did hydrophobia develop. In this one case the wound was on the face and was not cauterized. The incubation period was extremely short, 17 days, almost the shortest on record. The usual incubation period is from five to eight weeks. The shortest 12 days and the longest authentic period seven months.

In carrying out the treatment of patients away from the laboratory on which I have been working for the past five years, we have in the past added sterile glycerin to the emulsions of cords; then, if at a distance, sent by mail; if near, by messenger. I have usually, when sending to a distance, employed a cord fresher by one day in my reckoning the age of the cords for the various treatments. That is to say, in sending a three-day emulsion which will not be given for 24 hours, I use a two-day cord in its preparation.

In addition to a very good case book for recording the patient's history, treatment, etc., I believe it would be of advantage to have tabulated questions sent to all physicians applying for treatment to be administered away from the laboratory. It would give information to help in advising about the case, need of treatment, its intensity and length, general advice as to cauterization, etc.

Tabulated Questions.

1. Name.
2. Age.
3. Address.
4. Date application for treatment was made.
5. Name of physician referring case.
7. Address of physician referring case.
8. Date, position and extent of bite.
9. What cautery was used, how soon and how complete.
10. Did wound bleed freely? Was it washed or sucked?
11. History of animal.
12. Veterinary opinion as to cause of illness of dog.

13. If dog is alive preserve it for observation. If dead have brain tested with guinea pigs.

14. If possible send live dog to laboratory. If dead, ship the head packed in ice. No preservative to be used. If medulla is sent put in glycerin, send by mail.

By this kind of information we could get a good idea of the case and its needs.

In closing this report I can say that I have never seen any serious consequence follow the Pasteur treatment which I considered as in any way due to it. I make this observation because in the past there has been a fairly general belief that this treatment may cause hydrophobia.

I have, however, seen cases where many peculiar nervous symptoms temporarily followed its use. This is especially so in women and children. Nor do I believe these symptoms the result alone of worry over the possible consequence of the original injury. While I was giving myself a course of the treatment I felt many nervous symptoms which must have been caused by the virus, for I had not received any injury from a suspected animal, but took the treatment for experimental purposes.

Department of Health—City of New York.
Southwest Cor. 55th Street and 6th Avenue, Borough of Manhattan,
New York, June , 1903.

To the Board of Health, Department of Health, City of New York:

Gentlemen—I have the honor to transmit the report of the Bureau of Records for the year 1902.

General Statistics.

There were 68,085 deaths, 85,644 births and 36,207 marriages reported during the year, showing a decrease of 2,729 deaths and an increase of 4,909 births and 2,760 marriages, as compared with 1901.

A decrease in the number of deaths occurred in every borough with the exception of the Borough of The Bronx, in which an increase of 155 was reported, but if the presence of five large institutions in this latter borough, most of whose inmates were residents of other boroughs—especially of the Borough of Manhattan—be taken into consideration, this increase would be wiped out and this borough would undoubtedly show a rate of decrease corresponding to that of its sister boroughs, Manhattan and Brooklyn, each of which showed a decrease of 1,806 and 998 respectively.

The increase in the number of births reported occurred in every borough, and was distributed as follows: Manhattan, 2,301; The Bronx, 1,197; Brooklyn, 1,325; Queens, 71, and Richmond, 15. During the fall and winter hundreds of physicians and midwives were notified of their negligence in the matter of reporting births occurring in their practice, summoned to appear at the borough offices in order that they may be given an opportunity of explaining their delinquencies and warned that in the future, if they persisted in their violations of the State law and Sanitary Code, that they would be severely dealt with; an immediate and considerable increase in the daily number reported took place, and at date of present writing, June, 1903, has continued during every month of the present year. Even with this increase during the year 1902 continuing into 1903, all the births occurring in the city are not reported, the Borough of Manhattan making the best showing, the Borough of Queens the worst; the birth rate of the entire city should be about 30 per 1,000, which means that about 20,000 births escape registration, a state of affairs that must be remedied before the Greater City is many years older; what is true at present of our city is true in a greater degree of many cities and towns in the entire country.

There were reported 2,760 more marriages than during the previous year, every borough showing an increase with the exception of the Borough of Queens, in which 9 less marriages were reported.

DEATHS.

The actual number of deaths that took place during the year were 68,112, representing a death rate of 18.75 per 1,000 against 20.00 per 1,000 in 1901. Since consolidation the death rates per 1,000 by boroughs and city were as follows:

Borough.	1898.	1899.	1900.	1901.	1902.
Manhattan	20.28	19.77	20.99	20.55	19.40
The Bronx	22.42	20.23	21.52	21.60	20.21
Brooklyn	19.77	19.13	20.09	19.25	17.88
Queens	18.69	17.29	17.95	17.20	16.13
Richmond	20.48	19.45	20.52	19.51	18.12
City of New York	20.26	19.47	20.57	20.00	18.75

This gradual decrease in the death rate of the Greater City, as exemplified in the above table, is in perfect accord with the experience of the chief cities of the world, and it is to be deplored that the loose manner of keeping records of death previous to 1898 in the Boroughs of Queens and Richmond prevents comparison of the years previous to consolidation. The following tables, showing the decrease in the death rates of the former City of New York (present Boroughs of Manhattan and The Bronx) and the City and Borough of Brooklyn since 1890, prove by the gradual and constant fall of the rates that the factors producing this welcome result are still in active operation. The death rate of 19.49 per 1,000 for the former City of New York is the lowest on record; the next lowest death rate was 19.66, in the year 1814, but this low rate has always been questioned, as many of the deaths occurring in the first half of that century were not recorded. The death rate of 17.88 in the Borough of Brooklyn is the lowest since 1866, and in all probability the lowest on record in the history of that city.

Year.	Old City of New York.	City of Brooklyn.	Year.	Old City of New York.	City of Brooklyn.
1890	24.87	23.58	1897	20.03	19.49
1891	26.31	24.56	1898	20.46	20.08
1892	25.95	23.16	1899	19.81	19.13
1893	25.30	22.64	1900	21.04	20.09
1894	22.76	22.08	1901	20.66	19.25
1895	23.18	22.76	1902	19.49	17.88
1896	21.84	21.95			

The number of deaths from the principal causes is compared in the following table with that of the preceding year and the increase or decrease noted:

Cause of Death.	1901.	1902.	Increase in 1902.	Decrease in 1902.
Typhoid fever	727	764	37	....
Malarial fever	195	125	....	70
Small-pox	410	310	....	100
Measles	449	710	261	....
Scarlet fever	1,162	940	....	222
Whooping Cough	289	606	317	....
Diphtheria and Croup	2,068	2,015	....	53
Influenza	856	157	...	699
Dysentery	348	254	....	94
Pulmonary tuberculosis	8,135	7,569	....	566
Other tubercular diseases	1,254	1,314	60	....
Cancer, sarcoma	2,463	2,450	....	13
Diabetes	503	471	....	32
Alcoholism	329	345	16	...
Diseases of nervous system	5,732	5,478	....	254
Diseases of circulatory system	5,363	5,931	568	....
Bronchitis, acute and chronic	2,152	2,283	131	....
Pneumonia, lobar and broncho	9,168	9,377	209	....

Cause of Death.	1901.	1902.	Increase. in 1902.	Decrease in 1902.
Diarrhœal diseases, under two years	5,796	4,938	....	858
Diarrhœal diseases, two years and over	977	829	....	148
Other diseases of digestive organs	2,873	2,812	....	61
Bright's disease and acute nephritis	5,500	5,461	....	39
Puerperal diseases	648	642	....	6
Congenital debility and malformations	2,477	3,278	801	....
Old age	1,231	959	....	272
Homicide	112	127	15	....
Suicides	713	772	59	....
Accidents	3,811	2,853	....	958
Ill-defined causes	2,230	1,199	....	731
All other causes	2,749	2,843	94	....
Total	70,720	68,112	2,568	5,176
Balance	2,608		2,608	

Typhoid Fever.

There were 37 more deaths reported from this disease than in the previous year, an increase that was confined to the Boroughs of Brooklyn (50) and The Bronx (18), a slight decrease being noted in the Boroughs of Manhattan (15) and Richmond (16), the Borough of Queens reporting the same number as in the previous year; the death rate for the entire city was 21.0 per 100,000, against 20.6 for the previous year. This rate compares favorably with the large cities of this country, and with some of the large European cities.

The death rates per 100,000 from typhoid fever in principal cities of Europe and United States for the year 1901 are shown in the following table:

Europe.	Rate per 100,000.	United States.	Rate per 100,000
London	12.1	New York	20.6
Paris	12.9	Chicago	30.0
Berlin	4.7	Philadelphia	33.6
Vienna	4.4	Boston	24.7
St. Petersburg	84.9	St. Louis	33.1
Belfast	99.4	San Francisco	19.4
Liverpool	24.1	Washington	57.8
Dublin	27.7	Baltimore	27.2

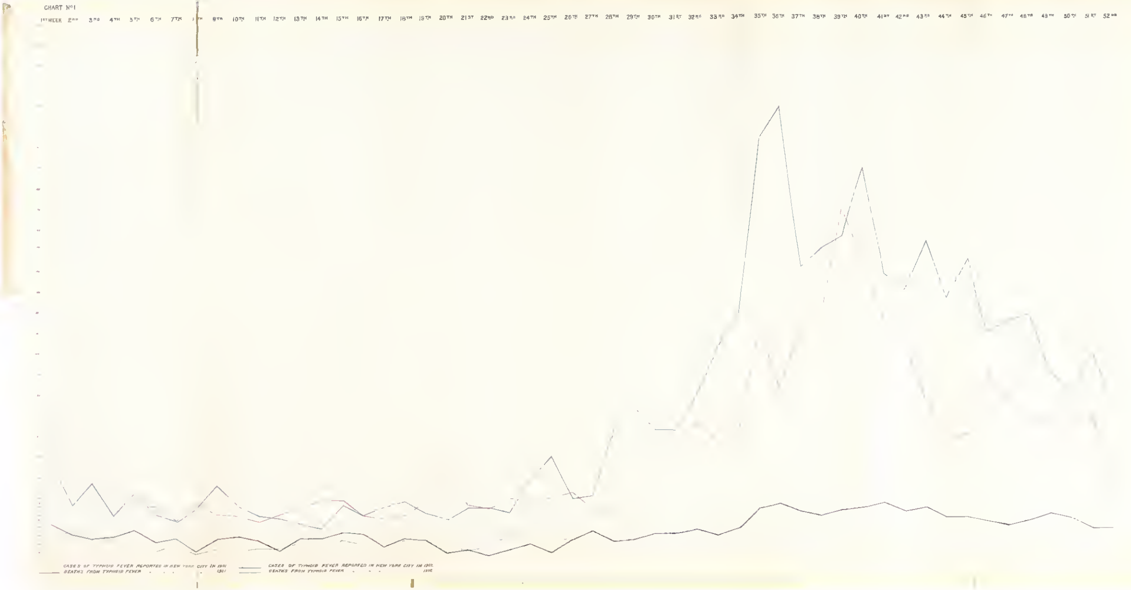

CHART No. 1
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52nd
CASES OF TYPHOID FEVER REPORTED IN NEW YORK CITY IN 1901
DEATHS FROM TYPHOID FEVER 1901
CASES OF TYPHOID FEVER REPORTED IN NEW YORK CITY IN 1902
DEATHS FROM TYPHOID FEVER . . . 1902

MONTHLY AND YEARLY DEATH RATE PER 100000 FROM TYPHOID FEVER

The average decennial death rate per 100,000 from this disease in the former City of New York for the past three decades were as follows:

1873–1882	32.8
1883–1892	28.7
1893–1902	17.8

In other words, the death rate from typhoid fever has diminished almost 50 per cent. during the last ten years, as compared with 1873–1882.

In the Borough of Brooklyn the average death rate per 100,000 from this disease for the ten years 1883–1892 was 18.8, and from 1893 to 1902 was 20.2, showing a slight increase.

The accompanying chart (1) shows the number of cases and deaths from typhoid fever in the entire city during years 1901 and 1902; the marked autumnal rise is noticeable; the number of cases in 1902 exceeded the number reported in 1901, and as the death rates for both years were about the same, it is fair to presume, in the absence of the discovery during the year of any therapeutical agent influencing the rate of mortality of this disease, that this apparent increase was due to physicians taking advantage of the facilities offered by this Department for the diagnosis of typhoid fever, thereby reporting cases which otherwise would have escaped registration and which would have been considered as cases of malarial or continued fevers.

Chart (2) shows the monthly and yearly death rates per 100,000 from typhoid fever for the Boroughs of Manhattan and Brooklyn and the city during years 1898–1902, inclusive.

Malarial Fevers.

There were 125 deaths from malarial fevers, against 195 deaths for year 1901, a decrease of 70. The question naturally arises was this decrease due to more accurate diagnoses upon the part of the physicians, thereby placing some of the deaths that otherwise would be classified as from malarial fever under their true heading of typhoid fever, or were the official and individual efforts aimed at the extermination of the malariæ plasmodium-conveying mosquito productive of such immediate and beneficial results?

Small-pox.

There were 310 deaths from this disease, as against 410 for the previous year, a decrease of 100 deaths. In September, 1874, the free vaccination corps was organized as a separate branch of the Department, and during that year there were 1,462 cases reported and 484 deaths, and 3,397 cases and 1,280 deaths during the following year; since that time the recurrent waves of small-pox have returned regularly every three or four years, varying in height and intensity, but have fallen far below the mark reached by the high wave of 1875 and the high waves of 1871 and 1872. It is high time that we should follow in the footsteps of some of the European countries and cities and adopt compulsory and continuous vaccination; it is the only means of stamping out completely this loathsome disease.

Measles and Scarlet Fever.

There were 710 deaths from measles, as against 449 for the previous year, an increase of 261 deaths. The following table shows the actual number of deaths from measles and broncho-pneumonia by months for the years 1901 and 1902:

Month.	Deaths from Measles.		Deaths from Broncho-Pneumonia.	
	1901.	1902.	1901.	1902.
January	9	106	290	428
February	24	140	253	403
March	30	103	287	352
April	38	96	284	300
May	39	69	211	262
June	46	78	163	191
July	57	40	137	166
August	33	18	99	153
September	13	5	151	165
October	17	7	191	[illegible]
November	38	16	246	223
December	105	32	309	256

The above table shows clearly the effect of the prevalence of a severe epidemic of measles upon the deaths from broncho-pneumonia; during the first half of the year there were 448 more deaths from broncho-pneumonia than in the corresponding half of the previous year; in all cases where the certificate of death mentions measles and pnumonia as the cause of death, the contagious disease is given the preference; after analyzing this table it is very evident that a large number of cases of measles are not reported to the Department, probably due to the view taken by the laity of the mildness and harmlessness of this disease, causing them not only to neglect engaging medical advice, but to expose carelessly other members of the family, so that the children "may all have it at the one time and be done with it."

How fatally erroneous this idea is may be judged from the above figures. Notwithstanding this prevalent idea, the death rate from measles has materially declined since 1896, when cases of this disease were quarantined for the first time.

The number of deaths from scarlet fever during the year was 940, a decrease of 222, compared with the previous year.

The following table gives the deaths and death rates per 10,000 of the population from measles and scarlet fever in the former City of New York from 1873–1902, inclusive:

Year.	Measles.		Scarlet Fever.	
	Deaths.	Death Rate.	Deaths.	Death Rate.
1873	306	3.1	1,045	10.6
1874	319	3.1	879	8.5
1875	167	1.6	514	4.9
1876	362	3.4	891	8.3
1877	155	1.4	983	8.9
1878	272	2.4	1,093	9.7
1879	244	2.1	1,477	12.6
1880	479	4.0	618	5.1
1881	429	3.4	1,964	15.8
1882	913	7.1	2,056	16.1
1883	716	5.4	744	5.6
1884	762	5.6	608	4.5
1885	735	5.3	559	4.0
1886	668	4.6	371	2.6
1887	767	5.2	589	4.0
1888	591	3.9	1,361	8.9
1889	470	3.0	1,242	7.9
1890	730	4.5	408	2.5
1891	663	4.0	1,220	7.4
1892	864	5.1	977	5.7
1893	393	2.2	551	3.1
1894	584	3.2	541	3.0
1895	793	4.2	468	2.5
1896	714	3.7	402	2.1
1897	391	2.0	500	2.6
1898	416	2.3	523	2.6
1899	379	1.9	332	1.6
1900	470	2.3	315	1.5
1901	272	1.3	625	3.0
1902	462	2.2	635	3.0

Scarlet Fever quarantined in 1888; Measles quarantined in 1896.

It shows that since scarlet fever was quarantined in 1888 the death rate has fallen gradually from almost 9 to 3 per 10,000; the average death rate per 10,000 from this disease for the decennium 1873–1882 was 9.22; 1883–1892 was 5.37, and from 1893–1902 was

2.51; it is interesting to note that the average death rate per 10,000 from measles for the past ten years in the former City of New York equaled that of scarlet fever for the same time and place, to wit, 2.51; in other words, during the past ten years as many deaths have been caused by measles as by scarlet fever, and if the fact be taken into consideration that quite a number of deaths were attributed to broncho-pneumonia, but which actually were a sequence of an attack of measles, and therefore should have been credited to the latter disease, it is very evident that more decisive steps should be taken to impress upon mothers the necessity of isolating and quarantining members of the family attacked by this latter disease, and to subject them to visitation by the medical inspection of the Department.

Whooping Cough.

There were 317 more deaths recorded from this disease in 1902, as compared with the previous year, the figures being respectively 289 and 606.

Diphtheria and Croup.

There were recorded 2,015 deaths from this disease, a decrease of 53 as compared with the previous year. The lowering of the death rate from and the case-fatality of this disease is clearly shown in the following tables; note the number of cases, death rate and case-fatality of the year 1891 as compared with those of 1902, especially in the Boroughs of Manhattan and The Bronx; in April, 1895, arrangements were made for the free administration of diphtheria antitoxin by medical inspectors of the Department upon the request of the attending physician, and an almost immediate lowering of the death rate is shown in the following table, compiled under the direction of Dr. Hermann M. Biggs, Medical Officer of the Department.

The average death rate per 100,000 from this disease in the old City of New York during the decade 1873-1882 was 190.1; for the decade 1883-1892 was 146.9, and for the decade 1893–1902 was 83.9, a remarkable decrease. There is hardly any doubt at present existing in the mind of the unprejudiced medical observer of the specific value of diphtheria antitoxin as a medicinal and immunizing agent, and it is earnestly recommended that in the future a more extensive and an earlier use of antitoxin be resorted to by the medical profession in order that this most fatal of the contagious diseases attacking children in this city may be relegated to the ranks of those diseases possessing past historical value rather than contemporaneous prevalence.

Cases, Deaths, Death Rates Per 100,000 *and Case Fatality of Diphtheria and Croup, from*

1888 to 1902, inclusive, old City of New York.

