

Document No. 5.

TWENTIETH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY,

AND REPORT OF THE

BUREAU OF VITAL STATISTICS.

1896.

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The State Board of Health.

HON. HENRY C. KELSEY, Secretary of State,
 HON. JOHN P. STOCKTON, Attorney-General, } Members *ex-officio*.
 Prof. JOHN C. SMOCK, State Geologist,

Prof. A. R. LEEDS, Ph.D. Hoboken.
 CORNELIUS SHEPHERD, M.D. Trenton.
 JOHN A. GITHENS, Esq. Asbury Park.
 EDWARD R. O'REILLY, M.D. Elizabeth.
 LABAN DENNIS, M.D. Newark.
 Prof. CYRUS F. BRACKETT, M.D., LL.D. Princeton.
 FRANKLIN GAUNT, M.D., Burlington.

President CYRUS F. BRACKETT, M.D., LL.D.
 Secretary HENRY MITCHELL, M.D.

Secretary's Report.

To His Excellency John W. Griggs:

GOVERNOR—I have the honor, in behalf of the Board of Health of the State of New Jersey, to present to you its Twentieth Annual Report, and also the Eighteenth Report of the Bureau of Vital Statistics.

The total number of deaths in the State for the year ending June 30th, 1896, was 30,767, and the estimated population 1,718,543, thus showing a death-rate of 17.90 per 1,000.

This is the lowest death-rate which has been recorded during the past eight years, as the following table indicates:

DEATH-RATE IN NEW JERSEY PER 1000 FOR EIGHT YEARS, 1889—1896.

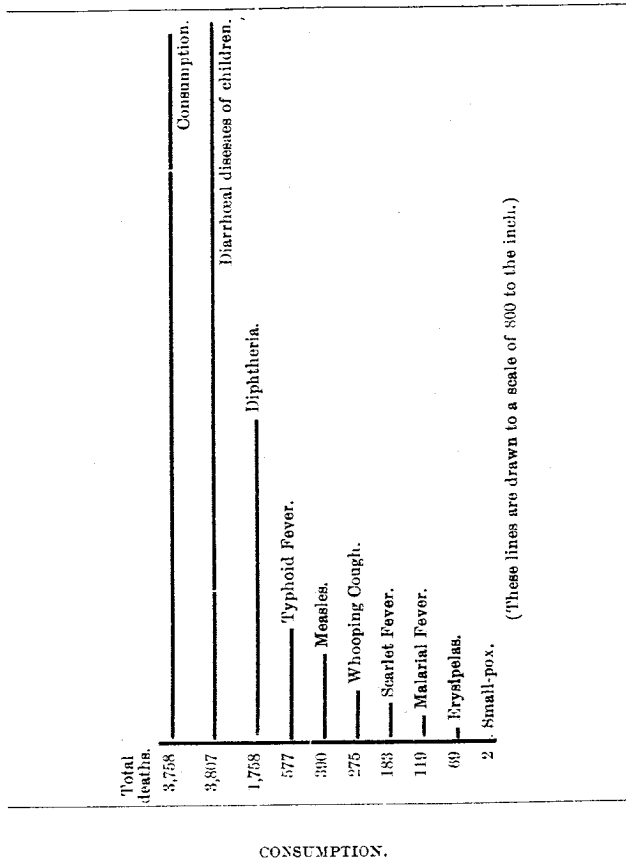
Year.....	1889	1890	1891	1892	1893	1894	1895	1896
Rate.....	18.99	19.80	19.50	21.62	19.88	19.09	18.31	17.90

Although the total number of deaths in the State exceeds that of any previous year, yet the rate of increase of the population has advanced and the death-rate has diminished. The following table shows the comparative mortality from the ten chief preventable diseases:

DEATHS FROM THE TEN CHIEF PREVENTABLE DISEASES.