1888 to 1902, inclusive, City and Borough of Brooklyn.

1898 to 1902, inclusive, Borough of Queens.

1898 to 1902, inclusive, Borough of Richmond.

Old City (Manhattan and The Bronx).					Brooklyn.				
Year.	Cases.	Deaths.	Death Rate Per 100,000	Case Fatality.	Year.	Cases.	Deaths.	Death Rate Per 100,000.	Case Fatality.
1888	6,491	2,553	167.7	39.3	1888.......	2,297	1,285	164.2	55.9
1889........	6,489	2,291	146.2	35.3	1889.......	2,798	1,467	180.8	52.4
1890... ...	4,604	1,783	110.6	38.7	1890.......	2,185	1,283	152.6	58.7
1891........	5,364	1,970	118.7	36.7	1891.......	1,850	1,180	135.8	63.8
1892........	5,184	2,105	123.3	40.6	1892.......	1,829	1,137	126.6	62.2
1893........	7,057	2,558	145.5	36.2	1893.......	1,672	978	105.3	58.5
1894	9,641	2,870	158.6	29.7	1894.......	3,812	1,660	173.0	43.5
1895........	10,505	1,976	105.2	18.8	1895.......	4,687	1,454	146.6	31.0
1896........	11,399	1,763	91.2	15.4	1896.......	5,231	1,310	127.8	25.0
1897	10,896	1,590	81.0	14.6	1897.......	4,147	998	94.1	24.1
1898........	7,593	923	46.7	12.2	1898.......	3,221	745	68.0	23.1
1899........	8,210	1,085	53.9	13.2	1899.......	2,894	744	65.7	25.7
1900	8,364	1,276	62.1	15.3	1900.......	3,856	863	73.7	22.4
1901........	7,726	1,227	58.5	15.9	1901.......	3,942	732	63.5	18.6
1902........	10,430	1,142	53.4	10.9	1902.......	4,236	762	61.0	18.0
Queens.					Richmond.				
1898........	226	47	34.3	20.8	1898.......	156	29	45.5	18.6
1899........	260	63	43.4	24.2	1899.......	146	20	30.6	13.7
1900........	455	74	48.1	16.3	1900.......	238	52	77.4	21.8
1901........	411	70	43.0	17.0	1901.......	250	39	56.6	15.6
1902........	467	92	53.3	19.7	1902.......	186	19	26.9	10.2

In the old City of New York croup was not reported to the Department previous to 1890, and in the City of Brooklyn previous to 1895, so that the figures above the red line represent cases of diphtheria alone as reported, and deaths and rates from diphtheria and croup combined.

Influenza.

The comparative mildness of the periodic visitation of influenza during the year 1902 resulted in 699 less deaths, attributed directly to this cause, than in the year 1901, and, judging from past experience, a corresponding decrease in the number of deaths from diseases of the respiratory tract was to be expected; but another fruitful cause of pneumonia and acute bronchitis, to wit, measles, assumed in the very beginning of the year the proportions of a severe epidemic, which lasted during the first half of the year; the effect of this epidemic upon broncho-pneumonia has been noted in treating of measles on a previous page; during the first half of the year 1902 the deaths from pneumonia and acute bronchitis numbered 7,177, as against 6,637 for first half of 1901, an increase of 540; the deaths from measles for the first half of year 1902 equalled 592, against 186 for same period of the previous year, the deaths from influenza for first half of 1902 were 119, against 802 for corresponding period of 1901.

The following table shows the deaths from measles, influenza and pneumonia by months for the years 1901 and 1902:

Months.	Deaths from Measles.		Deaths from Influenza.		Deaths from Pneumonia.	
	1901.	1902.	1901.	1902.	1901.	1902.
January	9	106	398	30	1,344	1,322
February	24	110	194	37	888	1,261
March	30	103	114	32	1,170	1,053
April	38	96	67	15	955	945
May	39	69	20	4	743	911
June	46	78	9	1	533	527
July	57	40	....	1	375	442
August	33	18	1	2	361	399
September	13	5	4	....	401	472
October	17	7	8	8	571	550
November	38	16	13	9	771	683
December	105	32	28	18	1,056	812

Pulmonary Tuberculosis.

During the year there were 7,569 deaths recorded from tuberculosis of the lungs, as compared with 8,135 during the previous year, a decrease of 566.

The following table, compiled under the direction of Dr. Hermann M. Biggs, the Medical Officer of the Department, shows at a glance the result of the persistent warfare waged against tuberculosis in the former City of New York. In 1881 the death rate from tuberculosis of the lungs in the old city was 4.27; in 1902, 2.29 per 1,000; that is to say, the mortality from this disease was reduced almost one-half; the average quinquennial death rates from 1881 to 1885 was 3.98, 1886 to 1890 was 3.50, 1891 to 1895 was 2.86, and 1896 to 1900 was 2.56.

Year.	Total Deaths Tuberculosis of Lungs.	Total Deaths other Tuberculosis.	Death Rate, Tuberculosis of Lungs.	Death Rate, all Tuberculous.	General Death Rate.	Total Cases Tuberculosis Reported.	Number of Duplicates	Number of Specimens of Sputum Examined.
1886	5,477	872	3.81	4.42	25.99	......	.....	......
1887	5,260	747	3.56	4.06	26.32	......	......	......
1888	5,260	813	3.46	3.99	26.39	......	......	......
1889	5,179	862	3.30	3.86	25.32	......	......	......
1890	5,492	917	3.41	3.97	24.87	......	......	......
1891	5,160	949	3.11	3.56	26.31	......	......	......
1892	5,033	1,028	2.95	3.55	25.95	......	......	......
1893	5,124	1,039	2.91	3.51	25.30	......	......	......
1894	4,658	1,062	2.57	3.16	22.76	4,166	......	511
1895	5,205	1,078	2.78	3.35	23.18	5,824	......	1,147
1896	4,994	932	2.62	3.11	21.84	8,334	......	1,856
1897	4,843	948	2.50	2.98	20.03	9,735	......	2,703
1898	4,957	944	2.51	2.99	20.45	10,798	2,239	2,920
1899	5,238	971	2.60	3.08	19.81	10,484	2,472	3,115
1900	5,278	901	2.57	3.01	21.04	9,639	2,436	3,512
1901	5,233	816	2.50	2.89	20.66	12,135	3,005	4,397
1902	4,893	851	2.29	2.68	19.49	13,722	3,738	4,631

Diseases of the Circulatory System.

The following table, containing the deaths for 1901 and 1902 from influenza and organic heart diseases, does not explain the increase of 568 deaths in diseases of this system; apparently the mildness of the influenza prevalent druing the first four months of the year had not the effect of lessening the number of deaths from these diseases; in the first four months of 1901 there were 773 deaths from influenza and 1,641 deaths from organic heart diseases, and in the first four months of 1902 there were 114 deaths from influenza and 1,902 deaths from organic heart diseases; the deaths from diseases of the arteries, embolism and acute endocarditis increased by 272 the number of deaths in this division of diseases, so that the increase was not confined simply to the chronic diseases of the heart, but extended through all circulatory diseases; the percentage of increase among the males was 13, and among the females almost 8, and the years at which the increases took place were, among the males, at all ages above 40 years, the greatest increase taking place between the age of 60 and 65, and, among the females, 80 per cent. of the entire increase occurred among those 70 years of age and over.

Deaths from Influenza and Organic Heart Diseases 1901 and 1902.

Months.	Influenza.		Organic Heart Diseases.	
	1901.	1902.	1901.	1902.
January	398	30	372	512
February	194	37	410	467
March	114	32	455	460
April	67	15	404	463
May	20	4	433	451
June	9	1	392	389
July	..	1	311	329
August	1	2	321	308
September	4	..	328	305
October	8	8	345	420
November	13	9	400	354
December	28	18	455	401

Diarrheal Diseases.

5,767 deaths from diarrheal diseases were recorded during the year, against 6,773 deaths during the previous year, a decrease of 1,006; this desirable showing was in great part due to the pleasant summer of 1902, the following table showing the effect of the temperature upon the mortality from this disease.

Months.	Mean Thermometer.		Deaths from Diarrhoea Under Two Years.	
	1901.	1902.	1901.	1902.
June	70.5	66.8	267	500
July	77.7	72.7	1,598	1,478
August	74.9	71.9	1,558	1,087
September	68.1	66.7	1,071	714

During the year 1892 there were 4,119 deaths of children under five years in the old City of New York from diarrheal diseases, representing a death rate of 24.10 per 10,000 of the entire population; during the year 1902 there were 2,936 deaths from diarrheal diseases under five years in the present Boroughs of Manhattan and The Bronx (former City of New York), representing a death rate of 13.72 per 10,000 of the entire population, a decrease of 42 per cent. in the rate.

The death rate from diarrheal diseases in children has been gradually decreasing for the past twenty years, as shown in the following table, the most prominent factors being a supply of purer milk by reason of official watchfulness, the Pasteurization of milk through the instrumentality of private philanthropic endeavor, the education of the mother and nurse to the necessity of constant vigilance as to care and cleanliness of the infant's food, especially the milk; the opening of small parks, clean streets and the establishment of seaside and country homes for the care of infants.

Deaths and Death Rates from All Diarrheal Diseases, Old City of New York, 1881-1902.

Year.	Deaths.	Death Rates.	Year.	Deaths.	Death Rates.
1881	4,488	3.61	1892	4,683	2.74
1882	4,249	3.32	1893	4,359	2.48
1883	3,624	2.75	1894	4,124	2.28
1884	4,077	3.01	1895	4,464	2.38
1885	3,851	2.76	1896	4,122	2.16
1886	3,997	2.73	1897	3,854	1.99
1887	4,318	2.92	1898	4,145	2.10
1888	4,165	2.74	1899	3,262	1.62
1889	4,238	2.70	1900	3,690	1.80
1890	4,116	2.55	1901	3,577	1.71
1891	4,480	2.70	1902	3,248	1.52

Congenital Debility and Malformations.

There were 3,278 deaths recorded from these diseases during the year, against 2,477 during 1901, an increase of 958 deaths, this increase being due to a change in the classification of the causes of death, all deaths from marasmus at three months of age and under having been transferred from the ill-defined causes to the more definite title of congenital debility.

DEATHS FROM VIOLENCE.

Accidental Deaths.

There were 2,853 deaths recorded from accident during the year, against 3,811 during the year previous, a decrease of 958 deaths; this decrease is more than accounted for by 1,273 deaths from sunstroke during the intense heat of the summer months of the year 1901, against 36 deaths from this cause during the summer of 1902.

Suicide.

There were 772 deaths recorded under this heading during the year, against 713 deaths during the previous year, an increase of 59 deaths. Of these 772 deaths, 576 were males and 196 females; 31 per cent. of the males and 47 per cent. of the females used carbolic acid to accomplish their end; 28 per cent. of the males and 4 per cent. of the females chose gunshot wounds to make their exit.

Homicides.

There were 127 homicides reported during the year, against 112 for 1901, an increase of 15.

SEARCHES AND TRANSCRIPTS.

The searches of the records of births, deaths and marriages numbered 27,340, and 23,025 transcripts of these records were issued during the year.

Respectfully submitted,

WM. H. GUILFOY, M. D.,
Registrar.

REPORT OF BUREAU

For Year ending

	Borough of—	
	Manhattan.	*The Bronx.
Number of deaths	36,769	4,935
Death rate	19.40	20.21

* The death rate in the Borough of The Bronx is materially increased by the deaths in

Borough.	Estimated Population.	Certificates Received and Tabulated.			
		Marriages.	Births.	Deaths.	Still-births.
Manhattan	1,895,491	24,766	52,291	36,760	3,521
The Bronx	244,141	1,227	5,220	4,945	341
Brooklyn	1,249,650	9,014	23,507	22,315	1,829
Queens	172,472	768	3,198	2,782	230
Richmond	70,747	432	1,428	1,283	90
City of New York	3,632,501	36,207	85,644	68,085	6,011

	Borough of—	
	Manhattan.	The Bronx.
Actual number of deaths in institutions	10,771	1,878
Actual number of deaths in tenements	23,298	1,733
Actual number of deaths in dwellings	1,793	1,214
Actual number of deaths in hotels and boarding-houses	353	15
Actual number of deaths in streets, rivers, etc	554	95

OF RECORDS,

December 31, 1902.

Borough of—			City of New York.
Brooklyn.	Queens.	Richmond.	
22,344	2,782	1,282	68,112
17.88	16.13	18.12	18.75

institutions, most of the inmates having been transferred from the Borough of Manhattan.

Rate per 1,000.				Transit Permits Issued.	Coroners' Cases.	Searches Made.	Transcripts Issued.
Marriages.	Births.	Deaths.	Still-births.				
13.07	27.59	19.39	1.86	998	5,092	18,990	14,738
5.03	21.38	20.25	1.40	11	500	563	680
7.21	18.81	17.86	1.46	345	3,423	7,039	6,791
4.45	18.54	16.13	1.33	....	500	546	595
6.11	20.18	18.14	1.27	....	214	202	221
9.97	23.58	18.74	1.65	1,355	9,729	27,340	23,025

Borough of—			City of New York.
Brooklyn.	Queens.	Richmond.	
4,015	305	370	17,339
11,442	634	141	37,251
6,485	1,736	717	11,945
88	36	7	499
314	71	44	1,078

CITY OF

	TOTAL.	WHITE.		COLORED.		NATIVE PARENTS.		FOREIGN PARENTS.		PARENTAGE OF MIXED NATIVITIES.		PARENTAGE UNKNOWN OR NOT STATED.	
		M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
*Marriages.....	36,207	35,162	35,168	1,045	1,039	....	....	....	....	....	....	....	....
*Births.........	85,644	42,879	41,327	736	702	12,321	11,959	24,914	23,911	6,005	5,808	375	351
Deaths........	68,085	35,741	30,333	1,004	1,007	7,427	6,602	21,007	18,735	3,447	3,027	4,864	2,976
*Still-births....	‖6,011	3,595	2,354	127	73	1,003	729	1,885	1,260	420	280	215	158

* The Returns of Births, Marriages and Still-births are incomplete. ‖ Sex undetermined, 61.

BOROUGH OF

Marriages.. ...	24,766	24,009	24,014	757	752	....	....	....	....	....	....	....	....
Births..........	52,291	26,166	25,203	479	443	5,701	5,470	17,454	16,900	3,119	2,931	371	345
Deaths....... .	36,760	19,369	16,247	560	584	3,264	2,822	11,791	10,570	1,885	1,626	2,989	1,813
Still-births......	‡3,521	1,970	1,375	79	47	447	328	1,271	849	203	154	128	91

‡ Sex undetermined, 50.

BOROUGH OF

Marriages	1,227	1,205	1,205	22	22	....	....	....	....	....	....	....	....
Births	5,220	2,618	2,505	51	46	1,057	985	1,008	945	603	621	1	....
Deaths.........	4,945	2,660	2,073	110	102	536	451	1,623	1,240	345	296	266	188
Still-births. . ..	341	197	129	6	9	77	59	73	50	40	26	13	3

BOROUGH OF

Marriages......	9,014	8,780	8,781	234	233	....	....	....	....	....	....	....	....
Births..........	23,507	11,789	11,378	174	166	4,533	4,480	5,641	5,255	1,787	1,808	2	1
Deaths.........	22,315	11,510	10,266	268	271	2,967	2,776	6,439	5,915	1,029	951	1,343	895
Still-births	§1,829	1,048	720	36	14	419	293	462	296	141	86	62	59

§ Sex undetermined, 11.

BOROUGH OF

Marriages......	768	746	746	22	22	....	....	....	....	....	....	....	....
Births..........	3,198	1,572	1,574	22	30	715	712	547	569	331	321	1	2
Deaths.........	2,782	1,443	1,255	47	37	453	387	800	752	137	112	100	41
Still-births......	230	132	92	4	2	42	33	51	46	32	10	11	5

BOROUGH OF

Marriages......	432	422	422	10	10	....	....	....	....	....	....	....	....
Births..	1,428	734	667	10	17	315	312	264	242	165	127	..	3
Deaths.........	1,283	759	492	19	13	207	166	354	258	51	42	166	39
Still-births	90	49	38	2	1	18	16	28	19	4	4	1	....

Still-births Reported during Year ending December 31, 1902.

NEW YORK.

Single M.	Single F.	Married. M.	Married. F.	Widowed. M.	Widowed. F.	Not Stated M.	Not Stated F.	1	2	3	4	5	6	7	8	9	10	Not Stated.
32,008	32,594	....	....	4,198	3,612	1	1											
....	....	....	....	....	....	....	....											
21,408	16,043	11,227	8,279	3,505	6,451	605	117	.	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	21	123	263	474	768	885	768	2,547	145	18

Month of Utero-gestation.

MANHATTAN.

21,393	22,328	....	....	2,773	2,438	....	....	..	..	..	..	..	..	..	..	..	..	..
....	...	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..
11,714	8,728	6,017	4,691	1,823	3,332	375	80	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	16	99	186	308	463	490	434	1,411	103	6

THE BRONX.

1,089	1,123	...	....	138	104	....	....	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..
1,666	1,146	812	632	270	394	22	3	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	...	....	....	..	..	4	8	24	30	55	54	138	22	6

BROOKLYN.

7,877	8,052	....	....	1,137	962	....	....	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..
6,803	5,307	3,683	2,890	1,165	2,302	127	29	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	5	19	60	122	235	285	240	846	11	6

QUEENS.

670	696	....	....	97	71	1	1	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	..	..	..	..	..	.	..	..	..	..
840	615	485	377	136	296	29	4	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	..	1	9	16	29	44	30	97	4	..

RICHMOND.

379	395	....	....	53	37	....	....	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..
385	247	230	130	111	127	52	1	..	..	..	..	..	..	..	..	..	..	..
....	....	....	....	....	....	....	....	..	..	..	..	4	11	10	10	55	..	..