	1889	1890	1891	1892	1893	1894	1895	1896
Consumption.....	3,449	3,669	3,456	3,575	3,429	3,433	3,542	3,758
Diarrhoeal diseases of children.....	2,862	3,527	3,191	4,043	3,981	3,893	3,776	3,807
Diphtheria and Croup...	1,574	1,575	1,737	1,776	1,677	1,294	1,464	1,758
Enteric Fever.....	724	782	695	628	506	485	568	577
Scarlet Fever.....	533	209	288	1,008	445	272	264	183
Whooping Cough.....	278	371	299	163	237	328	272	275
Erysipelas.....	114	81	85	94	74	97	74	69
Measles.....	118	174	250	197	73	257	95	390
Small-pox.....	3	0	0	38	43	11	23	2
Malarial Fever.....	203	195	180	198	148	162	144	119
Total.....	9,858	10,583	10,181	10,720	10,613	10,232	10,192	10,938

The following diagram shows the comparative mortality of the specified preventable diseases during the year ending June 30th, 1896:



CONSUMPTION.

This disease is charged with causing 3,758 deaths, which is 417 more than the average for the past eighteen years, and about one-eighth of all who died, but the difficulties of diagnosis lead to errors

in the classification of cases which are grouped under the headings, "diarrhoeal diseases of children," "acute lung diseases," "brain and nervous diseases of children," "adult brain and spinal diseases," and "digestive and intestinal diseases," and if the true cause of death could in each case be accurately determined, the number of persons dying of tuberculosis would undoubtedly be considerably increased. This disease is generally attended with prolonged illness, which incapacitates the individual for periods ranging from a few weeks to two or more years, and the greater number of its victims die in early life. From every point of view this disease is the most formidable of all with which we have to deal, but there is good reason to believe that the influences already in operation will in time produce an amelioration of the destruction heretofore caused by this affection. The knowledge that consumption is infectious, and that, together with other forms of tuberculosis, it can be transmitted by contact with unclean objects, by the inhalation of infected dust, by eating infected food, etc., will lead to greater care in avoiding the sources of infection.

DIPHTHERIA.

This disease has caused a larger number of deaths than during either of the preceding three years, although it was not so fatal as during the years 1888 and 1892. Frequent outbreaks of diphtheria have occurred in various parts of the State, and it very often reappears in localities where it has once prevailed. The investigations conducted in the bacteriological laboratory in Princeton have shown that persons having no clinical symptoms do carry the bacilli of diphtheria in their throats, and such infected persons are capable of transmitting the disease to others who are susceptible and who may sicken and die while the unsuspected individual who is the source of the trouble may exhibit no sign of illness. Diphtheria causes more deaths in New Jersey than any other single disease except tuberculosis, and it is more fatal in children than adults.

DIARRHOEAL DISEASES OF CHILDREN.

The unusually hot and uncomfortable Summer was not attended by a high death-rate among infants, and this fact may in a measure be due to a better knowledge on the part of mothers concerning the

consequences attending the use of infected milk. The sterilization of the milk which is fed to young children has become an established domestic procedure among the more intelligent classes of the population, and the value of this precaution has been demonstrated to the satisfaction of every observant physician, parent and nurse.

TYPHOID FEVER.

Typhoid fever has caused about the usual number of deaths in the State, and the causes which have led to the appearance of this disease in the various localities have been, in almost every instance, traced without difficulty to polluted wells. In many instances the well giving rise to the disease has previously been the cause of one or more cases of this affection. To prevent the necessity of providing a new source of domestic water-supply, some house-owners will trifle with the lives of their families or those of their tenants by continuing to permit the use of water from wells which are known to have produced typhoid fever, blinding themselves to the danger by taking the trouble to "clean out" the well, and by trying to hope that perhaps there is some mistake about the transmission of the germ through the well-water. It is safe to assert that a well once polluted with typhoid poison can never again be made fit for household use, for the source of contamination is not in the well itself, but it proceeds from some adjacent cesspool or other pollution of the ground in the vicinity of the well, and to clean the well itself will not remove the trouble at all. One of the most useful functions of the local authorities is to take action to secure the abandonment of wells which have been proved to be dangerous to health. The law expressly provides that ordinances may be made to close any well, the water of which is polluted or detrimental to the public health.

SCARLET FEVER.

Only 183 deaths occurred from scarlet fever, this being the smallest number of deaths from that disease which has occurred in any one of the last eighteen years.

WHOOPIING COUGH.

Whooping cough carried off more than the average number of persons, the deaths from that affection being 275.