Deaths of Males by Age, and Cause of Death, City

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
1.—*General Diseases.*											
1. Typhoid fever	764	487	1	6	2	2	2	13	19	16	49
2. Typhus fever	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever	125	64	5	6	2	1	2	16	4	3	4
5. Small-pox	310	196	16	8	17	4	7	52	9	1	5
6. Measles	710	375	117	140	52	26	19	354	17	1	1
7. Scarlet fever	940	473	22	63	87	77	61	310	124	22	5
8. Whooping cough	606	287	167	65	23	13	7	275	11	1	..
9. Diphtheria and croup	2,015	1,059	94	264	190	136	120	804	211	19	7
10. Influenza	157	84	5	3	1	..	1	10	1	1	3
11. Miliary fever	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery	254	121	30	10	11	3	2	56	11	2	1
15. Plague	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	1	1	..	..	..	..	..	..	..	..	..
17. Leprosy	1	1	..	..	..	..	..	..	..	..	..
18. Erysipelas	186	105	41	3	1	..	..	45	2	..	..
19. Other epidemic diseases	15	10	9	..	..	1	..	10	..	..	..
20. Pyæmia, septicæmia	114	76	18	3	1	..	1	23	4	..	5
21. Glanders	..	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	2	1	..	..	..	..	..	..	..	..	..
23. Hydrophobia	7	4	..	..	..	1	..	1	1	..	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	58	39	..	..	..	..	..	..	..	1	2
27. Tuberculosis of lungs	7,569	4,641	23	23	13	3	6	68	13	21	217
28. Tubercular meningitis	794	411	123	93	43	36	26	321	46	10	6
29. Abdominal tuberculosis	178	80	22	8	3	1	1	35	2	2	1
30. Potts' disease	46	29	..	1	..	1	..	2	8	5	2
31. Cold abscess	6	3	..	..	..	..	..	..	1	..	..
32. White swelling	21	16	1	..	1	..	1	3	2	3	3
33. Tuberculosis of other organs	96	63	5	4	3	..	1	13	7	3	3
34. General tuberculosis	115	71	7	5	4	2	1	19	4	..	2

of New York, for Year ending December 31, 1902.

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
76	91	66	59	35	19	20	6	9	7	1		..	..	13
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..		..	..	..
2	3	6	1	4	1	3	2	2	5	3	2	2	1	2
12	18	22	26	20	10	9	7	3	1	1	..	..	..	22
..	1	..	..	..	1	..	..	..	..	..	..	..	..	3
5	3	1	3	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
4	2	5	2	3	..	2	..	..	..	..	..	..	..	10
6	5	9	6	5	3	8	4	4	3	8	2	4	2	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	.	..	..	..	..	..	..	..	..	..
2	2	5	4	2	2	5	4	6	5	9	4	..	1	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	.	..	..	..	..	..	..	..	..	..
5	5	9	5	7	6	5	3	2	2	5	3	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	6	6	3	4	6	5	3	1	3	1	..	1	1	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
..	..	2	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	5	5	3	7	5	2	1	2	1	..	..	..	2
437	624	782	724	628	382	292	183	146	58	41	17	6	2	179
5	3	7	3	1	4	2	2	1	..	..	..	..	..	10
7	4	9	5	3	4	1	..	5	..	1	1	..	..	6
3	2	3	1	..	1	..	..	1	1	..	..	..	..	2
..	..	..	..	..	1	..	1	..	..	..	..	..	..	..
..	1	1	2	..	..	..	1	..	..	..	..	..	..	..
6	5	7	4	2	2	3	1	1	2	1	2	..	1	3
5	9	8	4	6	4	6	1	3	..	..	..	..	..	4

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
35. Scrofula	3	2	1	..	..	1	..	2	..	..	..
36. Syphilis	179	98	62	2	1	..	1	66	..	..	..
37. Gonorrhœa (adults)	1	1	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	..	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	104	82	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver	976	446	..	..	..	..	..	..	1	..	..
41. Cancer of intestines, rectum	304	138	2	..	..	..	..	2	..	..	2
42. Cancer of female genital organs	420	..	..	..	..	..	..	..	..	..	..
43. Cancer of the breast	205	..	..	..	..	..	..	..	..	..	..
44. Cancer of the skin	39	27	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified	402	229	1	2	3	2	..	8	2	2	1
46. Other tumors (except of female genital organs)	29	14	1	..	..	..	..	1	..	..	..
47. Acute articular rheumatism	219	107	5	..	..	..	1	6	9	8	4
48. Chronic rheumatism and gout	60	20	..	..	..	..	1	1	..	2	..
49. Scurvy	11	9	7	1	..	..	..	8	..	..	..
50. Diabetes	471	212	..	..	..	..	2	2	2	4	5
51. Exophthalmic goitre	15	1	..	..	..	..	..	..	..	..	..
52. Addison's disease	12	6	..	..	..	..	..	..	..	..	..
53. Leukæmia	59	37	1	2	..	..	3	6	5	3	3
54. Anæmia, chlorosis	104	39	8	..	..	..	2	10	2	1	2
55. Other general diseases	1	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic	345	274	..	..	..	..	..	..	..	..	..
57. Lead poisoning	13	13	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	9	4	..	..	..	..	..	..	..	..	1
59. Other chronic poisonings	..	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis	23	14	3	..	1	1	..	5	..	1	1
61. Simple meningitis	1,033	553	180	113	46	17	21	377	49	9	11
(of which, cerebro-spinal meningitis)	265	145	39	37	14	7	8	105	17	2	4
62. Locomotor ataxia	72	53	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord	131	63	1	..	..	..	..	1	1	1	1
64. Apoplexy, congestion of brain	2,419	1,217	18	1	..	..	..	19	1	..	1
65. Softening of brain	84	41	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified	197	81	1	..	..	..	2	3	1	..	1
67. General paresis	158	127	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	5	6	4	7	2	2	2	1	..	..	..	..	..	4
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	3	2	3	5	6	7	14	21	7	8	2	2	2	1
2	5	13	24	33	50	65	69	67	49	36	20	8	4	7
1	5	5	23	13	8	12	16	17	18	12	4	..	..	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	3	1	1	7	2	2	4	5	2	..	..	..
7	7	9	13	17	23	36	23	34	19	14	3	7	4	3
1	1	..	2	1	2	1	2	2	..	..	1	..	..	..
4	11	5	4	11	13	9	9	5	3	2	3	1	..	4
..	..	..	..	..	1	..	3	4	3	3	2	..	1	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	7	13	12	14	9	27	19	29	34	21	12	..	..	1
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
2	1	..	2	..	..	..	1	..	..	..	..	..	..	..
5	3	3	2	2	..	2	2	..	..	1	..	..	..	..
1	2	..	2	2	3	5	3	3	..	2	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	26	48	65	39	28	24	17	12	6	2	..	..	..	2
..	1	..	2	4	2	3	..	..	1	..	..	..	..	..
..	..	2	..	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	1	1	..	1	2	..	1	..	..	..
9	14	17	13	14	11	7	6	5	4	1	3	2	1	18
5	2	2	2	2	..	..	2	..	1	..	1	..	..	..
..	1	2	3	7	4	8	9	9	5	1	2	2	..	..
2	..	3	7	7	9	6	6	5	12	2	1	1	..	1
7	16	27	54	65	99	132	146	159	180	136	99	52	24	13
..	..	1	..	2	1	6	5	6	2	10	5	1	2	1
1	1	5	5	4	5	10	9	5	10	8	6	5	2	1
3	5	11	26	22	19	15	10	9	1	3	1	2	..	1

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
68. Other forms of insanity.	132	52	..	..	..	..	..	..	1	..	4
69. Epilepsy	114	66	2	..	..	2	..	4	6	5	7
70. Convulsions (not puerperal)	6	3	..	..	..	..	..	..	3	..	..
71. Convulsions of infants..	717	409	343	45	13	6	2	409	..	..	..
72. Tetanus, trismus.......	84	52	26	..	..	..	..	26	3	3	4
73. Chorea.................	7	2	..	..	..	..	..	..	..	..	..
74. Other nervous diseases.	147	86	5	2	2	3	..	12	6	4	5
75. Diseases of the eyes....	2	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears....	122	75	20	7	4	3	..	34	3	1	2
III.—Diseases of Circulatory System.											
77. Pericarditis	82	38	..	2	1	3	1	7	2	1	2
78. Acute endocarditis.....	285	129	1	3	1	2	4	11	10	7	4
79. Organic heart diseases..	4,859	2,513	16	4	7	2	8	37	47	43	43
80. Angina pectoris........	148	85	..	..	..	..	..	..	..	..	2
81. Diseases of arteries, aneurism, etc......	325	207	2	..	..	..	..	2	..	..	..
82. Embolism, thrombosis..	124	54	..	1	1	..	1	3	..	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.).	18	8	1	..	..	..	..	1	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	5	4	3	..	..	..	..	3	..	..	..
85. Hæmorrhage...........	85	48	33	..	1	2	1	27	4	..	2
86. Other diseases of circulatory system....	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of the nasal fossæ	2	1	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx..	65	35	7	7	9	2	1	26	4	..	2
89. Diseases of the thyroid gland	2	1	..	..	..	..	..	..	..	..	..
90. Acute bronchitis.......	1,898	945	578	133	40	16	10	777	14	2	4
91. Chronic bronchitis......	385	162	9	2	2	..	..	13	..	1	1
92. Broncho-pneumonia	3,126	1,599	770	359	123	49	18	1,319	38	4	8
93. Pneumonia.............	6,251	3,362	641	393	144	77	33	1,288	86	32	54
94. Pleurisy	328	179	20	23	12	4	3	62	6	2	3
95. Congestion of lungs, pulmonary apoplexy	133	62	25	1	..	..	..	26	3	2	1
96. Gangrene of lung......	33	27	..	..	1	2	..	3	..	..	1
97. Asthma................	140	64	..	..	..	..	..	..	..	1	..
98. Pulmonary emphysema.	68	40	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (Phthisis excepted).	86	62	3	..	1	..	..	4	..	1	2

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
1	4	7	6	6	6	3	4	5	3	2	..	..	..	..
7	3	7	6	4	3	4	..	2	6	1	1	..	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	21
2	2	2	2	1	2	3	1	1	..	..	..	..	..	3
..	1	..	..	..	..	..	1	..	..	..	..	..	..	..
1	4	7	7	10	8	6	7	3	4	1	1	..	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	7	6	5	3	1	3	1	1	2	1	..	..	..	1
2	1	5	3	2	3	2	1	2	1	1	3	..	..	3
10	10	11	8	7	13	3	9	8	8	7	1	..	2	2
69	99	136	141	189	186	237	274	327	244	196	160	53	32	48
..	..	5	5	9	6	7	7	13	13	7	5	1	1	..
..	1	6	13	14	15	19	22	17	24	30	20	19	5	7
1	..	6	3	4	2	8	4	5	9	4	3	2	..	2
..	..	..	1	1	1	1	..	2	1	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
2	4	2	..	2	..	1	3	..	..	..	..	..	1	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	1	1	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
6	5	9	2	5	7	9	15	14	23	19	16	12	6	36
3	6	9	5	6	3	12	14	18	12	18	17	17	7	..
14	9	14	17	16	17	17	19	25	21	24	20	8	8	51
119	166	183	212	197	189	176	174	142	133	100	62	26	23	103
11	10	15	11	10	13	10	7	9	3	3	3	1	..	3
4	1	2	1	1	3	1	1	2	3	6	2	2	1	2
..	1	4	2	3	2	5	3	1	2	..	..	..	..	1
1	1	..	2	3	6	11	4	8	7	10	7	..	3	4
1	3	1	1	1	6	6	5	9	2	1	2	1	1	..
4	3	7	11	11	6	3	2	2	1	1	4	..	..	4

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System.											
100. Diseases of mouth and adnexa	18	10	4	1	..	..	1	6	3	..	..
101. Diseases of pharynx	34	19	6	2	..	..	1	9	1	..	2
102. Diseases of œsophagus	12	8	1	..	1	..	..	2	..	..	1
103. Ulcer of stomach	162	81	..	..	..	..	..	..	..	..	2
104. Other diseases of stomach (cancer excepted)	441	219	72	5	5	2	2	86	4	..	2
105. Diarrhœa and enteritis (under two years)	4,938	2,673	2,211	462	..	..	..	2,673	..	..	..
(of which) chronic diarrhœa	16	11	9	2	..	..	..	11	..	..	..
106. Diarrhœa and enteritis (two years and over)	829	385	..	..	95	25	19	139	28	13	5
107. Intestinal parasites	2	2	..	1	..	..	..	1	..	..	..
108. Hernia, intestinal obstruction	490	223	42	8	2	4	1	57	5	4	3
109. Other diseases of intestines	67	36	11	1	2	1	..	15	..	1	1
110. Acute yellow atrophy of liver	8	2	1	..	..	..	..	1	..	..	..
111. Hydatid tumor of liver	1	1	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver	746	479	..	..	..	..	..	..	2	..	..
113. Biliary calculi	89	30	2	..	..	..	..	2	..	..	..
114. Other diseases of liver	210	99	8	..	2	..	..	10	1	1	2
115. Diseases of spleen	4	3	..	..	..	1	..	1	..	..	..
116. Simple peritonitis (non-puerperal)	102	36	7	..	1	1	..	9	..	..	3
117. Other diseases of digestive system (except tuberculosis and cancer)	22	10	2	..	..	1	..	3	..	..	..
118. Appendicitis and iliac abscess	404	229	1	..	..	2	4	7	30	16	26
VI.—Diseases of Genito-urinary System.											
119. Acute nephritis	688	360	29	13	8	17	8	75	28	6	14
120. Bright's disease	4,773	2,585	20	5	6	9	10	50	19	14	31
121. Other diseases of kidneys and adnexa	76	49	..	..	1	..	..	1	3	..	1
122. Urinary calculus	16	14	1	..	..	..	..	1	..	..	..
123. Diseases of bladder	103	92	1	..	..	..	..	1	..	..	..
124. Diseases of urethra, urinary abscess, etc.	21	21	1	..	..	..	..	1	..	..	..
125. Diseases of the prostate	57	57	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs	8	8	4	..	..	..	..	4	..	..	..
127. Metritis	7	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)	6	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)	94	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus	46	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
..	..	..	..	..	..	..	..	..	..	1	..	..	..	2
1	..	1	1	1	1	2	..	..	..	..	..	..	..	3
..	2	1	..	1	..	1	..	..	..	..	..	..	..	..
5	4	8	16	8	2	9	11	4	4	6	..	2	..	2
6	2	6	11	9	8	12	20	11	10	13	11	8	..	3
..	..	..	..	..	..	..	..	..	..	..	..	.	..	65
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	13	12	13	18	18	13	15	30	15	19	16	9	3	7
1	..	..	..	..	..	..	..	..	..	..	.	..	..	..
8	5	8	16	14	10	17	18	13	17	17	7	4	..	7
1	..	1	2	4	2	2	3	4	..	..	..	..	..	1
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
1	14	33	51	62	49	76	61	55	45	18	8	3	..	4
..	3	..	2	..	3	6	4	2	6	2	..	..	..	..
3	4	8	6	12	11	6	8	8	8	5	3	2	1	2
..	..	..	.	..	1	1	..	..	..	..	..	..	..	.
1	..	2	3	4	6	1	2	1	4	..	..	..	..	..
1	1	2	2	..	..	..	1	..	..	..	..	..	..	..
31	19	28	9	16	11	13	10	4	4	3	2	..	..	3
18	24	32	26	25	26	14	18	20	14	7	8	3	2	9
51	97	134	225	215	255	266	282	293	241	207	108	75	22	76
1	4	4	1	3	2	6	2	5	6	4	1	5	..	2
..	..	2	1	2	1	1	3	..	..	1	1	1	..	..
3	..	1	..	4	5	6	3	11	15	15	15	10	3	2
..	1	..	3	4	1	2	4	1	2	1	1	..	..	1
1	1	..	1	2	..	3	3	9	6	12	13	2	4	1
..	..	..	..	1	1	..	..	..	1	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
131. Ovarian cysts and tumors	82	..	..	..	..	..	..	..	..	..	..
132 Other diseases of female genital organs.	95	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal nor cancer)	..	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.											
134. Accidents of pregnancy.	158	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage.	45	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	85	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia..	249	..	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions.	97	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	..	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	5	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	3	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	75	37	1	1	..	..	..	2	..	..	..
143. Carbuncle	10	9	1	..	..	..	..	1	..	..	..
144. Phlegmon, acute abscess	67	46	9	1	2	..	1	13	1	..	1
145. Other diseases of skin and adnexa	31	13	5	..	1	..	..	6	..	..	..
IX.—Diseases of Locomotory System.											
146. Diseases of bones (non-tuberculous)	155	88	35	15	2	2	1	55	5	7	6
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	9	2	1	..	1	..	..	2	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion..	..	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital malformations	416	229	213	11	1	..	1	226	1	2	..
XI.—Diseases of Infancy.											
151. Congenital debility, Icterus and sclerema	2,425	1,349	1,345	4	..	..	..	1,349	..	..	..
152. Other diseases peculiar to infancy	168	95	95	..	..	..	..	95	..	..	..
153. Neglect	2	1	1	..	..	..	..	1	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored
.	..	..	..	..	..	..	..	..	..	..	. .		..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	3	1	2	1	1	4	4	5	5	4	2	2	..
..	..	..	2	..	2	1	..	1	1	1	..	..	..	..
..	2	3	4	3	3	3	5	1	4	2	..	1	..	..
1	..	1	..	2	..	2	..	..	..	1	..	..	.	..
2	2	2	..	3	..	2	1	1	..	1	..	1	..	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	59
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
XII.—Diseases of Old Age.											
154. Senile debility..........	959	356	..	..	..	..	..	..	..	..	..
XIII.—External Causes.											
155. Suicide by poison	327	214	..	..	..	..	..	..	..	..	4
156. Suicide by asphyxia....	118	77	..	..	..	..	..	..	..	..	1
157. Suicide by hanging or strangulation.......	81	70	..	..	..	..	..	..	..	1	1
158. Suicide by drowning....	10	3	..	..	..	..	..	..	..	..	..
159. Suicide by firearms.....	167	160	..	..	..	..	..	..	..	..	4
160. Suicide by cutting instruments..........	30	26	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height....	36	23	..	..	..	..	..	..	..	..	..
162. Suicide by crushing	1	1	..	..	..	..	..	..	..	..	..
163. Suicide by other methods	2	2	..	..	..	..	..	..	..	..	..
164. Fractures	193	159	3	..	..	..	1	4	3	7	2
165. Dislocations	..	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	1,414	1,147	11	11	17	15	32	86	93	63	51
167. Burn, by fire, scald.....	331	139	7	23	26	11	9	76	12	1	2
168. Burning by corrosive substances..........	2	1	..	..	..	..	..	..	..	..	..
169. Sunstroke...............	36	20	2	..	..	..	..	2	..	..	1
170. Freezing	7	6	..	1	..	..	..	1	..	..	..
171. Electrical shock........	21	20	..	..	..	..	..	..	1	2	1
172. Accidental drowning ...	421	393	2	1	..	1	1	5	40	30	21
173. Inanition (starvation)...	..	..	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal....	235	165	1	2	..	..	1	4	1	1	6
175. Other acute poisoning..	116	67	2	3	5	2	..	12	1	..	1
176. Other external violence.	201	137	9	3	1	1	1	15	4	2	5
(Of which)											
a. Homicide, by blows	24	20	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments	20	12	..	..	..	..	..	..	..	..	2
c. Homicide, by gunshot............	71	53	..	..	..	1	..	1	2	..	2
d. Homicide, by poison	3	2	..	..	..	..	..	..	..	..	..
e. Homicide by other methods	9	5	1	..	..	..	..	1	..	1	..
XIV.—Ill-defined or Not Specified Causes.											
177. Dropsy	1	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes.......	1,498	805	694	81	22	5	1	803	..	..	..
180. Injury during birth.....	269	162	162	..	..	..	..	162	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
..	..	..	..	..	..	..	1	8	24	73	83	91	76	4
22	26	22	28	35	21	21	10	15	3	4	3	..	..	4
5	5	7	12	10	6	7	13	5	3	2	..	1	..	..
2	3	4	11	10	7	8	8	7	4	1	1	1	1	..
..	1	..	..	1	1	..	..	..	..	..	..	..	..	..
18	16	20	18	24	19	13	8	6	7	3	2	2	..	1
1	1	3	6	4	2	4	1	1	..	1	..	2	..	..
1	..	7	5	3	2	1	1	2	..	..	1	..	..	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
..	..	..	..	2	..	..	..	..	..	..	..	..	..	..
13	13	17	30	15	3	15	16	12	5	..	1	2	1	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
78	112	127	124	104	84	74	40	41	33	15	10	8	4	16
4	7	8	10	1	3	5	3	4	2	1	..	..	..	3
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	3	4	2	3	..	..	..	1	..	2	..	1	1	..
..	..	1	1	..	..	3	..	..	..	..	..	..	..	..
3	3	3	4	1	2	..	..	..	..	..	..	..	..	1
27	33	52	56	49	31	22	7	10	6	3	..	..	1	10
..	..	..	..	..	..	..	..	..	.	..	..	..	..	..
17	17	16	25	13	16	13	7	13	6	3	3	2	1	3
2	5	8	8	3	3	6	6	7	4	..	1	..	..	..
9	14	20	23	13	12	5	7	3	1	1	3	..	..	5
2	3	4	4	1	2	2	2	..	..	..	..	..	..	..
2	..	1	4	1	1	1	..	..	..	..	..	..	..	..
4	5	13	14	5	3	1	2	..	1	..	..	..	..	4
..	..	..	..	1	..	..	..	..	..	1	..	..	..	..
..	.	..	..	..	1	..	1	..	..	..	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	1	..	1	..	..	..	..	..	..	..	22
..	..	..	..	..	..	..	..	..	..	..	.	..	..	5

Cause of Death.	Total Both Sexes.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
I.—General diseases ...	19,071	10,456	794	712	458	310	268	2,542	518	131	334
a. Tuberculous diseases.........	8,883	5,353	181	134	67	43	36	461	83	45	236
b. Cancer..........	2,450	922	3	2	3	2	..	10	3	2	3
II.—Diseases of nervous system and organs of sense...	5,478	2,895	599	168	66	32	25	890	74	24	37
III.—Diseases of circulatory system ..	5,931	3,087	46	10	11	9	15	91	63	51	53
IV.—Diseases of respiratory system	12,497	6,539	2,053	918	332	150	65	3,518	151	45	76
V.—Diseases of digestive system	8,579	4,545	2,368	480	108	37	28	3,021	74	35	47
VI.—Diseases of genito-urinary system.	6,077	3,186	56	18	15	26	13	133	50	20	46
VII.—Puerperal diseases..	642	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue ..	183	105	16	2	3	..	1	22	1	..	1
IX.—Diseases of locomotory system.	164	90	36	15	3	2	1	57	5	7	6
X.—Malformations......	416	229	213	11	1	..	1	226	1	2	..
XI.—Diseases of Infancy.	2,864	1,607	1,603	4	..	..	..	1,607	..	..	..
XII.—Diseases of old age	959	356	..	..	..	..	..	..	..	..	..
XIII.—External causes.....	3,752	2,830	37	44	49	30	45	205	155	107	100
a. Suicide	772	575	..	..	..	..	..	..	..	1	10
b. Homicide	127	92	1	..	..	1	..	2	2	1	4
c. Accident	2,853	2,162	36	44	49	29	45	203	153	105	86
XIV.—Causes ill-defined...	1,499	806	694	81	22	5	1	803	..	..	..
Total males.....	....	36,732	8,515	2,463	1,068	601	468	13,115	1,092	422	700
Total females...	....	31,380	7,011	2,291	995	566	410	11,273	973	467	714
Total both sexes	....	68,112	15,526	4,754	2,063	1,167	878	24,388	2,065	889	1,414

Deaths of Females by Age, and Cause of Death,

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever....................	277	..	3	2	2	1	8	18	14	36
2. Typhus fever....................	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever..................	..	..	..	..	..	..	..	..	..	..
4. Malarial fever..................	61	2	3	3	3	3	14	4	2	4
5. Small-pox........................	114	15	10	5	5	7	42	10	1	3
6. Measles..........................	335	87	125	58	20	19	309	17	2	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
616	865	1,059	1,019	873	604	566	403	382	233	178	82	31	..	106
465	631	822	748	643	405	309	191	158	63	44	20	6	[illegible]	205
10	20	19	66	69	88	127	124	141	97	75	31	17	1	14
38	58	95	134	145	169	204	205	211	231	166	[illegible]	65	[illegible]	64
84	115	171	194	228	226	278	321	374	305	245	192	75	41	67
163	205	245	265	253	253	250	244	232	208	182	133	67	49	204
66	67	110	132	119	123	159	153	132	113	85	47	28	4	99
74	127	173	257	256	291	298	315	339	285	248	147	[illegible]	1	91
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	3	7	7	7	6	7	9	6	10	9	4	3	..	..
2	2	2	..	3	..	2	1	1	..	1	..	1	..	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	67
..	..	..	..	..	..	..	1	8	24	73	83	91	75	4
203	259	319	354	292	212	197	127	127	74	36	25	[illegible]	[illegible]	46
49	52	63	80	90	58	54	41	36	17	11	7	6	1	5
8	8	18	22	8	7	4	5	..	1	1	1	..	..	4
145	199	238	262	194	147	139	81	91	56	24	17	[illegible]	8	37
..	..	..	1	1	..	1	..	..	..	..	..	..	..	22
1,247	1,701	2,182	2,353	2,207	1,884	1,962	1,770	1,812	1,483	1,223	833	[illegible]	[illegible]	979
1,282	1,561	1,566	1,543	1,453	1,261	1,470	1,426	1,556	1,422	1,303	972	674	464	1,018
2,529	3,262	3,748	3,896	3,660	3,145	3,432	[illegible]	3,368	2,905	2,526	1,805	1,150	725	1,997

City of New York, for Year Ending December 31, 1902.

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
52	41	31	20	17	10	11	5	4	3	2	3	2	..	7
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	6	4	3	4	..	4	2	1	2	2	2	1	1	3
13	15	11	5	4	3	5	..	..	..	1	1	..		7
1	2	..	..	1	1	1	..	..	..	..	..	..	..	6

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
7. Scarlet fever	467	18	60	84	63	52	277	141	23	5
8. Whooping cough	319	172	75	38	17	8	310	9	..	..
9. Diphtheria and croup	956	72	204	189	131	103	699	199	33	11
10. Influenza	73	5	1	1	..	..	7	4	2	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..
14. Dysentery	133	21	14	6	5	2	48	5	2	..
15. Plague	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	81	31	5	..	..	..	36	..	2	5
19. Other epidemic diseases	5	3	..	..	..	..	3	..	1	..
20. Pyæmia, septicæmia	38	16	1	..	1	1	19	..	1	1
21. Glanders	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	1	..	..	..	..	..	..	..	..	..
23. Hydrophobia	3	..	..	..	..	..	..	1	1	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..
24a Trichinosis	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	19	..	1	..	..	..	1	1	..	1
27. Tuberculosis of lungs	2,928	24	15	15	8	4	66	75	46	235
28. Tubercular meningitis	383	113	89	41	22	15	280	50	15	7
29. Abdominal tuberculosis	98	20	7	3	..	2	32	5	2	8
30. Pott's disease	17	..	..	..	1	2	3	6	2	1
31. Cold abscess	3	..	..	..	..	..	..	..	2	..
32. White swelling	5	..	..	..	..	..	..	1	..	..
33. Tuberculosis of other organs	33	4	..	3	1	1	9	3	2	2
34. General tuberculosis	44	5	3	5	2	1	16	2	3	4
35. Scrofula	1	..	1	..	..	..	1	..	..	..
36. Syphilis	81	63	2	..	1	..	66	..	1	1
37. Gonorrhœa (adults)	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	22	..	..	..	..	1	1	..	..	..
40. Cancer of stomach, liver	530	..	..	..	..	..	..	..	..	1
41. Cancer of intestines, rectum	165	..	..	1	..	..	1	..	..	3
42. Cancer of female genital organs	420	..	..	..	..	..	..	..	2	2

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
6	7	2	1	2	1	1	..	..	..	..	..		..	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	21
7	2	1	2	1	..	..	..	..	..	..	..	1	..	15
2	3	3	3	5	3	2	7	6	7	8	8	3	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	4	5	4	5	2	6	6	8	10	6	7	6	5	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	2	7	3	..	3	4	3	6	4	2	..	1	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..		1
3	2	2	3	1	2	1	1	..	..	1	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	5	1	2	1	3	..	2	1	..	..	..	..	..	..
467	539	462	355	254	137	106	86	61	30	30	15	9	5	144
11	7	4	3	3	1	?	1	..	..	..	1	..	..	12
6	14	7	4	7	3	1	4	3	..	1	1	..	..	5
1	..	..	..	3	..	..	..	..	1	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
2	..	1	..	..	1	..	..	..	..	..	..	..	..	..
3	3	1	4	2	..	..	1	1	2	..	..	..	..	1
5	3	5	4	..	1	..	..	1	..	..	..	..	..	10
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	2	3	..	3	1	1	..	..	..	1	..	..	..	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	..	4	4	2	1	4	1	2	1	..	1
2	4	11	25	42	48	87	70	81	67	51	24	10	7	8
1	1	8	11	14	12	27	25	19	18	16	6	4	..	4
1	10	21	38	56	70	56	62	36	31	19	12	3	1	6

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
43. Cancer of the breast	205	..	..	..	..	..	..	1	..	..
44. Cancer of the skin	12	..	..	..	..	..	..	1	..	..
45. Cancer of other organs and unspecified	173	1	1	4	1	..	7	2	1	..
46. Other tumers (except of female genital organs)	15	..	..	..	..	1	1	1	..	..
47. Acute articular rheumatism	112	3	..	2	1	..	6	10	12	5
48. Chronic rheumatism and gout	40	..	..	..	..	..	..	..	..	1
49. Scurvy	2	2	..	..	..	..	2	..	..	..
50. Diabetes	259	..	..	..	..	..	..	5	3	2
51. Exophthalmic goitre	14	..	..	..	..	..	..	..	..	..
52. Addison's disease	6	..	..	..	..	..	..	..	..	..
53. Leukæmia	22	1	1	..	..	..	2	..	1	2
54. Anæmia, chlorosis	65	4	2	1	..	..	7	1	..	5
55. Other general diseases	1	..	..	..	..	..	..	..	1	..
56. Alcoholism, acute and chronic	71	..	..	..	..	..	..	..	..	..
57. Lead poisoning	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	5	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.										
60. Encephalitis	9	1	..	1	1	..	3	..	..	1
61. Simple meningitis	480	155	110	44	24	18	351	35	16	13
(of which) cerebro-spinal meningitis	120	28	25	15	6	7	81	8	8	6
62. Locomotor ataxia	19	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord	65	2	1	1	..	1	5	..	1	3
64. Apoplexy, congestion of brain	1,232	9	5	2	1	..	17	..	..	2
65. Softening of brain	43	..	..	..	..	..	..	..	..	..
66. Paralysis (unspecified)	116	1	..	..	..	..	1	..	1	..
67. General paresis	31	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	80	..	..	..	..	..	..	..	2	2
69. Epilepsy	48	1	..	2	..	..	3	4	2	6
70. Convulsions (not puerperal)	3	..	..	..	..	..	..	1	1	..
71. Convulsions of infants	308	251	39	12	4	2	308	..	..	..
72. Tetanus, trismus	32	24	1	..	..	2	27	..	..	..
73. Chorea	5	..	..	1	..	..	1	..	2	..
74. Other nervous diseases	61	3	2	..	1	1	7	3	3	3
75. Diseases of the eyes	2	..	..	..	..	..	..	1	..	..
76. Diseases of the ears	47	6	7	3	4	3	23	6	2	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
1	2	8	16	34	25	27	24	27	19	11	5	4	1	6
..	..	..	..	..	1	1	1	..	3	2	2	..	1	..
3	4	3	11	24	16	20	18	12	13	15	7	9	8	3
1	1	..	1	..	2	..	2	2	1	2	1	..	..	1
9	6	9	7	4	4	6	9	8	5	6	4	2	..	2
..	1	1	3	5	4	2	1	2	7	8	3	1	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	7	9	8	6	17	22	30	49	41	30	16	7	3	4
1	1	1	..	3	1	1	..	3	..	1	2	..	..	..
..	..	1	1	1	1	1	1	..	..	..	..	..	..	..
3	..	1	1	3	2	4	1	1	..	..	..	..	1	..
5	8	5	5	4	7	1	6	6	4	..	1	..	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	5	13	21	14	3	5	1	5	1	..	..	..	..	3
..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
2	..	..	1	1	..	..	1	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	1	1	..	..	..	..	..	1	1	..	..
8	14	5	8	8	9	6	3	1	1	2	..	..	..	13
4	3	1	3	2	2	2	..	..	..	..	..	..	..	..
..	..	2	3	1	3	3	5	2	..	..	..	..	..	..
2	2	6	6	6	5	16	5	3	3	3	3	2	1	1
5	14	29	40	57	83	128	148	172	148	139	125	80	45	33
..	..	..	1	..	4	3	4	6	4	6	9	3	3	..
1	3	3	1	5	8	12	8	22	16	15	12	6	2	4
..	1	3	2	2	4	1	2	2	1	5	4	4	..	2
4	1	9	15	8	6	7	4	7	7	1	4	2	..	4
4	10	4	5	4	1	2	..	2	1	1	1	..	..	1
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
2	1	1	..	1	..	..	..	..	..	..	..	..	..	1
1	..	..	..	..	..	..	1	..	..	..	..	..	..	..
6	2	8	5	4	3	4	3	3	2	3	2	..	..	4
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
4	4	1	1	..	2	2	..	..	..	1	..	..	..	1