MEASLES.

Measles appears in epidemic form in every community in the State about once in four years, and none of the measures which have been found useful in staying the progress of the other epidemic diseases have proved to have much value when applied to outbreaks of this affection. It is the most communicable of all the eruptive fevers, and such a degree of isolation as that which has proved to be effectual in preventing the spread of diphtheria will not avail in the case of measles. The first cases in a locality are generally unrecognized, and before the local health authorities are informed that the disease exists, it has gained a foothold and is spreading rapidly. To apply isolation restrictions under these circumstances does no good, and thus far, in defiance of every measure which has been employed to restrict it, this disease has attacked nearly every individual who has reached the age of sixteen years. During the last eighteen years measles has caused the death of 2,907 persons.

MALARIAL FEVERS.

Malarial diseases have prevailed to a less extent than during any one of the past eighteen years, there having been only 119 deaths from these affections. As the residence localities of the State are improved from year to year, being supplied with wholesome water and good drainage, we may expect a continuous diminution in the number of cases of this class of affections, for the malarial bacteria are known to be conveyed through water obtained from swamps and from wells in certain soils. The drying-up of large areas of water-soaked lands in built-up districts, by the construction of sewers and under-drains, will unquestionably be followed by a subsidence of the malarial influences when they have hitherto existed in such situations.

SMALL-POX.

This disease caused but two deaths during the year, but this gratifying fact should not incline the public to further neglectfulness concerning vaccination. We find that the former custom of vaccinating all children soon after birth is dying out, and at present there are few communities in the State which can be regarded as well protected by recent vaccination against small-pox.

The following figures, taken from the school census, indicate that at least 21 per cent. of the children within the school age are unvaccinated.

TABLE SHOWING LIST OF UNVACCINATED SCHOOL CHILDREN IN NEW JERSEY BY COUNTIES.

County.	Total Number Enrolled.	Unvaccinated.
Atlantic.....	7,855	2,663
Bergen.....	15,985	2,383
Burlington.....	14,450	6,425
Camden.....	24,493	6,616
Cape May.....	3,157	1,696
Cumberland.....	12,394	7,937
Essex.....	78,601	4,402
Gloucester.....	7,901	3,685
Hudson.....	102,706	9,463
Hunterdon.....	8,067	3,312
Mercer.....	20,949	4,439
Middlesex.....	16,815	4,239
Monmouth.....	19,603	5,234
Morris.....	14,550	6,987
Ocean.....	4,938	3,232
Passaic.....	36,253	5,512
Salem.....	6,567	3,040
Somerset.....	7,283	1,171
Sussex.....	5,792	3,779
Union.....	20,929	2,609
Warren.....	9,681	5,687
	438,969	94,481

NOTIFICATION OF INFECTIOUS DISEASES.

The operation of the act approved March 22d, 1895, has been satisfactory in those sections of the State where its provisions have been conformed to by the physicians and health officers, whose duty it is, under the law, to report and record cases of the dangerous communicable diseases. The reports sent to the State Board of Health show that the law is not complied with in all districts, and in many localities its provisions are conformed to by a portion only of the medical practitioners. Until the local boards and their officers become more active in requiring from all physicians prompt reports of cases of infectious diseases, there will remain numerous points of infection for the further spread of these affections. The need of more accurate

knowledge concerning the methods by which communicable diseases are conveyed, has been made apparent by the reports and investigations received from local boards, and the measures to be employed for the restriction of the spread of these affections are not yet understood by some of the officers who are depended upon by the public to put an end to epidemic outbreaks. In all districts where the notification of infectious diseases has been well established there is general approval of its enforcement. It has been found that a practice has prevailed among parents in some localities of leaving home with children who are convalescing after attacks of scarlet fever, diphtheria, etc., for the tonic effects which a change of location is thought to have in such cases. Such removals of children partly recovered from one of the grave communicable diseases has in several known instances during the past year been the cause of new outbreaks. Every sanitary district in the State has a right to demand that the isolation of patients in other districts until they are no longer sources of danger to other persons shall be enforced by the local health authority, and that the cleansing of infected persons and premises shall be conducted upon approved principles and in accordance with a recognized standard of procedure. The diseases mentioned in Section I of the act above referred to, viz., cholera, yellow fever, typhus fever, leprosy, plague, trichinosis, small-pox, varioloid, typhoid fever, diphtheria, membranous croup and scarlet fever, are not the only affections which may lawfully be included by local boards as notifiable. Section XII, sub-section 111, of the act approved March 31st, 1887, authorizes local boards to make ordinances to require physicians and others to report cases of such of the dangerous infectious diseases as in the judgment of each local board the public safety may require, and under this act many boards have included various diseases which are not named in the act approved March 22d, 1895. In at least one district tuberculosis has been placed on the notifiable list, and the following resolution was adopted by the local board: "Resolved, that in the opinion of this board notification in cases of tuberculosis will prove beneficial to the public health for the following reasons:

"1. Any insanitary conditions surrounding the patients could be improved or removed, and thus other members of the household could, in a measure, be protected.

"2. The patient could be instructed in the proper destruction of the sputa, and thus the family and others brought into contact with the

patient would be defended against the greatest danger which attends such cases, viz, the careless disposal of the discharges from the mouth and nose."

RAVINE ROAD SEWER NUISANCE.

The attention of the board was called in September, 1894, to the discharge of sewage upon the surface of the ground near Ferry street, Hoboken, and an investigation showed that the Ravine road sewer drains about three hundred acres of the territory formerly known as Hudson City, now containing about thirty thousand inhabitants, and that it extends from Jersey City Heights down the sharp descent of the Ravine road, crossing the boundary between Jersey City and Hoboken, and enters Hoboken at Ferry street. About one hundred feet east of the Hoboken city boundary line the sewer bends toward the southeast and continues across private lands. At the point where this angle occurs the sewer is broken, and at times the sewage freely flows out through this opening and spreads over an extensive area of the adjoining ground-surface, polluting the soil and the air, and creating a nuisance and source of foulness hazardous to the public health. The extension of the sewer from the southern boundary of the city of Hoboken is very flat and it is connected with two sewers, the combined capacity of which is insufficient to carry off the water, which, flowing down the Ravine road sewer in a swift current, stops suddenly at the foot of the hill, thus causing pressure and breaking the arch of the sewer.

These conditions have continued for fourteen years, notwithstanding efforts for the abatement of the nuisance have been made by the citizens of Hoboken to compel the proper officials representing Jersey City to proceed to abate the nuisance by the construction of a suitable outlet for the sewage which now escapes from the Ravine road sewer. On May 1st, 1895, a petition, signed by forty-one residents of the city of Hoboken, was received by the State Board of Health, setting forth that the health of the persons dwelling in the vicinity of the broken Ravine road sewer was "greatly endangered by foul, noxious, loathsome and nauseous odors and gases emanating from said broken sewer, and from the offensive matter ejected therefrom, which floods and pollutes the surrounding land and stagnates." Inquiry by the State Board of Health showed that intricate questions relating to ancient streams and water-courses, and to property rights claimed by certain railroad com-

panies, had prevented the construction of a new sewer by the city of Jersey City for the disposal of the escaping filthy fluids, and that in 1890 a commission was appointed to proceed to abate the nuisance. The act creating this commission was found to be defective, and in 1891 a supplement was passed. Plans were proposed for the construction of a sewer extending from the Hoboken city boundary to the Hudson river, but the commissioners declined to proceed with the construction, believing that the act was not explicit enough in its provisions to warrant them in undertaking the work. In 1892 the legislature again passed a relieving act, authorizing the extension of the sewer to tide-water. But the Delaware, Lackawanna and Western Railroad Company claimed ownership of one of the streets through which it was proposed to build the sewer, and declined to permit any use of this street for sewer purposes unless their claim to ownership was recognized by the commissioners. This the officials declined to agree to, and, after some further negotiations, the whole subject rested.