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
III.—Diseases of Circulatory System.										
77. Pericarditis	44	3	1	..	..	..	4	5	6	1
78. Acute endocarditis	156	8	4	3	..	1	16	18	14	4
79. Organic heart diseases	2,346	29	7	7	6	3	52	46	76	69
80. Angina pectoris	62	..	..	..	..	..	..	1	..	1
81. Diseases of arteries, aneurism, etc.	118	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	70	1	..	..	1	..	2	1	1	1
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	10	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	1	..	1	..	..	..	1	..	..	..
85. Hæmorrhage	37	14	..	..	2	..	16	4	2	1
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of the nasal fossae	1	..	..	..	..	..	..	1	..	..
88. Diseases of the larynx	30	4	4	3	7	3	21	3	..	..
89. Diseases of thyroid gland	1	1	..	..	..	..	1	..	..	..
90. Acute bronchitis	953	502	129	53	12	7	703	17	3	4
91. Chronic bronchitis	223	4	2	2	..	..	8	4	1	6
92. Broncho-pneumonia	1,527	614	371	126	58	22	1,191	44	10	15
93. Pneumonia	2,880	541	417	121	74	48	1,201	82	34	62
94. Pleurisy	129	12	11	7	8	3	41	3	5	4
95. Congestion of lungs, pulmonary apoplexy	71	16	5	1	1	1	24	..	..	1
96. Gangrene of lung	6	..	1	..	..	..	1	..	..	..
97. Asthma	76	1	..	..	..	..	1	1	..	..
98. Pulmonary emphysema	28	..	1	..	..	..	1	1	..	..
99. Other diseases of respiratory system (phthisis excepted)	24	1	1	..	..	..	2	1	..	..
V.—Diseases of Digestive System.										
100. Diseases of mouth and adnexa	8	6	..	1	1	..	8	..	..	..
101. Diseases of pharynx	15	1	2	2	..	.	5	4	1	..
102. Diseases of œsophagus	4	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach	81	1	..	..	..	..	1	2	1	1
104. Other diseases of stomach (cancer excepted)	222	65	8	5	4	1	83	2	..	3
105. Diarrhœa and enteritis (under two years)	2,265	1,879	386	..	..	..	2,265	..	..	..
(of which) chronic diarrhœa	4	2	2	..	..	..	4	..	..	..
106. Diarrhœa and enteritis (two years and over)	444	..	..	75	19	19	113	23	10	7
107. Intestinal parasites	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
2	3	2	3	2	1	..	3	7	2	2	1	..	..	3
12	12	8	13	8	9	9	4	4	8	7	4	3	[illegible]	3
59	94	115	136	158	149	201	223	263	217	211	[illegible]	82	35	74
..	3	5	4	3	8	8	4	7	6	6	3	1	2	4
1	..	2	13	6	1	10	9	14	15	21	19	8	9	2
3	4	1	3	10	3	4	8	6	5	6	3	6	3	2
..	1	2	..	1	..	1	2	..	..	1	1	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	3	2	2	1	1	1	..	1	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	1	1	1	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	7	6	6	7	5	12	11	22	35	45	24	18	25	35
3	3	1	11	6	9	12	14	22	32	31	27	20	13	4
15	13	14	12	15	8	11	25	23	37	37	25	15	15	60
95	125	131	116	105	100	129	121	142	129	122	96	64	35	109
9	4	7	8	1	8	9	4	6	8	6	1	4	1	..
1	2	4	2	3	1	3	2	5	6	4	4	7	2	4
..	1	..	..	1	1	1	..	1	..	..	..	..	..	..
1	..	..	2	3	7	4	9	11	19	10	4	3	1	2
..	..	..	..	2	..	..	3	3	4	5	3	4	2	..
..	3	2	1	4	1	2	2	1	1	1	2	..	1	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	1	2	..	..	..	..	..	..	..	1	..	..
..	..	2	..	..	..	1	1	..	..	..	..	..	..	1
10	11	5	11	13	5	8	3	4	2	2	..	2	..	..
7	7	6	8	9	10	18	14	14	13	11	8	4	5	5
..	..	..	..	..	..	..	..	..	.	..	..	..	..	51
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	11	18	19	18	16	19	27	34	38	38	15	20	12	16
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
108. Hernia, intestinal obstruction.....	267	20	1	2	2	2	27	4	2	5
109. Other diseases of intestines......	31	7	1	2	..	..	10	..	1	..
110. Acute yellow atrophy of liver.....	6	1	..	..	..	..	1	..	..	..
111. Hydatid tumor of liver...........	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver..................	257	1	..	..	..	..	1	1	1	..
113. Biliary calculi	59	2	..	..	..	..	2	..	..	..
114. Other diseases of liver............	111	1	..	..	..	1	2	3	..	2
115. Diseases of spleen................	1	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal).	66	4	1	..	..	..	5	1	3	4
117. Other diseases of digestive system (except tuberculosis and cancer)......................	12	..	..	..	..	..	..	1	..	..
118. Appendicitis and iliac abscess....	175	2	..	..	1	..	3	18	23	18
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis...................	328	15	3	10	4	9	41	15	16	9
120. Bright's disease..................	2,188	13	3	8	6	2	32	13	18	31
121. Other diseases of kidneys and adnexa......................	27	1	..	..	..	..	1	1	1	..
122. Urinary calculus.................	2	..	..	..	..	..	..	..	..	..
123. Diseases of bladder	16	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc....................	..	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate..........	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs................	..	..	..	..	..	..	..	..	..	..
127. Metritis	7	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)......................	6	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer).......	94	..	..	..	..	..	..	..	..	1
130. Other diseases of uterus..........	46	..	..	..	..	..	..	2	..	4
131. Ovarian cysts and tumors.......	82	..	..	..	..	..	..	..	..	1
132. Other diseases of female genital organs......................	95	..	..	..	..	1	1	..	..	3
133. Diseases of breast (not puerperal, nor cancer)..................	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.										
134. Accidents of pregnancy	158	..	..	..	..	..	..	..	..	6
135. Puerperal hæmorrhage...........	45	..	..	..	..	..	..	..	..	..
136. Other accidents of labor..........	85	..	..	..	..	..	..	..	..	2
137. Puerperal septicæmia............	249	..	..	..	..	..	..	..	..	13
138. Puerperal albuminuria and convulsions	97	..	..	..	..	..	..	..	1	5
139. Puerperal phlegmasia alba dolens.......................	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	5	..	..	..	..	..	..	..	..	1
141. Puerperal diseases of breast......	3	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
5	14	11	24	24	18	30	25	30	19	14	6	6	3	6
2	2	..	3	2	..	2	2	1	2	1	1	2	..	2
2	..	1	..	..	..	..	..	1	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	10	24	30	23	40	35	25	15	29	14	10	3	1	..
..	2	1	9	8	5	6	8	7	6	2	2	..	1	..
3	6	8	7	12	12	12	8	13	10	4	7	1	1	4
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
2	12	12	10	3	1	3	1	2	4	2	1	..	..	2
1	1	..	..	3	2	3	..	1	..	..	..	..	..	..
22	14	23	15	7	8	4	5	5	5	..	2	..	1	8
26	32	29	34	23	22	13	16	14	17	12	4	4	1	9
64	120	107	140	181	200	232	235	235	210	179	113	53	25	54
3	4	2	1	4	2	4	1	2	..	1	..	..	..	1
..	..	..	..	..	..	..	..	..	1	1	..	..	..	..
2	2	1	..	..	1	1	..	4	1	1	1	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	3	1	1	..	..	..	..	..	..	..	..	..	..
3	..	..	2	..	1	..	..	..	..	..	..	..	..	..
..	4	11	22	23	12	8	6	4	2	1	..	..	..	12
2	8	10	6	7	5	..	1	1	..	..	..	..	..	..
5	6	10	12	14	10	7	2	6	4	1	1	3	..	3
15	25	19	16	8	3	2	2	..	..	..	..	..	..	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	41	51	26	10	1	..	..	..	..	..	..	..	..	10
13	7	12	10	3	..	..	..	..	..	..	..	..	..	1
11	14	25	24	9	..	..	..	..	..	..	..	..	..	1
59	72	53	36	15	1	..	..	..	..	..	..	..	..	6
20	21	24	15	11	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	2	..	..	..	..	..	..	..	..	..	..	..	1
..	2	..	1	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene	38	3	1	..	..	..	4	1	..	..
143. Carbuncle	1	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	21	8	..	..	..	..	8	..	1	..
145. Other diseases of skin and adnexa	18	7	1	..	..	..	8	..	..	..
IX.—Diseases of Locomotory System.										
146. Diseases of bones (non-tuberculous)	67	29	13	2	1	..	45	3	1	2
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	7	1	..	..	..	..	1	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..
X.—Malformations.										
150. Congenital malformations	187	178	3	2	1	1	185	1	1	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema	1,076	1,069	6	..	..	..	1,075	1	..	..
152. Other diseases peculiar to infancy	73	72	..	..	..	..	72	..	1	..
153. Neglect	1	1	..	..	..	..	1	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility	603	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison	113	..	..	..	..	..	..	1	1	11
156. Suicide by asphyxia	41	..	..	..	..	..	..	..	1	1
157. Suicide by hanging or strangulation	11	..	..	..	..	..	..	..	..	..
158. Suicide by drowning	7	..	..	..	..	..	..	..	..	1
159. Suicide by firearms	7	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments	4	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height	13	..	..	..	..	..	..	..	..	..
162. Suicide by crushing	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods	..	..	..	..	..	..	..	..	..	..
164. Fractures	34	2	..	..	..	..	2	..	2	..
165. Dislocations	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	267	4	12	10	12	15	53	30	13	10
167. Burn, by fire, scald	195	8	16	11	19	17	71	28	4	6
168. Burning by corrosive substances	1	..	1	..	..	..	1	..	..	..
169. Sunstroke	16	6	1	1	1	..	9	1	..	..
170. Freezing	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
..	2	1	..	1	1	3	..	2	2	8	6	5	2	3
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	4	1	2	1	1	..	..	..	..	1	..	..	2
..	..	..	..	1	..	1	..	3	..	2	1	1	1	1
3	..	1	4	2	2	2	1	..	..	1	..	..	..	6
..	1	..	1	..	..	..	..	1	2	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	50
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	2	4	20	49	85	120	154	169	13
21	13	13	11	9	11	6	8	4	1	1	1	..	1	..
2	8	8	4	3	9	1	1	1	1	1	..	..	..	..
1	1	..	..	..	2	3	1	1	1	1	..	..	..	..
..	..	1	1	2	..	1	..	1	..	..	..	..	..	..
..	3	1	2	1	..	..	..	..	..	..	..	..	..	1
1	..	..	..	..	..	3	..	..	..	..	..	..	..	..
2	3	4	3	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	3	2	2	2	2	2	1	2	1	4	5	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	10	11	18	14	15	12	13	12	12	10	9	6	6	1
10	6	8	8	15	3	11	7	8	3	..	4	2	1	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	2	..	2	1	1	1
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
171. Electrical shock	1	..	..	..	..	..	..	..	..	..
172. Accidental drowning	28	2	2	1	..	2	7	4	2	3
173. Inanition (starvation)	..	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal	70	2	1	..	..	..	3	4	1	11
175. Other acute poisoning	49	3	1	2	2	..	8	..	..	3
176. Other external violence	64	8	4	2	2	1	17	4	..	4
Of which										
a. Homicide, by blows	4	..	..	1	..	..	1	..	..	1
b. Homicide, by sharp instruments	8	..	..	..	..	..	..	..	..	1
c. Homicide, by gunshot	18	..	..	..	..	..	..	1	..	1
d. Homicide, by poison	1	1	..	..	..	..	1	..	..	..
e. Homicide, by other methods	4	1	1	..	1	..	3	1	..	..
XIV.—Ill-defined or not Specified Causes.										
177. Dropsy	1	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	692	597	80	9	3	1	690	1	1	..
180. Injury during birth	107	106	1	..	..	..	107	..	..	..
I.—General diseases	8,615	682	623	461	284	223	2,273	522	178	346
a. Tuberculous diseases	3,530	166	115	67	34	25	407	93	72	258
b. Cancer	1,528	1	1	5	1	1	9	4	3	6
II.—Diseases of nervous system and organs of sense	2,582	453	165	66	35	27	746	50	30	31
III.—Diseases of circulatory system	2,844	55	13	10	9	4	91	75	99	77
IV.—Diseases of respiratory system	5,958	1,696	942	313	160	84	3,195	157	53	92
V.—Diseases of digestive system	4,034	1,990	399	87	27	23	2,526	59	42	40
VI.—Diseases of genito-urinary system	2,891	29	6	18	10	12	75	31	35	49
VII.—Puerperal diseases	642	..	..	..	..	..	..	..	1	27
VIII.—Diseases of skin and cellular tissue	78	18	2	..	..	..	20	1	1	..
IX.—Diseases of locomotory system	74	30	13	2	1	..	46	3	1	2
X.—Malformations	187	178	3	2	1	1	185	1	1	..
XI.—Diseases of infancy	1,257	1,248	7	..	..	..	1,255	1	1	..
XII.—Diseases of old age	603	..	..	..	..	..	..	..	..	..
XIII.—External causes	922	35	38	27	35	35	171	72	24	50
a. Suicide	196	..	..	..	..	..	..	1	2	13
b. Homicide	35	2	1	1	1	..	5	2	..	3
c. Accident	691	33	37	26	35	35	166	69	22	34
XIV.—Causes ill-defined	693	597	80	9	2	1	690	1	1	..
Total Females	31,380	7,011	2,291	995	566	410	11,273	973	467	714

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
1	1	2	3	2	..	3	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	5	7	5	2	3	4	..	5	..	1	1	1	..	2
6	7	7	8	3	2	3	1	1	..	..	..	..	..	..
7	6	6	8	2	4	1	3	1	..	..	1	..	..	5
..	..	..	..	..	..	1	..	1	..	..	..	..	..	1
..	..	2	2	..	2	..	..	..	..	..	1	..	..	1
4	5	2	2	1	1	..	1	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	23
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
630	708	641	568	524	389	408	372	345	273	216	123	65	34	283
495	571	481	373	270	146	107	94	67	33	31	17	9	5	172
8	22	51	102	170	176	222	202	176	155	115	58	31	18	28
36	52	72	88	97	129	178	183	220	184	176	161	98	51	71
89	118	138	164	190	172	234	254	301	254	254	181	101	52	88
128	162	166	159	148	140	183	191	236	271	261	186	135	95	218
65	90	112	137	124	117	141	122	127	129	88	52	39	24	95
121	2[illegible]3	192	235	261	256	267	203	266	235	196	119	61	26	117
127	158	167	112	48	2	..	..	..	..	..	..	..	..	21
..	5	5	1	4	2	5	..	5	2	10	8	6	3	6
3	1	1	5	2	2	2	1	1	2	2	..	..	..	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	56
..	..	..	..	..	..	2	4	20	49	85	120	154	159	13
83	64	72	74	55	52	50	36	35	22	15	22	15	10	16
27	28	27	21	15	23	14	10	7	3	3	1	..	1	1
4	5	4	4	1	3	1	1	1	..	..	1	..	..	3
52	31	41	49	39	26	35	25	27	19	12	20	15	6	12
..	..	..	..	..	..	..	..	..	1	..	..	..	..	23
1,282	1,561	1,566	1,543	1,453	1,261	1,470	1,426	1,556	1,422	1,303	972	674	464	1,018

Total Deaths, According to Sex

	All Ages.	0	1	2	3	4	Total Under 5.	5	10	15
Borough of Manhattan.										
Males	19,912	4,694	1,404	573	301	229	7,201	559	221	355
Females	16,857	3,900	1,279	538	296	207	6,220	454	252	367
Total, both sexes	36,769	8,594	2,683	1,111	597	436	13,421	1,013	473	722
Borough of Brooklyn.										
Males	11,787	2,788	778	366	195	173	4,300	369	140	243
Females	10,557	2,271	748	328	195	141	3,683	374	151	245
Total, both sexes	22,344	5,059	1,526	694	390	314	7,983	743	291	488
Borough of The Bronx.										
Males	2,765	488	180	80	72	45	865	77	40	59
Females	2,170	399	151	91	49	41	731	93	36	62
Total, both sexes	4,935	887	331	171	121	86	1,596	170	76	121
Borough of Queens.										
Males	1,490	379	71	37	21	14	522	59	14	32
Females	1,292	322	86	24	21	13	466	41	19	31
Total, both sexes	2,782	701	157	61	42	27	988	100	33	63
Borough of Richmond.										
Males	778	166	30	12	12	7	227	28	7	11
Females	504	119	27	14	5	8	173	11	9	9
Total, both sexes	1,282	285	57	26	17	15	400	39	16	20

and Age, by Boroughs, Year 1902.

20	25	30	35	40	45	50	55	60	65	70	75	80	85	COLORED.
612	602	1,191	1,297	1,227	1,092	1,166	988	1,005	761	585	404	220	126	552
711	843	855	878	857	717	774	793	820	701	622	469	292	232	577
1,323	1.745	2,046	2,175	2,084	1,809	1,940	1,781	1,825	1,462	1,207	873	512	358	1,129
418	526	651	677	646	552	541	578	570	533	453	314	180	96	254
412	482	507	481	429	420	516	480	546	531	490	360	279	171	294
830	1,008	1,158	1,158	1,075	972	1,057	1,058	1,116	1,064	943	674	459	267	548
131	169	237	234	215	142	136	110	96	81	78	46	37	12	103
114	156	138	106	110	62	97	82	97	94	70	64	42	26	100
245	325	365	340	325	204	233	192	193	175	148	110	79	38	208
55	68	72	107	84	64	82	62	91	66	62	27	20	13	47
34	56	58	60	38	52	64	52	68	65	82	49	34	23	33
89	124	130	167	122	110	146	114	159	121	144	76	54	36	80
31	36	31	38	35	34	37	41	50	52	45	42	19	14	18
11	24	18	18	19	10	19	19	25	31	39	30	27	12	14
42	60	49	56	54	44	56	60	75	83	84	72	46	26	32

**Table of Mortality from the Principal*

Cause of Death.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
	Borough of									
Total, all causes	3,517	3,300	3,342	3,359	3,137	2,767	3,270	3,042	2,728	2,837
1. Typhoid fever	23	10	17	18	17	17	26	43	42	66
3. Malarial fevers	3	3	6	4	3	5	9	4	7	7
4. Small-pox	2	6	4	3	..	1	..	1	..	..
5. Measles	68	69	45	38	19	24	8	3	2	4
6. Scarlet fever	65	57	58	51	70	49	25	13	9	20
7. Whooping-cough	24	34	26	35	30	30	40	27	31	15
8. Diphtheria and croup	104	115	94	117	100	96	80	59	38	58
9. Influenza	15	19	23	11	4	..	..	1	..	4
12. Other epidemic diseases	14	27	12	22	19	18	32	21	13	13
13. Phthisis	301	327	370	337	314	315	307	276	259	341
14. Tubercular meningitis	27	46	43	51	54	44	50	49	31	29
15. Other forms of tuberculosis	30	26	30	28	27	25	34	19	24	17
16. Cancer, malignant tumors	97	95	113	122	155	122	112	117	112	101
17. Meningitis, simple	69	71	93	91	52	75	63	44	36	50
18. Apoplexy, congestion and softening of brain	105	131	113	109	93	76	101	95	86	129
19. Organic heart disease	287	249	270	271	258	208	178	194	166	227
20. Acute bronchitis	142	114	100	99	83	38	40	50	55	69
21. Chronic bronchitis	19	18	20	24	13	18	18	10	15	19
22. Pneumonia	491	439	366	313	340	173	149	142	168	191
22*a*. Broncho-pneumonia	286	254	216	205	182	128	112	100	115	153
23. Diseases of stomach (cancer excepted)	31	28	36	29	20	27	16	23	18	26
24. Diarrheas (under 2 years)	82	49	81	93	100	187	660	551	406	183
25. Hernia, intestinal obstruction	20	31	27	21	21	20	28	28	23	24
26. Cirrhosis of liver	44	40	34	47	29	35	34	29	28	35
27. Bright's disease and nephritis	279	255	268	268	236	236	192	227	204	258
28. Diseases of women (not cancer)	25	15	25	25	21	17	13	11	18	13
29. Puerperal septicæmia	13	14	21	23	14	9	10	12	6	8
30. Other puerperal diseases	22	21	21	20	15	20	19	17	18	9
31. Congenital debility and malformations	155	143	155	169	169	161	189	231	154	151
32. Old age	34	38	32	31	28	13	32	26	35	36
33. Violent deaths	187	165	144	205	221	196	222	204	184	182
a. Sunstroke	..	..	..	..	3	4	13	4	..	..
b. Other accidents	152	143	101	160	160	150	164	156	126	137
c. Homicide	5	3	8	5	10	6	9	11	9	7
d. Suicide	30	19	35	40	48	36	36	33	49	38

* Actual mortality.

Causes of Death during the Year 1902.

Manhattan.			Borough of The Bronx.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
2,554	2,916	36,769	477	478	426	449	434	390	503	400	352	336	361	329	4,935
52	34	365	1	..	..	4	1	3	6	4	..	4	3	8	34
1	..	52	1	2	..	..	2	4	1	2	..	2	..	1	15
..	..	17	33	33	24	35	20	38	15	3	..	..	..	..	201
9	16	305	19	34	28	19	13	16	16	6	..	2	1	3	157
13	16	446	17	25	12	20	29	21	20	7	7	4	6	12	189
17	9	318	5	3	4	12	7	9	4	12	6	..	4	1	67
80	102	1,043	18	4	6	12	6	8	7	7	7	6	9	14	99
5	13	95	..	3	1	1	..	..	..	..	..	..	1	..	6
7	18	216	..	2	2	1	1	2	14	9	7	3	..	..	41
292	300	3,739	111	103	98	99	92	86	97	90	98	93	102	85	1,154
20	44	488	2	11	3	5	5	5	2	4	4	..	1	2	44
12	9	281	1	4	1	3	1	5	3	2	7	2	5	4	38
121	132	1,398	19	5	10	8	13	5	12	21	4	16	15	10	138
36	38	718	4	5	9	6	8	4	9	8	1	4	4	4	65
105	125	1,268	13	15	12	19	17	10	12	15	11	14	11	17	166
208	203	2,719	28	24	19	21	22	14	9	12	16	27	17	22	231
81	84	955	11	5	4	4	9	2	3	1	6	2	12	6	65
28	16	208	2	3	1	2	1	1	1	1	1	..	1	1	15
236	266	3,274	54	53	41	36	39	17	17	12	17	15	32	24	357
121	160	2,032	28	30	36	20	10	4	7	3	6	7	18	9	178
23	26	303	8	1	..	1	2	2	1	..	1	1	2	3	22
79	68	2,539	..	6	5	2	6	21	108	63	40	13	12	1	277
17	32	292	2	1	..	2	1	6	5	4	2	3	5	2	33
26	42	423	2	1	1	5	2	4	5	2	3	..	..	2	27
209	284	2,916	24	30	27	25	27	18	27	23	20	25	17	19	282
14	19	216	2	..	1	2	..	..	1	1	1	..	..	1	9
9	6	145	1	..	2	2	3	..	2	..	2	1	2	2	17
13	24	219	2	3	1	2	6	3	2	1	3	2	3	..	28
137	194	2,008	11	5	9	11	18	16	13	27	12	17	21	15	175
38	39	385	4	3	5	10	4	3	4	6	7	5	5	[illegible]	65
192	170	2,272	12	15	18	10	25	29	22	16	17	25	16	16	221
..	..	24	..	..	..	..	..	..	1	..	..	..	..	..	1
140	147	1,736	10	11	14	7	16	26	16	12	11	20	11	12	166
8	2	83	..	..	..	..	1	..	2	1	..	2	..	..	6
44	21	429	2	4	4	3	8	3	3	3	6	3	5	4	48

Cause of Death.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
	Borough of									
34. All other causes	418	371	452	453	397	354	400	348	357	327
35. Ill-defined causes	35	20	27	26	33	30	71	67	76	72
Under one year	739	657	662	697	622	588	1,084*	999	807	688
One year and under two years	324	268	279	273	219	205	263	219	189	158
Total under five years	1,304	1,184	1,179	1,177	1,058	980	1,527	1,348	1,099	961
Sixty-five years and over	459	442	390	433	410	295	294	292	289	334
Males	1,914	1,815	1,827	1,828	1,680	1,468	1,801	1,628	1,481	1,525
Females	1,603	1,485	1,515	1,531	1,457	1,299	1,469	1,414	1,247	1,312
Colored	114	82	101	105	88	98	109	95	81	84

* Actual mortality.

Table of Mortality from the Principal

Cause of Death.	Jan.	Feb.	Mar.	Apr.	May.	une.	July.	Aug.	Sept.	Oct.
	Borough of									
Total, all causes	2,002	1,967	1,889	1,870	1,901	1,933	2,262	1,892	1,691	1,541
1. Typhoid fever	25	12	8	14	17	23	25	37	45	45
3. Malarial fevers	5	3	6	3	6	1	5	3	4	4
4. Small-pox	..	8	16	19	15	15	8	2	5	2
5. Measles	19	37	29	36	36	37	16	9	3	1
6. Scarlet fever	32	45	37	35	35	22	15	11	8	11
7. Whooping-cough	10	9	15	10	24	17	35	25	17	15
8. Diphtheria and croup	79	69	67	56	72	73	43	30	53	58
9. Influenza	14	14	8	2	..	1	1	1	..	4
12. Other epidemic diseases	11	14	10	9	4	16	31	38	19	11
13. Phthisis	179	200	228	195	229	186	198	186	171	168
14. Tubercular meningitis	21	16	23	14	24	32	21	26	19	15
15. Other forms of tuberculosis	10	11	15	10	14	11	19	18	16	15
16. Cancer, malignant tumors	58	67	72	68	73	65	72	71	65	65
17. Meningitis simple	26	20	13	15	15	12	22	16	13	7
18. Apoplexy, congestion and softening of the brain	98	94	71	60	88	68	73	53	62	57
19. Organic heart diseases	171	162	145	140	139	132	113	77	91	135
20. Acute bronchitis	112	116	82	75	75	41	33	28	45	58

Manhattan.			Borough of The Bronx.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
322	397	4,596	39	39	38	39	38	36	47	34	32	34	35	33	444
31	30	518	3	10	8	2	6	3	11	4	14	9	1	2	73
494	557	8,594	66	72	81	59	58	67	145	107	75	50	70	37	887
135	151	2,683	33	35	40	41	29	26	38	31	20	13	11	14	331
742	862	13,421	135	158	157	141	138	135	225	163	110	73	93	68	1,596
350	424	4,412	62	62	43	49	48	33	38	35	43	41	50	46	550
1,381	1,564	19,912	263	266	242	250	234	215	288	224	195	188	210	189	2,765
1,173	1,352	16,857	214	212	184	199	200	175	215	176	156	148	151	140	2,170
82	90	1,129	21	13	21	18	21	13	14	25	21	16	14	9	206

Causes of Death during the Year 1902.

Brooklyn.			Borough of Queens.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1,576	1,820	22,344	199	217	242	215	220	227	210	269	221	222	184	256	2,782
42	29	322	1	..	1	..	1	1	3	5	9	2	5	4	32
4	2	46	..	1	1	1	..	..	..	3	3	..	..	..	9
1	..	91	..	..	..	..	..	..	..	..	..	..	..	..	..
4	12	239	..	..	1	3	1	1	..	..	..	..	..	..	6
10	14	275	..	2	4	..	2	1	1	..	1	1	..	..	12
6	5	188	1	1	3	2	1	1	1	1	1	..	..	1	13
73	89	762	6	6	7	10	12	4	4	5	11	7	9	11	92
3	4	52	..	1	..	1	..	..	..	..	..	..	..	1	3
7	10	180	..	..	2	..	2	4	3	3	1	..	..	..	15
180	197	2,317	15	21	24	24	13	19	22	22	11	27	12	19	229
9	14	234	4	2	..	3	4	..	..	3	2	..	1	1	20
13	22	174	5	..	3	2	..	2	3	1	1	2	..	1	20
59	56	791	4	7	8	9	6	5	7	3	7	9	9	7	81
11	7	177	..	2	5	4	5	6	4	7	4	6	4	6	53
82	79	885	14	11	17	16	16	6	18	12	7	11	10	11	149
101	139	1,545	16	24	19	13	23	24	21	13	22	21	18	20	243
65	85	815	9	8	9	2	2	4	0	2	3	..	3	6	48

Cause of Death.	Borough of									
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21. Chronic bronchitis	14	11	9	17	8	7	9	13	10	14
22. Pneumonia	300	305	254	255	221	122	91	82	108	103
22a. Broncho pneumonia	104	98	80	64	67	52	40	45	42	49
23. Diseases of stomach (cancer excepted)	33	18	16	20	18	28	17	24	23	21
24. Diarrheas under 2 years	19	30	32	30	44	258	569	357	224	102
25. Hernia, intestinal obstruction	10	13	10	15	10	11	11	11	13	9
26. Cirrhosis of liver	25	16	23	19	17	25	18	17	20	21
27. Bright's disease and nephritis	190	186	177	183	171	154	151	150	131	142
28. Diseases of women (not cancer)	10	4	9	15	14	14	5	5	1	10
29. Puerperal septicæmia	12	9	8	6	2	6	5	5	9	2
30. Other puerperal diseases	8	7	16	9	10	12	10	17	9	7
31. Congenital debility and malformations	58	55	61	81	67	57	62	87	73	50
32. Old age	45	38	41	48	30	24	22	24	29	35
33. Violent deaths	63	55	66	74	95	101	104	98	85	65
a. Sunstroke	..	..	..	..	3	1	4	..	1	..
b. Other accidents	47	39	40	50	60	66	76	81	62	51
c. Homicide	1	1	3	4	4	1	5	2	4	2
d. Suicide	15	15	23	20	28	33	19	15	18	12
34. All other causes	204	193	209	226	217	224	283	226	206	175
35. Ill-defined causes	37	32	33	47	44	86	135	100	72	65
Under one year	364	355	343	323	336	507	808	632	451	348
One year and under two years	112	155	120	138	121	139	190	143	140	80
Total under five years	605	656	592	583	614	785	1,128	876	661	517
Sixty-five years and over	358	331	330	321	281	236	255	225	230	230
Males	998	1,042	1,036	1,023	998	1,001	1,195	1,022	855	814
Females	1,004	925	853	847	903	932	1,067	870	826	727
Colored	47	42	48	51	45	47	70	35	46	38

Brooklyn.			Borough of Queens.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
13	14	139	2	1	3	3	1	2	2	1	..	..	2	2	19
157	210	2,208	34	46	23	26	36	21	13	7	9	14	23	43	295
76	76	793	5	14	15	8	2	5	4	4	1	11	8	8	85
12	16	246	2	1	..	2	4	2	..	..	1	..	..	3	15
41	26	1,732	4	2	3	3	2	31	87	64	27	16	6	5	250
15	11	139	2	2	4	4	1	..	..	2	2	4	..	2	23
17	13	236	1	2	9	3	5	3	1	4	4	3	2	7	44
158	183	1.976	17	11	22	18	18	17	15	12	23	10	15	23	201
9	4	100	..	..	..	..	1	..	..	..	..	..	..	..	1
2	5	71	2	1	2	..	..	..	2	2	..	3	..	1	13
9	12	126	3	2	1	2	..	3	3	..	2	..	2	..	18
55	70	777	9	6	11	10	8	6	14	14	8	9	5	11	111
22	53	411	6	5	3	3	3	6	6	6	8	1	3	5	55
86	83	975	11	11	10	7	12	26	26	25	12	20	19	14	193
..	..	9	..	..	..	..	..	..	..	..	..	..	..	..	..
61	56	689	6	10	8	6	10	21	21	21	10	15	15	12	155
3	5	35	..	..	..	..	..	..	1	1	..	..	..	..	2
22	22	242	5	1	2	1	2	5	4	3	2	5	4	2	36
192	241	2,596	22	24	27	36	27	17	30	27	18	22	19	25	294
41	34	726	4	3	5	..	12	10	20	21	24	23	9	9	140
272	320	5,059	33	41	48	43	54	61	118	102	57	58	45	41	701
89	99	1,526	13	14	16	9	16	14	17	19	16	8	7	8	157
445	521	7.983	54	65	74	65	81	85	149	133	89	71	57	65	988
266	344	3.407	38	41	47	43	32	43	50	33	23	28	23	30	431
815	978	11,787	115	98	126	104	112	133	182	140	130	114	101	135	1,490
761	842	10,557	84	119	116	111	108	94	128	129	91	108	83	121	1,292
42	37	548	5	8	5	8	2	6	16	9	8	4	8	1	80

**Table of Mortality from the Principal*

Cause of Death.	Borough of										
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Total, all causes	92	103	111	105	79	87	142	162	109	93	96
1. Typhoid fever	1	..	..	..	..	2	1	1	..	4	..
2. Typhus fever	..	..	..	..	..	..	..	..	..	..	..
3. Malarial fevers	1	..	..	..	..	..	..	1	1	..	..
4. Small-pox	..	1	..	..	..	..	..	..	..	..	..
5. Measles	..	..	..	..	..	..	..	..	..	..	2
6. Scarlet fever	1	..	1	2	3	1	2	1	1	1	3
7. Whooping-cough	..	..	..	1	1	1	1	5	5	3	1
8. Diphtheria and croup	3	3	..	1	..	2	1	2	..	3	3
9. Influenza	1	..	..	..	..	..	..	..	..	..	..
10. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
11. Cholera nostras	..	..	..	..	..	..	..	..	..	..	..
12. Other epidemic diseases	1	..	..	..	1	..	..	..	..	..	..
13. Phthisis	7	15	16	13	9	8	8	10	11	8	12
14. Tubercular meningitis	..	3	..	..	..	2	..	1	1	..	..
15. Other forms of tuberculosis	..	..	1	..	..	1	1	3	1	..	..
16. Cancer, malignant tumors	3	3	4	1	3	2	7	5	4	4	4
17. Meningitis simple	1	2	2	1	1	1	1	1	2	2	..
18. Apoplexy, congestion and softening of brain	3	4	10	5	5	5	4	2	6	6	6
19. Organic heart diseases	10	8	7	18	9	11	8	12	10	10	10
20. Acute bronchitis	4	..	3	3	1	1	..	..	..	..	..
21. Chronic bronchitis	1	..	..	..	..	..	..	1	..	1	1
22. Pneumonia (excluding broncho-pneumonia)	15	15	17	15	13	3	6	3	5	5	7
22a. Broncho pneumonia	5	7	5	3	1	2	3	1	1	2	5
23. Diseases of the stomach (cancer excepted)	2	2	1	..	..	3	..	..	4	4	..
24. Diarrhœas (under 2 years)	1	1	2	2	1	3	54	52	17	5	2
25. Hernia, intestinal obstruction	..	1	..	..	..	..	1	..	1	..	..
26. Cirrhosis of liver	1	1	1	3	3	..	1	..	1	2	2
27. Bright's disease and nephritis	7	9	8	5	6	11	4	10	7	4	7
28. Diseases of women (not cancer)	..	1	..	..	..	..	1	..	..	1	1
29. Puerperal septicæmia	1	..	..	..	..	1	..	..	..	1	..
30. Other puerperal diseases	..	..	..	..	..	..	..	..	..	1	..
31. Congenital debility and malformations	2	3	4	..	..	2	2	5	5	4	5
32. Old age	3	2	1	4	8	2	6	4	1	5	1

* Actual mortality.

Causes of Death during the Year 1902.

Richmond		City of New York.												
Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
103	1,282	6,287	6,065	6,010	5,998	5,771	5,404	6,487	5,765	5,101	5,029	4,771	5,424	68,112
2	11	51	22	26	36	36	46	61	90	96	121	102	77	764
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	3	10	9	13	8	11	10	15	13	15	13	5	3	125
..	1	35	48	41	57	35	54	23	6	5	2	1	..	310
1	3	106	140	103	96	69	78	40	18	5	7	16	32	710
2	18	115	129	112	117	139	91	63	32	26	37	32	44	940
2	20	40	47	48	60	63	58	81	70	60	33	28	18	606
1	19	210	197	174	196	190	178	135	103	109	132	174	217	2,015
..	1	30	37	32	15	4	1	1	2	..	8	9	18	157
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	4	25	43	26	32	27	41	80	71	40	27	14	30	456
13	130	613	666	736	668	657	614	632	584	550	637	598	614	7,569
1	8	54	78	69	73	87	83	73	83	57	44	31	62	794
..	7	6	41	50	43	42	44	60	43	49	36	30	36	520
2	42	181	177	207	208	250	199	210	217	191	195	208	237	2,450
5	19	100	100	122	117	81	98	99	76	56	69	55	60	733
9	65	233	255	223	209	219	165	208	177	172	217	214	241	2,533
8	121	512	467	460	463	451	389	329	308	305	420	354	401	4,859
2	15	278	243	198	183	170	86	76	81	109	129	162	183	1,898
..	4	38	33	33	46	23	28	30	25	16	34	45	33	385
13	117	894	858	701	645	649	336	276	246	307	328	455	556	6,251
3	38	428	403	352	300	262	191	166	153	165	222	228	256	3,126
1	17	76	50	53	52	44	62	34	47	47	52	37	49	603
..	140	106	88	123	130	153	500	1,478	1,087	714	319	140	100	4,938
..	3	34	48	41	42	33	37	45	45	41	40	37	47	490
1	16	73	60	68	77	56	67	59	52	56	61	47	70	746
8	86	517	491	502	499	458	436	389	422	385	439	406	517	5,461
..	4	37	20	35	42	36	31	20	17	20	24	24	24	330
..	3	29	24	33	31	19	16	19	19	17	15	13	14	249
1	2	35	33	39	33	31	38	34	35	32	19	27	37	393
7	39	235	212	240	271	262	242	280	364	252	231	224	297	3,110
5	42	92	86	82	96	73	48	70	66	83	82	69	112	959

Cause of Death.	Borough of										
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
33. Violent deaths......	7	5	10	7	8	7	6	11	8	6	10
a. Sunstroke	..	..	..	..	..	1	1	..	..	..	..
b. Other accidents..................	6	3	9	3	6	4	4	11	8	4	9
c. Homicide........................	..	..	..	1	..	..	..	..	..	..	..
d. Suicide............................	1	2	1	3	2	2	1	..	..	2	1
34. All other causes	10	17	15	20	4	12	17	19	13	10	8
35. Ill-defined causes..................	1	..	3	1	2	4	7	12	4	1	5
Under one year........................	8	12	19	11	7	12	60	70	33	17	17
One year and under two years......	8	4	5	2	..	4	14	10	4	2	3
Total under five years...........	19	22	27	13	7	20	80	88	44	22	29
Sixty-five years and over................	33	25	31	30	32	17	26	30	19	22	21
Males................................	56	67	66	54	54	61	79	98	66	56	59
Females..............................	36	36	45	51	25	26	63	64	43	37	37
Colored	1	2	2	2	1	2	3	5	5	3	3

Richmond.		City of New York.												
Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
6	91	280	251	248	303	361	359	380	354	306	298	323	289	3,752
..	2	..	..	..	..	6	6	19	4	1	..	..	..	36
4	71	221	206	172	226	252	267	281	281	217	227	236	231	2,817
..	1	6	4	11	9	15	7	17	15	13	11	11	7	127
2	17	53	41	65	67	88	79	63	54	75	60	76	51	772
6	151	693	644	741	774	683	643	777	654	626	568	576	702	8,081
2	42	80	65	76	76	97	133	244	204	190	170	87	77	1,499
19	285	1,210	1,137	1,153	1,133	1,077	1,235	2,215	1,910	1,123	1,161	898	974	15,526
1	57	490	476	460	463	385	388	522	422	369	261	245	273	4,754
29	400	2,117	2,085	2,029	1,979	1,898	2,005	3,109	2,608	2,003	1,644	1,366	1,545	24,388
25	311	950	901	841	876	803	624	663	615	604	655	710	869	9,111
62	778	3,346	3,288	3,297	3,259	3,078	2,878	3,545	3,112	2,738	2,697	2,566	2,928	36,732
41	504	2,941	2,777	2,713	2,739	2,693	2,526	2,942	2,653	2,363	2,332	2,205	2,496	31,380
3	32	188	147	177	184	157	166	212	169	161	145	149	140	1,995

Actual Number of Deaths from Zymotic and Certain other Preventable

BOROUGH OF

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphtheria.	Typhoid Fever.
First	154.0	9,516	61.8	3	4	7
Second	81.0	1,488	18.4	..	..	1
Third	95.0	1,797	18.9	..	2	2
Fourth	83.0	19,554	235.7	2	12	4
Fifth	168.0	8,298	49.4	1	8	3
Sixth	86.0	20,004	232.7	2	7	5
Seventh	198.0	89,237	450.7	7	52	13
Eighth	183.0	29,059	158.8	6	15	5
Ninth	322.0	59,650	185.2	8	32	18
Tenth	110.0	71,879	653.4	5	58	10
Eleventh	196.0	99,144	505.8	5	59	8
Twelfth	5,504.0	476,602	86.6	38	239	91
Thirteenth	107.0	64,117	599.2	4	32	4
Fourteenth	96.0	34,035	354.5	9	11	1
Fifteenth	198.0	24,066	121.5	2	10	5
Sixteenth	349.0	52,808	151.3	10	25	15
Seventeenth	331.0	130,796	395.1	11	89	19
Eighteenth	450.0	61,325	136.3	9	62	11
Nineteenth	1,481.0	257,448	173.8	14	163	57
Twentieth	444.0	89,798	202.2	8	46	27
Twenty-first	411.0	60,211	146.5	10	46	12
Twenty-second	1,529.0	189,261	123.7	20	71	47
Total	12,576.0	1,850,093	147.2	174	1,043	365

* BOROUGH OF

Twenty-third	4,267.0	132,413	31.0	10	68	18
Twenty-fourth	22,255.8	43,009	1.9	6	31	16
Total	26,522.8	175,422	6.6	16	99	34

* The greater part of the deaths in institutions in the Borough of The Bronx were of non-resident.