It appears from the records that an action was begun in Chancery in 1880 by the city of Hoboken to secure an order which should require that the necessary steps should be taken by the city of Jersey City for the abatement of the nuisance, and in January, 1895, the board of health of Hoboken brought suit in the Supreme Court for the issue of a mandamus to compel the proper officials of Jersey City to proceed to abate the nuisance by the construction of a suitable outlet for the sewage which now escapes from the broken Ravine road sewer. A report on file in the office of the State Board of Health, dated March 23d, 1896, concluded as follows:

"1. The nuisance complained of in the petition dated May 16th, 1895, did then exist as stated in said petition, and it still continues unabated. Said nuisance was originally the consequence of an engineering error, and it continued year after year because of the needless delay on the part of the said sewer commission in the condemnation of the necessary lands and in the construction of the necessary works.

"2. The action taken by the local board of health of the city of Hoboken has failed in its purpose to secure active measures on the part of the commission appointed under the provisions of the act of the Legislature, approved March 18th, 1890.

"3. Communications received by this board from the local board of Health of Hoboken, show that said local board is making no further effort for the abatement of said nuisance."

In view of the foregoing considerations, and because the health of a large number of persons dwelling in the city of Hoboken was believed to be endangered by the nuisance in question, the State Board of Health authorized counsel to bring the case to the attention of the Chancellor, in accordance with the provisions of Section II of an act passed May 24th, 1894, and ask for such an order for the abatement of the nuisance as the facts and the law may warrant.

This was done. In an opinion on demurrer by the railroad companies, Vice-Chancellor Pitney, after reviewing certain features of the bill, says :

“A vigorous attack in argument was made upon the constitutionality of the legislation which authorizes this suit. This legislation has been before the Court of Errors and Appeals several times; once in *Hutchinson v. Board of Health*, 13 Stew. 569, where the decision below had been in favor of the Board of Health and against the appellant, and the decree below was affirmed. Again, in *Butterfos v. Lambertville*, 13 Stew. 325, where a decree against the defendant was also sustained. In none of these cases was it suggested that the legislation was unconstitutional, and I am unable to see the least ground for this contention. It is within the jurisdiction of this court to abate nuisances, and the question at the hearing will be whether the nuisance is thoroughly established, so that the complainant's right is in doubt upon the facts. Neither can I see the least reason to doubt the power of the Legislature to invest the several boards of health, whether State or local, with the power to act in behalf of the public to abate nuisances which are an injury to the health of the public at large. The demurrer is overruled with costs.”

A decree was rendered by the Vice-Chancellor, November 23d, 1896, requiring the authorities of Jersey City to abate the nuisance within nine months, as follows :

“This cause coming on for final hearing in the presence of Charles L. Corbin, counsel for complainant; Spencer Weart and John A. Blair, counsel for The Mayor and Aldermen of Jersey City, and James F. Minturn, counsel for The Mayor and Council of the City of Hoboken, and witnesses having been examined and counsel heard :

“It is, on this twenty-eighth day of December, A. D. 1896, on motion of Collins & Corbin, counsel for complainant, ordered, adjudged and decreed that the bill be taken as confessed against the

defendants Edlow W. Harrison, Theophilus Butts and Michael T. Connolly, who have not filed any plea, answer or demurrer to the bill.

“And it is further ordered, adjudged and decreed that a public nuisance exists injurious to the public health within the territorial jurisdiction of the local board of health of the city of Hoboken, having a source and origin outside of the limits of such territorial jurisdiction, namely, the discharge from the sewer mentioned in the bill called the Ravine road sewer, on lands and streets in the city of Hoboken, of sewage collected in Jersey City by the public sewers of the city, and flowing into the Ravine road sewer, and that the defendant, The Mayor and Aldermen of Jersey City, are responsible for said nuisance, and are chargeable with the duty of abating the same; and the Court doth hereby order, adjudge and decree that The Mayor and Aldermen of Jersey City shall abate said nuisance within nine months from the date of this decree, and thereafter shall cease and refrain from discharging any sewage from said sewer, directly or indirectly, upon said lands and streets in the city of Hoboken, and that a writ of injunction do issue forthwith against The Mayor and Aldermen of Jersey City, their officers and agents, commanding them to comply with all and singular the premises so enjoined upon them.

“And it is further ordered that the complainants do recover their costs of this suit against said defendants, The Mayor and Aldermen of Jersey City; and the consideration of the decree to be made as to the defendants, The Delaware, Lackawanna and Western Railroad Company and The Morris and Essex Railroad Company, is reserved.