Diseases, by Wards, for the year ending December 31, 1902.

MANHATTAN.

Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Phthisis.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
..	1	2	..	5	18	48	397	38	88
..	..	..	..	..	..	6	42	..	5
..	..	1	..	1	2	7	86	..	15
1	3	1	..	5	49	66	561	..	235
..	..	1	1	6	12	20	261	253	64
..	5	2	..	1	33	80	530	5	183
..	6	27	1	6	122	129	1,389	459	573
3	9	4	1	10	50	80	653	4	292
2	22	5	2	20	95	204	1,551	424	437
3	7	24	2	5	96	110	1,156	1	550
1	15	50	1	9	135	102	1,390	203	663
16	82	87	1	76	654	762	8,550	1,812	2,969
..	9	35	1	4	74	56	728	..	396
1	2	6	1	6	101	76	845	1	476
2	2	1	2	4	27	55	413		[illegible]
2	12	17	..	11	72	138	1,129	15	293
1	21	49	..	20	210	243	2,668	109	1,103
2	15	10	2	8	116	179	1,588	1,344	501
3	46	50	2	61	517	565	5,617	3,674	2,110
1	15	16	..	20	145	260	1,902	93	602
3	4	11	..	8	83	192	1,527	1,689	432
11	29	47	..	32	300	361	3,786	644	1,299
52	305	446	17	318	2,917	3,739	36,769	10,771	13,421

THE BRONX.

6	137	176	200	38	236	846	3,493	1,449	1,173
9	20	13	1	29	95	308	1,442	419	423
15	157	189	201	67	331	1,154	4,935	1,868	1,596

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphtheria.
First	233.0	20,307	87.2	..	6
Second	97.7	8,565	87.7	..	12
Third	161.4	17,949	111.2	..	11
Fourth	111.3	12,568	112.9	1	10
Fifth	119.4	18,862	158.0	1	22
Sixth	302.9	42,485	140.2	7	13
Seventh	458.5	40,471	88.3	..	19
Eighth	1,843.2	52,414	28.4	4	44
Ninth	623.6	42,876	68.8	1	21
Tenth	318.7	39,100	122.7	1	33
Eleventh	252.6	22,608	89.5	1	11
Twelfth	663.1	30,354	45.8	2	26
Thirteenth	230.3	24,029	104.3	2	13
Fourteenth	282.6	31,483	111.4	3	29
Fifteenth	244.8	30,269	123.6	3	14
Sixteenth	244.8	56,550	231.0	2	37
Seventeenth	823.3	57,309	69.6	5	50
Eighteenth	873.0	25,133	28.8	2	22
Nineteenth	413.8	37,645	91.0	..	22
Twentieth	461.5	25,446	55.1	1	8
Twenty-first	483.2	58,957	122.0	1	30
Twenty-second	1,361.6	66,575	48.9	1	29
Twenty-third	736.0	61,813	84.0	2	16
Twenty-fourth	1,198.5	31,767	26.5	3	11
Twenty-fifth	567.8	48,328	85.1	2	27
Twenty-sixth	3,590.2	66,086	18.4	1	33
Twenty-seventh	400.7	43,961	109.7	3	39
Twenty-eighth	884.4	77,912	88.1	5	64
Twenty-ninth	3,800.0	27,188	7.2	..	65
Thirtieth	5,404.1	24,700	4.6	2	16
Thirty-first	6,312.3	14,609	2.3	..	5
Thirty-second	5,479.5	8,243	1.5	1	4
Total	38,977.8	1,166,582	29.9	57	762

BROOKLYN.

Typhoid Fever.	Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Phthisis.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
3	1	7	3	..	2	52	21	340	56	139
..	..	3	4	..	2	16	20	180	..	84
3	1	1	2	..	1	26	14	280	19	92
1	1	2	2	..	2	18	19	236	..	88
3	..	10	5	..	2	50	33	420	..	206
30	2	24	2	..	8	97	260	1,334	593	349
9	..	20	6	..	5	71	68	705	88	288
21	1	19	13	..	7	86	101	975	66	421
12	..	5	5	1	8	57	67	693	88	227
6	3	14	8	..	6	88	80	812	..	360
6	2	9	6	..	5	37	41	587	212	207
6	1	10	3	..	8	91	55	663	..	308
4	1	3	3	..	1	29	34	501	113	118
8	2	8	16	..	3	87	69	662	2	344
4	2	5	12	..	7	84	53	557	..	251
3	5	8	9	..	5	92	60	771	..	370
6	3	5	17	..	4	127	59	959	1	419
20	..	5	5	..	6	72	138	773	293	272
6	1	6	12	..	6	48	61	567	9	191
15	2	2	2	..	9	31	34	470	63	138
8	5	9	14	2	9	71	99	871	5	330
24	2	17	20	..	11	94	75	1,188	205	399
19	1	2	10	1	11	54	85	897	152	216
29	1	3	8	1	14	60	188	892	393	208
13	1	2	5	..	7	55	63	730	33	260
6	2	8	12	..	12	119	75	909	31	403
4	1	5	11	..	7	87	49	700	36	280
19	1	6	22	..	8	97	111	1,290	193	414
29	1	15	25	86	5	91	238	1,658	1,335	327
4	2	5	8	..	6	40	23	390	11	159
1	1	..	1	..	1	32	14	232	18	74
..	..	1	4	..	..	16	10	102	..	41
322	46	239	275	91	188	2,075	2,317	22,344	4,015	7,983

BOROUGH OF

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphteria.	Typhoid Fever.
First	4,650	48,272	10.4	3	29	5
Second	14,700	40,903	2.8	2	23	5
Third	22,000	25,870	1.2	2	5	12
Fourth	36,600	30,761	.8	2	31	5
Fifth	3,770	7,193	1.9	2	4	5
Total	81,720	152,999	1.9	11	92	32

BOROUGH OF

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphtheria.	Typhoid Fever.
First	3,340	21,441	6.4	2	9	5
Second	4,130	13,200	3.2	2	7	2
Third	10,050	13,701	1.4	..	..	2
Fourth	8,180	9,516	1.2	2	1	2
Fifth	10,900	9,163	.8	1	2	..
Total	36,600	67,021	1.8	7	19	11

QUEENS.

Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Phthisis.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
2	1	3	..	2	94	89	976	197	315
3	3	6	..	4	74	62	672	10	287
2	1	2	..	4	36	40	435	58	130
2	1	1	..	3	62	31	565	36	210
..	..	..	..	..	22	7	134	4	46
9	6	12	..	13	288	229	2,782	305	988

RICHMOND.

Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Phthisis.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
..	..	10	..	7	26	48	473	183	104
1	..	4	..	5	22	38	266	57	78
1	..	2	..	7	19	26	220	25	64
1	3	2	1	..	79	10	208	94	119
..	..	..	..	1	10	8	115	11	35
3	3	18	1	20	156	130	1,282	370	400

Country.	Nativity of Deceased. Borough of— Manhattan.	The Bronx.	Brooklyn.
Asia	....	....	3
Africa	3	....	1
Arabia	1	...	1
Armenia	3	....	....
Alaska	....	....	1
Algeria	1	....	....
Australia	5	2	3
At Sea	4	1	....
Austria-Hungary	879	68	117
Azores	2	....	....
Belgium	16	4	11
Bermuda	5	1	2
Bohemia	214	10	9
Brazil	1	....	1
British America	186	26	115
Barbadoes	....	....	2
China	81	1	5
Cuba	22	....	10
Danish W. I.	1	....	....
Denmark	36	7	52
England	612	111	552
Egypt	1	....	....
Finland	21	5	15
France	211	15	47
Germany	3,272	566	2,270
Greece	18	1	....
Hawaii	....	....	1
Holland	30	4	19
India	5	....	4
Ireland	4,707	579	2,533
Isle of Man	1	....	....
Italy	1,376	131	496
Jamaica	1	....	....
Japan	6	1	2

Deceased and Parents of Deceased.

Nativity of Deceased.			Nativity of Parents of Deceased.					
Borough of—		City of New York.	Borough of—					City of New York.
Queens.	Richmond.		Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
....	....	3	1	1	3	....	....	5
....	....	4	4	....	....	....	....	4
....	....	2	...	....	2	....	....	2
....	....	3	3	....	....	....	....	3
....	....	1	....	....	....	....	....	....
....	....	1	....	....	....	....	....	....
1	2	13	2	1	2	....	....	5
....	....	5	1	....	....	....	....	1
21	4	1,089	1,860	97	227	51	10	2,245
....	....	2	1	....	1	....	....	2
....	1	32	13	2	12	....	....	27
....	....	8	4	....	2	....	....	6
13	....	251	338	18	15	27	....	398
....	....	2	....	....	....	....	....	....
14	7	348	109	19	83	14	2	227
....	....	2	....	....	1	....	....	1
1	....	88	74	....	5	1	....	80
....	....	32	15	....	5	....	....	20
....	....	1	....	....	....	....	....	....
25	4	124	34	11	50	7	2	104
38	41	1,354	557	119	632	72	43	1,423
....	....	1	1	....	....	....	....	1
2	4	47	25	8	25	4	2	64
28	7	303	227	14	58	29	10	338
427	117	6,652	4,331	876	3,320	667	152	9,346
....	....	19	16	1	....	....	....	17
....	....	1	....	....	....	....	....	....
....	...	53	39	4	18	....	2	63
....	....	6	1	....	1	....	....	2
285	151	8,255	7,580	1,115	4,205	437	237	13,574
....	....	1	....	....	....	....	....	....
25	19	2,047	3,713	294	1,556	109	62	5,764
....	....	1	....	....	....	....	....	....
....	....	9	3	....	1	...	....	4

Country.	Nativity of Deceased.		
	Borough of—		
	Manhattan.	The Bronx.	Brooklyn.
Lapland	1	....	....
Mexico	3	....	....
Madeira	....	....	....
Morocco	1	....	....
Norway	38	9	....
Poland	45	10	20
Porto Rico	4	....	1
Portugal	2	1	8
Pr. Edward's Island	1	....	....
Roumania	140	6	13
Russia	1,136	75	229
Scandinavia	....	....	366
Scotland	215	31	168
Sicily	1	....	....
South America	7	1	2
Spain	18	....	9
Sweden	162	25	....
Switzerland	109	21	38
Syria	10	1	1
Trinidad	1	....	....
Turkey	6	....	1
United States	22,701	3,175	15,045
Unknown	398	32	140
Venezuela	3	....	....
Wales	....	5	9
Other West Indies	46	9	25
Mixed nationalities	....	....	....
Total	36,769	4,935	22,344

Nativity of Deceased.			Nativity of Parents of Deceased.					
Borough of—		City of New York.	Borough of—					City of New York.
Queens.	Richmond.		Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
....	....	1	....	....	....	....	....	....
....	....	3	1	....	....	....	....	1
....	....	....	....	1	....	....	....	1
....	....	1	....	....	....	....	....	....
4	15	66	41	11	....	5	13	70
....	3	78	78	16	63	....	10	167
....	....	5	6	1	1	....	....	8
....	....	11	4	....	4	....	....	8
....	....	1	....	....	....	....	....	....
....	....	159	215	10	24	....	1	250
29	5	1,475	2,384	143	679	74	27	3,307
....	....	366	....	....	630	....	....	630
14	17	445	245	42	202	22	20	531
....	....	1	....	....	....	....	....	....
....	....	10	3	....	1	....	....	4
1	....	28	17	....	20	1	....	38
7	11	205	188	36	....	18	8	250
9	8	185	102	23	36	9	8	178
....	....	12	20	1	3	....	....	24
....	....	1	....	....	....	....	....	....
....	2	9	9	....	....	....	2	11
1,794	851	43,566	6,092	980	5,773	840	371	14,056
38	9	617	4,806	440	2,215	144	205	7,840
....	....	3	3	....	....	....	....	3
1	2	17	....	7	12	2	1	22
....	2	82	55	5	23	....	1	84
....	....	....	3,518	639	2,404	249	93	6,903
2,782	1,282	63,112	36,769	4,935	22,344	2,782	1,282	68,112

Deaths by Suicide in

Nativity.	Cuts and Stabs.		Gunshots.		Hanging.		Leaps.		Drowning.		Illuminating Gas.		Arsenic.		Paris Green.		Carbolic Acid.		Hydrocyanic Acid.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Austria-Hungary	..	..	4	..	3	..	1	..	..	..	..	1	..	..	1	1	7	1	..	..
Bohemia.........	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	..	..	..
England..... ...	2	..	1	..	..	.	..	1	..	1	..	..	..	..	..	..	..	..	..	..
France..........	..	..	..	..	1	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..
Germany........	3	..	25	..	15	1	2	..	..	..	17	5	..	..	1	..	21	6	..	..
Ireland	2	1	10	..	1	3	3	3	1	1	2	4	..	1	..	3	10	10	..	..
Italy.	..	..	5	1	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..
Russia...........	..	1	1	..	..	..	1	1	..	2	2	2	..	..	..	..	7	7	..	..
Other foreign countries.....	2	..	6	1	2	1	2	..	..	..	2	..	..	..	..	..	4	1	..	..
United States ...	5	..	26	3	7	1	5	4	..	..	15	7	..	..	2	..	37	17	1	..
Unknown.	1	..	10	..	2	..	1	3	1	..	..	2	..	..	..	..	11	7	..	..
Total......	15	2	98	5	31	6	15	12	2	5	41	22	1	1	4	5	98	49	1	..

Borough of Manhattan.

Muriatic Acid.		Irritant Poison.		Morphine.		Opium.		Cyanide of Potassium.		Phosphorus.		Roach Powder.		Sulphuric Acid.		Jump in Front of Train.		Bichloride of Mercury.		Nitric Acid.		Total by Sexes.		Total of both Sexes.
M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	16	5	21
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	86	12	98
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	29	27	56
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	7	3	10
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	13	24
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	3	21
..	..	..	..	1	1	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	110	34	144
..	..	..	1	1	..	1	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	30	13	43
..	1	..	1	3	1	1	..	2	..	..	1	..	1	1	1	1	..	..	1	1	..	315	114	429

**Deaths by Suicide in The*

Nativity.	Cuts and Stabs.		Gunshots.		Hanging.		Leaps.		Drowning.		Illuminating Gas.		Arsenic.		Paris Green.		Carbolic Acid.		Muriatic Acid.		Hydrocyanic Acid.		Morphine.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Austria-Hungary...	..	..	4	..	4	..	1	..	..	..	..	2	..	..	1	1	8	3	..	1	..	..	..	..
Bohemia	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..
British America...	..	..	1	..	..	..	..	..	..	..	1	.	..	..	..	..	..	..	..	..	..	..	..	..
England	3	..	2	..	1	..	..	1	..	1	2	..	..	..	..	..	1	3	..	..	..	..	..	..
France	..	..	1	..	1	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	..	..
Germany	5	1	38	..	31	2	3	..	1	..	32	7	1	..	1	..	41	14	..	..	1	..	1	..
Ireland	3	1	11	..	4	3	4	3	1	1	4	4	..	1	..	3	13	14	..	..	..	..	..	..
Italy..............	..	..	5	1	..	..	..	..	..	1	1	..	..	..	..	..	1	..	..	..	..	..	..	..
Russia	..	1	4	..	1	..	2	1	..	2	2	4	..	..	..	..	8	11	..	..	..	..	..	..
Scotland	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	3	..	..	..	..	..	..	..
Other foreign countries	2	..	10	1	6	2	3	..	..	..	3	1	..	..	..	..	8	1	..	..	..	..	..	..
United States	11	1	66	5	16	4	10	4	..	2	27	20	4	1	3	1	74	32	..	..	2	..	1	1
Unknown..........	2	..	17	..	6	..	1	4	1	..	2	2	..	..	..	..	19	14	..	..	..	..	1	..
Total..........	26	4	160	7	70	11	24	13	3	7	77	41	6	3	5	6	176	92	..	1	3	..	3	1

* The 772 suicides in The City of New York occurred in the boroughs as follows:

City of New York.

Opium.		Strychnine.		Cyanide of Potassium.		Corrosive Sublimate.		Irritant Poison.		Phosphorus.		Roach Powder.		Sulphuric Acid.		Jump on Front of Train.		Bichloride of Mercury.		Nitric Acid.		Wood Alcohol.		Potash.		Other Method.		Total by Sexes.		Total of Both Sexes.
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	7	25
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	1		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	3
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	6	16
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	6
1	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	158	26	184
..	..	..	..	..	..	..	..	1	1	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	1	..	..	41	33	74
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	8	3	11
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	19	36
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	1	5
2	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37	5	42
2	..	..	..	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	217	73	290
1	..	..	..	2	..	1	..	2	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	55	21	76
6	..	..	1	9	..	2	..	4	4	..	1	..	1	1	..	1	..	..	1	1	..	..	1	..	1	2	..	576	196	772

Manhattan, 429; The Bronx, 48; Brooklyn, 242; Queens, 36; Richmond, 17.

DEATHS IN INSTITUTIONS FOR YEAR ENDING DECEMBER 31, 1902.

Borough of Manhattan.

Almshouse	380
Babies' Hospital	46
Bellevue Hospital	1,604
Beth Israel Hospital	84
City Hospital	395
Columbus Hospital	41
Flower Hospital	134
Foundling Hospital	662
French Hospital	46
General Memorial Hospital	47
German Hospital	216
Gouverneur Hospital	353
Hahnemann Hospital	31
Harlem Hospital	274
Home for the Aged (Little Sisters of the Poor)	99
Home for Aged and Infirm Hebrews	26
House of Relief	246
Infants' Hospital (Randall's Island)	188
Loomis Hospital	21
Manhattan State Hospital	398
Metropolitan Hospital	779
Montefiore Home	103
Mount Sinai Hospital	349
New York Hospital	392
New York Infant Asylum	83
New York Infirmary for Women and Children	55
Nursery and Child's Hospital	64
Polyclinic Hospital	41
Post-Graduate Hospital	365
Presbyterian Hospital	430
Randall's Island Hospital	62
Reception Hospital	83
Roosevelt Hospital	450
St. Francis Hospital	203
St. Luke's Hospital	279
St. Mark's Hospital	86
St. Vincent's Hospital	403
Skin and Cancer Hospital	3
Sloane Maternity Hospital	94
Trinity Hospital	9
Willard Parker Hospital	271

Woman's Hospital	8
Workhouse	64
Wright Memorial Hospital	152
Other Institutions	652
Total	10.771

Borough of The Bronx.

Catholic Protectory	13
Fordham Hospital	129
Hebrew Infant Asylum	25
Home for Incurables	50
Lebanon Hospital	152
Lincoln Hospital	231
Odd Fellows' Home	8
Riverside Hospital	469
St. Joseph's Hospital	582
Seton Hospital	195
Workhouse (Branch, Hart's Island)	7
Other Institutions	17
Total	1,878

Borough of Brooklyn.

Almshouse	285
Brooklyn Hospital	208
Brooklyn Maternity	17
Bushwick Hospital	27
Cumberland Street Hospital	59
Eastern District Hospital	55
German Hospital	156
German Evangelical Home	35
Home for Aged (Little Sisters of the Poor)	93
Home for Consumptives	123
House of Good Shepherd	7
Infants' Hospital	43
Kings County Hospital	773
Kings County Jail	4
Kings County Penitentiary	8
Kingston Avenue Hospital	183
Long Island College Hospital	189
Long Island State Hospital	102
Lutheran Hospital	21
Methodist Episcopal Hospital	143

Memorial Hospital	50
Norwegian Hospital	66
St. Catherine's Hospital	293
St. Christopher's Hospital	50
St. John's Hospital	85
St. Mary's Hospital	232
St. Peter's Hospital	404
Williamsburg Hospital	58
Other Institutions	245
Total	4,015

Borough of Queens.

Coombe's Sanitarium	10
Flushing Hospital	47
Jamaica Hospital	29
River Crest Sanitarium	21
St. John's Hospital (Long Island City)	175
Sanford Hall	6
Other Institutions	17
Total	305

Borough of Richmond.

Almshouse (Richmond County)	25
Mariners' Family Asylum	3
Mount Loretto	11
Nursery and Child's Hospital	8
Post Hospital (Fort Wadsworth)	5
Quarantine Hospitals	6
Sailors' Snug Harbor	71
Seaside Hospital	83
S. R. Smith's Infirmary	110
United States Marine Hospital	46
Other Institutions	2
Total	370

RECAPITULATION.

Prisons	141
Hospitals	14,089
Institutions for Insane	540
Institutions for Children	1,333
Homes for Aged	485

Almshouses	690
Other Institutions	61
Total	17,339

Deaths by Accident and Negligence.

	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York.
Fractures and Contusions—						
Crushed by boats, bridges, etc	9	..	..	..	..	9
" by diving	1	..	..	..	..	1
" by elevator	30	..	2	..	..	32
" by falling derrick	2	1	..	..	..	3
" falling stone	9	2	..	..	..	11
" by machinery	5	..	10	1	2	18
" by other falling bodies	45	5	30	3	3	86
Jumped from burning building	5	..	..	..	..	5
Other causes	..	..	7	..	..	7
Not defined by Coroners	146	1	15	5	1	168
Falls—						
Down air-shaft	2	..	1	..	..	3
" areaway	2	..	1	.	..	3
" elevator shaft	26	..	4	1	1	32
" hatchway	1	.	1	..	1	3
" stairs	66	4	38	2	..	110
From bridge	1	..	2	..	..	3
" buildings	81	4	5	..	1	91
" fire escape	13	1	2	..	..	16
" scaffold	10	1	12	2	1	26
" window	74	3	31	5	..	113
On ship	9	..	13	..	..	22
On sidewalk	19	3	9	1	..	32
Others	65	4	53	2	7	131
Not specified by Coroners	33	10	..	9	..	52
Street Vehicles—						
Run over by wagons, trucks, etc	123	5	26	1	1	156
Run over by automobile	7	..	..	..	2	9
Falls from wagons, trucks, etc	22	1	15	3	2	43

	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York
Burns—						
Burnings, buildings, boats, etc	29	..	4	3	1	37
Explosion of lamp	8	..	7	1	..	11
Oil or gas stove	24	4	5	1	..	34
Other causes	24	3	47	14	2	90
Not defined by Coroners	72	3	..	5	..	80
Scalds by—						
Escaping steam	4	..	3	..	..	7
Hot fluids	32	6	22	2	..	62
Not specified by Coroners	14	..	..	..	..	14
Explosions—						
Boiler	..	..	..	..	2	2
Explosive compounds	20	1	1	..	..	22
Gas	1	..	2	..	..	3
Tug boat	..	..	..	1	..	1
Not specified by Coroners	1	..	..	..	..	1
Drowning—						
In rivers, bays, etc	210	29	119	33	26	417
In tubs, pails, etc	..	2	1	1	..	4
Horses—						
Kicked by	3	1	1	..	..	5
Runaways, falls, etc	6	1	..	..	..	7
Suffocation—						
Caving-in of embankment	..	3	..	..	..	3
Food in larynx	..	1	2	..	..	3
Foreign body in larynx	10	3	5	1	..	19
In burning buildings	15	..	..	1	..	16
Overlaid in bed	4	1	6	2	3	16
Others	2	1	2	..	..	5
Not specified by Coroners	..	..	1	..	..	1
Killed by railroads—						
Elevated railroads	19	4	6	7	..	36
Horse cars	3	..	..	..	..	3
Trolley cars	29	18	56	..	2	105
Steam railroads	37	23	11	35	10	116
Cars not specified	61	..	2	4	..	67

	Borough of—					City of New York.
	Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
Poisons—						
Alcohol	3	..	3	..	..	6
Alkaloid	1	..	..	..	..	1
Arsenic	3	..	1	..	..	4
Atropine	1	..	1	..	..	2
Benzine	2	..	1	..	..	3
Bronze powder	1	..	..	..	..	1
Carbolic acid	41	1	6	..	..	48
Chloral	2	..	..	..	..	2
Chloroform	4	..	..	..	..	4
Codeine	1	..	..	..	..	1
Corrosive substance	2	..	..	..	..	2
Creosote	..	1	..	..	..	1
Ether	1	..	..	..	..	1
Hydrochloric acid	3	..	..	..	..	3
Hydrocyanic acid	3	..	..	..	..	3
Irritant poison	..	1	5	..	..	6
Morphine	2	..	..	..	..	2
Nitric acid	..	1	..	..	..	1
Oil of wintergreen	..	..	1	..	..	1
Opium	10	..	2	..	..	12
Oxalic acid	1	..	..	..	..	1
Potash	1	..	..	..	..	1
Ptomaines	3	2	1	..	..	6
Strychnine	2	..	..	..	..	2
Turpentine	3	..	..	..	..	3
Wood alcohol	2	..	..	..	..	2
Illuminating gas	147	7	53	1	..	208
Wounds—						
Gunshot	17	..	3	1	..	21
Incised	8	..	2	..	..	10
Lacerated	4	..	10	..	..	14
Others	..	..	2	..	..	2
Not specified by Coroners	3	..	1	..	..	4
Caisson disease	1	..	1	..	..	2
Circumcision	1	1	..	..	..	2

	Borough of—					City of New York.
	Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
Criminal abortion	18	1	6	..	..	25
Electric current	6	1	5	6	3	21
Neglect and exposure	..	..	5	1	1	7
Sunstroke	24	1	9	..	2	36
Surgical operations	9	..	..	..	..	9
Wrestling bout	1	..	..	..	..	1

RECAPITULATION.

	Borough of—					City of New York
	Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
Fractures and contusions	252	9	64	9	6	340
Falls	402	30	172	22	11	637
Vehicles	152	6	41	4	5	208
Burns and scalds	202	16	88	26	3	335
Explosions	22	1	3	1	2	29
Railroads	149	45	75	46	12	327
Drowning	210	31	120	34	26	421
Poison	239	13	74	1	..	327
Suffocation	31	9	16	4	3	63
Wounds	32	..	18	1	..	51
Horses	9	2	1	..	..	12
Criminal abortion	18	1	6	..	..	25
Caisson disease	1	..	1	..	..	2
Wrestling bout	1	..	..	..	..	1
Neglect and exposure	..	..	5	1	1	7
Surgical operations	9	..	..	..	..	9
Electric current	6	1	5	6	3	21
Circumcision	1	1	..	..	..	2
Sunstroke	24	1	9	..	2	36
Total deaths from accidents and negligence	1,760	166	698	155	74	2,853

Births by Nativities of Parents.

COUNTRY.	BOROUGH OF— MANHATTAN. Nativity of Both Parents.	MANHATTAN. Nativity of Mother Only.	THE BRONX. Nativity of Both Parents.	THE BRONX. Nativity of Mother Only.	BROOKLYN. Nativity of Both Parents.	BROOKLYN. Nativity of Mother Only.	QUEENS. Nativity of Both Parents.	QUEENS. Nativity of Mother Only.	RICHMOND. Nativity of Both Parents.	RICHMOND. Nativity of Mother Only.	CITY OF NEW YORK. Nativity of Both Parents.	CITY OF NEW YORK. Nativity of Mother Only.
Austro-Hungary	5,237	788	74	33	607	146	25	12	14	..	5,957	979
Bohemia	574	123	21	9	6	1	30	13	1	..	632	146
British America	66	128	11	18	57	109	12	14	8	6	154	275
England	222	495	40	68	165	305	19	40	25	13	471	921
France	103	123	7	13	4	21	11	11	5	1	130	169
Germany	2,964	1,022	570	173	2,055	617	431	152	138	58	6,158	2,022
Ireland	3,836	1,737	327	167	1,247	624	135	90	81	45	5,626	2,663
Italy	8,774	100	524	5	3,139	24	217	4	92	2	12,746	135
Russia and Poland	8,058	531	212	26	1,686	99	79	5	47	1	10,082	662
Scotland	76	134	15	16	75	89	12	12	10	6	188	257
Sweden	274	121	74	14	403	106	17	5	48	4	816	250
Switzerland	55	88	11	19	12	26	6	12	5	1	89	146
United States	11,196	3,855	2,043	621	9,013	2,201	1,403	403	627	168	24,282	7,248
Other Foreign	1,201	369	67	41	548	119	19	9	28	8	1,863	546
Unknown	22	19	..	1	3	..	..	..	1	2	26	22
Total	42,658	9,633	3,996	1,224	19,020	4,487	2,416	782	1,133	295	69,223	16,421

Disposition of the Dead, and of Still-born Infants in The City of New York.

CEMETERY.	BOROUGH OF— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	CITY OF NEW YORK.
Acacia	....	....	....	115	....	115
Almshouse	....	....	....	....	42	42
A. M. E. Zion	....	....	....	....	3	3
Astoria	....	....	....	6	....	6
Aqueduct	....	....	....	9	....	9
Bayside	....	....	....	358	....	358
Baron Hirsch	....	....	....	....	85	85
Bethel	....	....	....	....	47	47
Calvary	....	....	....	19,752	....	19,752

CEMETERY.	BOROUGH OF—					CITY OF NEW YORK.
	Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
Canarsie	....	....	54	....	....	54
Cedar Grove	....	....	....	437	....	437
City	....	4,295	....	....	....	4,295
County Farms	....	.. .	1,091	....	....	1,091
Cypress Hills	....	....	692	870	....	1,562
Douglaston	....	....	....	4	....	4
Dyckeman	2	....	....	....	....	2
Evergreens	....	....	1,0 7	2,991	....	4,028
Fairview	....	....	....	....	98	98
Father of Mercy Church Vault	....	....	1	....	....	1
Flatlands	....	....	9	....	....	9
Flushing	....	....	....	270	....	270
Fountain	....	....	....	....	23	23
Friends	....	....	17	....	....	17
Gen. U. S. Grant's Tomb	1	....	....	....	....	1
Gravesend	....	....	2	....	....	2
Grace Church	1	....	....	....	....	1
Greenwood	....	....	4,412	....	....	4,412
Hillside	....	....	....	....	8	8
Holy Cross	....	....	6,079	....	....	6,079
Holy Trinity	....	....	1,594	....	....	1.594
Jewish Congregation Cemeteries	....	....	8	.. .	....	8
Little Neck	....	....	....	24	....	24
Lake	....	....	....	....	46	46
Linden Hill	....	....	....	2,049	....	2,049
Long Island State Hospital	....	....	8	....	....	8
Lutheran	....	....	....	6,379	3	6,382
Machpelah	....	....	....	169	....	169
Maimonides	....	....	38	....	....	38
Maple Grove	....	....	....	190	....	190
Marble	11	....	....	....	....	11
Moravian	....	....	....	....	288	288
Mount Carmel	....	....	....	4	....	4
Mount Zion	....	....	....	1,424	....	1,424
Mount Nebo	....	....	....	132	....	132
Mount Olivet	....	....	....	1,903	. ..	1 903
Mount Loretto	....	...	....	....	8	8

Cemetery.	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York.
Mount Hope	....	....	48	...	....	48
New Springville	....	....	....	..	21	21
New Union Fields	....	....	....	116	....	116
Nursery and Child's Hospital	....	....	....	....	7	7
Ocean View	....	....	....	....	39	39
Prospect	....	....	....	11	....	11
Reformed	....	....	....	....	3	3
Springfield	....	....	....	20	....	20
Sailors' Snug Harbor	....	....	....	....	49	49
Salem Fields	....	....	218	....	....	218
St. Andrew's	....	....	....	....	4	4
St. John's	....	....	....	993	....	993
St. Joseph's	....	....	....	....	17	17
St. Luke's	....	....	....	....	10	10
St. Mary's	....	....	....	174	....	174
St. Mary's, Third Ward	....	....	....	....	25	25
St. Mary's, Fourth Ward	....	....	....	....	110	110
St. Michael's	....	....	....	1,451	1	1,452
St. Monica's	....	....	....	60	....	60
St. Peter's	....	33	....	....	277	310
St. Raymond's	....	1,761	....	....	....	1,761
Silver Lake	...	....	....	....	1,308	1,308
Silver Mount	....	....	....	....	80	80
Staten Island	....	....	....	....	23	23
Sylvan	....	....	....	....	10	10
Trinity	107	....	....	....	....	107
Union Fields	....	....	....	532	....	532
U. S. Crematory	....	....	....	581	....	581
Vaughn	....	....	....	....	3	3
Washington	....	....	2,961	2	....	2,963
Woodhaven	....	....	....	1	....	1
Woodland	...	....	....	....	152	152
Woodlawn	....	1,419	....	....	....	1,419
Woodrow Church	....	....	....	....	12	12
West Baptist	....	....	....	....	5	5
West Farms	....	2	....	....	....	2
Total	122	7,510	18,269	41,027	2,807	69,735

Table of Births in the City of New York

Months.	Total.	White.		Colored.	
		Male.	Female.	Male.	Female.
January	7,807	3,866	3,821	61	59
February	6,599	3,324	3,150	69	56
March	7,361	3,712	3,510	74	65
April	6,350	3,197	3,065	44	44
May	5,691	2,874	2,715	48	54
June	6,684	3,400	3,176	49	59
July	7,202	3,543	3,530	64	65
August	7,231	3,601	3,515	61	54
September	7,841	3,879	3,827	70	65
October	7,331	3,646	3,556	59	70
November	6,945	3,551	3,300	49	45
December	8,602	4,286	4,162	88	66
Total	85,644	42,879	41,327	736	702

Table of Marriages in the City of New York

Months.	Total.	White.	
		Male.	Female.
January	3,264	3,170	3,167
February	2,804	2,732	2,732
March	2,197	2,126	2,126
April	3,298	3,212	3,213
May	2,583	2,502	2,504
June	3,723	3,618	3,618
July	3,016	2,940	2,944
August	2,300	2,238	2,237
September	3,180	3,091	3,090
October	3,139	3,015	3,015
November	3,394	3,294	3,297
December	3,309	3,224	3,225
Total	36,207	35,162	35,168

for the Year ending December 31, 1902.

Nativity of Parents.								Births Reported by		Apparently Illegitimate.	Twins.	Triplets.
Native.		Foreign		Mixed.		Not Stated.						
Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Physicians.	Midwives.			
1,082	1,052	2,275	2,281	540	518	30	29	4,060	3,747	102	57	..
1,000	839	1,931	1,873	426	414	36	30	3,450	3,149	108	51	..
1,060	1,052	2,144	2,011	547	474	35	38	3,981	3,380	77	54	..
923	9[illegible]1	1,845	1,763	438	414	35	31	3,230	3,120	68	57	1
812	772	1,660	1,585	420	378	30	34	2,998	2,693	126	40	..
1,058	946	1,891	1,758	468	496	32	35	3,724	2,980	128	53	..
973	1,040	2,090	2,038	501	489	43	28	3,911	3,291	123	80	1
968	955	2,193	2,097	486	509	15	8	4,034	3,197	92	49	..
1,132	1,138	2,265	2,181	528	550	24	23	4,481	3,360	107	56	..
1,038	1,040	2,102	2,046	536	515	29	25	3,936	3,395	135	59	..
1,036	949	2,050	1,932	480	441	34	23	3,874	3,071	115	53	..
1,240	1,225	2,468	2,345	635	610	31	47	4,942	3,660	148	64	2
12,322	11,960	24,914	23,910	6,005	5,808	374	351	46,601	39,043	1,329	673	4

for the Year ending December 31, 1902.

Colored.		Single.		Widowed.		Native.		Foreign.	
Male.	Female.	Male	Female.	Male.	Female.	Male.	Female.	Male.	Female.
94	97	2,890	2,931	374	3[illegible]3	1,387	1,499	1,877	1,765
72	72	2,489	2,547	315	257	1,239	1,327	1,565	1,477
71	71	1,940	1,960	257	237	940	1,018	1,257	1,179
86	85	2,887	2,963	411	335	1,558	1,661	1,740	1,637
81	79	2,241	2,258	342	295	1,209	1,265	1,374	1,318
105	105	3,346	3,408	377	315	1,837	1,954	1,886	1,759
76	72	2,632	2,710	384	306	1,390	1,501	1,626	1,515
62	63	2,037	2,028	263	272	1,032	1,092	1,268	1,208
89	90	2,817	2,853	363	327	1,516	1,601	1,664	1,579
124	121	2,760	2,838	379	301	1,623	1,719	1,516	1,420
100	97	3,023	3,085	371	308	1,610	1,687	1,784	1,707
85	84	2,947	2,983	362	326	1,406	1,537	1,903	1,772
1,045	1,039	32,009	32,595	4,198	3,612	16,747	17,8[illegible]1	19,460	18,346

Deaths of Persons 100 Years of Age and Over.

Date of Death. 1902.	Name.	Age. Years.	Months.	Days.	Nativity.	Cause of Death.	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York.
Mar. 8..	Mary Silk	101	..	..	Ireland	Pleurisy	1	..	..	..	..	1
July 9	Michadis Silberstone	100	4	..	Posen.......	Arteris Sclerosis	1	..	..	..	..	1
Dec.31..	Catherine Conlon..	100	..	..	Ireland	Old age	1	..	..	..	..	1
Nov.15..	Mary Meany......	100	..	..	Ireland	Old age	..	..	1	..	..	1
Apr.17..	Ellen Hunt	110	..	..	Virginia.....	Heart disease.	..	..	..	1	..	1
July 31..	Eliza Martin......	101	..	..	Germany....	Intermittent fever.......	..	..	..	1	..	1
						Total.......	3	..	1	2	..	6