“Respectfully advised.

“H. C. PITNEY, V. C.”

INSPECTION OF TOWNS.

The accumulation of facts relating to the water-supply, sewerage, drainage, streets and public institutions in the municipalities of the State is progressing as fast as the inspection facilities of the board will permit. The records are made in accordance with the schedule printed on page 302 of the report of this board for 1895, and they are filed in the office of the board for ready reference.

THE MERIT SYSTEM OF APPOINTMENTS.

At a meeting of this board held April 10th, 1896, the following resolution was adopted :

Resolved: 1. That in future the appointments to the position of dairy commissioner, public analysts and inspectors, the State Board of Health shall take action in accordance with the principles and methods now regulating civil service appointments in like cases.

2. That the secretary be requested to present to this board a statement of the rules and methods which in his judgment shall best give effect to this resolution, and which shall embody the best practice now followed by State, municipal and medical examining boards.

In compliance with the foregoing requirements, the following preliminary report was submitted by the secretary:

"In the United States the methods which have heretofore been in operation for the selection of individuals to perform clerical and certain other duties in connection with the execution of public business, have constituted in many instances a system for the payment by successful politicians for favors received during campaign operations, and hence the appointment of incompetent persons has very frequently occurred.

"Every citizen is familiar with the difficulties which have attended attempts to root out this pernicious practice (the spoils system), but from a beginning first made in the bureaus of the National Government, the appointment of persons to the public service after examination into their fitness to perform the required duties (the merit system), has gradually grown into public favor until it is now a fixed principle in the administration of public affairs, and its application will doubtless ultimately extend to every department of National, State and municipal employment.

"In the State of New York, the merit system has been incorporated into the constitution, and enacted into law, and the civil officers of that State are being rapidly brought under the rules which govern this service. The advantages which attend this method of appointment are quite as valuable to the appointee as to the government, for under the tenure of office element no employee can be discharged merely to make way for a new political favorite, but every person thus employed may be discharged for cause only, and only after investigation and substantiation of charges. Improvement in the details of the system have been gradually going on, and the written, oral and practical examinations now conducted by commissioners selected for this duty effectually sifts out incompetent applicants.

"In accordance with the requirement of the foregoing resolution the following procedure is recommended:

"1. That a new standing committee be appointed in accordance with the provisions of section 10 of the by-laws, and that to this committee shall be assigned the duty of conducting suitable examinations for fitness in the case of all persons who may hereafter apply for appointment to any position within control of this board.

"2. That hereafter ever applicant for appointment by this board to any official position shall be of good moral character and shall make application in writing upon blanks furnished by the board.

"3. All examinations to be written, as far as possible, and all examination papers and ratings be preserved for reference.

"4. Appointments to be made from an eligible list of applicants, certified by the said committee to have passed a satisfactory examination in the line of service required.

"5. All applications should be submitted upon the blank forms furnished by the board, and they should include the following facts:

"Name of applicant. Age. Sex. Residence. Previous employment. (During preceding two years.)"

BACTERIOLOGICAL LABORATORY.

The laboratory for bacteriological diagnosis was opened in December, 1895, but the examination of specimens did not begin until April, 1896. Since that time 466 specimens have been received and the work of the institution is now actively progressing and the daily average number of cultures examined is steadily increasing. In the annual report of this Board for 1895, reference was made to the establishment of this laboratory, and to the philanthropic action of several public-spirited citizens in placing the finished and fully equipped laboratory building at the service of the State. During the session of the legislature for 1896 the State Board of Health presented to the Committee on Appropriations the desirability of providing the necessary funds (about \$3,000.00 per annum) for the maintenance of the service to be performed in this institution. Greatly to the surprise of the board the appropriation was not made. Funds from private sources have enabled the board to commence the work of the laboratory, and it will probably be continued on this basis until the next session (1897) of the legislature, at which time the board confidently expects that

an appropriation will be voted. Bacteriological examinations for diagnosis in cases of suspected infectious diseases are now of inestimable importance, and the field of usefulness promises to be still further extended. The advantage of being able to determine the character of the first case of an infectious disease is obvious. It assists the physician in reaching a conclusion in doubtful cases, and establishes his judgment upon an unmistakable basis, banishing guesswork from the diagnosis of certain affections, and enabling the health officers to intelligently enforce and limit isolation restrictions. The endeavor to obtain the consent of the U. S. postal authorities to use the mails for transmitting specimens of diseased tissues for bacteriological examinations, reference to which was made in the last report of this board, was granted and the following order has been issued:

Order No. 88. OFFICE OF POSTMASTER-GENERAL,
WASHINGTON, D. C., February 5th, 1896. }

Ordered, That the order of the Postmaster-General of June 1st, 1893, forbidding the use of the mails for the transmission of specimen germs of cholera, or other diseased tissues, is hereby modified to this extent:

Specimens of diseased tissues may be admitted to the mails for transmission to United States, State or municipal laboratories, only when enclosed in mailing packages constructed in accordance with the specifications hereinafter enumerated. Upon the outside of every such package shall be written, or printed, the words: "Specimen for Bacteriological Examination." No package containing diseased tissue shall be delivered to any representative of any of said laboratories until a permit shall have first been issued by the Postmaster-General, certifying that said institution has been found to be entitled, in accordance with the requirements of this regulation, to receive such specimens.

Specifications for the construction of packages for safely conveying through the mails pathological specimens for bacteriological examinations for diagnosis in cases of suspected diphtheria, tuberculosis, and other communicable diseases:

1. The receptacle for specimens of diseased tissues shall be a strong glass vial, having a capacity not greater than four drams. Said vial shall be covered and made water-tight by the use of a metal screw-cap and rubber washer. Said washer shall be at least one-eighth of one inch in thickness.

2. Said vial shall be placed, inverted, in a circular tin box. Said box shall be made of I. C. Bright tin-plate, and shall have countersunk bottom and soldered joints, and shall have the following dimensions, viz.: diameter, two and one-quarter inches; length, three and one-half inches. This box shall be closed by a metal screw-cover and rubber washer, and it shall be so packed with absorbent cotton that the glass vial contained in said tin box shall be evenly surrounded on all sides by said cotton, and said cotton shall be closely laid.

3. Said tin box shall be placed, inverted, inside of a larger tin box, similar to the one already described, but measuring two and three-quarters inches in diameter and four and three-eighths inches in length. Upon the inside of the

sides, top and bottom of this outer tin box there shall be at least two layers of porous, corrugated paper-felt, each layer to be not less than one-sixteenth of one inch in thickness. Said compressed paper-felt shall be attached to said tin box by an even layer of hot coal-tar pitch, or other equally adherent material.

WM. L. WILSON,

Postmaster-General.

The laboratory service is thus placed within the reach of every practitioner and health officer in the State. All specimens received at the laboratory (Princeton, N. J.) before 7 o'clock P.M. are ready for microscopical examination the following morning, and reports are forwarded, by telegraph or mail, as the sender of the specimen may direct, before noon. All specimens for examination at the laboratory must, if sent by mail, be enclosed in one of the specified mailing cases, and when the package contains writing, letter postage should be paid. These mailing cases will be sent to physicians and health officers upon request, and they can be obtained in the following places: Arlington, Asbury Park, Atlantic City, Bay Head, Bloomfield, Bound Brook, Bordentown, Bridgeton, Burlington, Belvidere, Camden, Cape May City, Elizabeth, Englewood, Flemington, Freehold, Gloucester City, Haddonfield, Hightstown, Hoboken, Long Branch, Moorestown, Morristown, Mount Holly, Millville, Mays Landing, New Brunswick, Orange Valley, Paterson, Phillipsburg, Perth Amboy, Plainfield, Riverton, Ridgefield Park, Rockaway, Red Bank, Salem, Somerville, South Orange, Trenton, Westfield, Williamstown, Vineland.

The work thus far accomplished in the laboratory has mainly related to the diagnosis of diphtheria and tuberculosis, but enteric fever has recently been added to the list of affections concerning which a positive diagnosis can be given.

STENCH NUISANCES.

Renewed attention has been given during the past year to several cases where offensive odors have seemed to demand action on the part of the local health authorities. Section XIII of the act approved March 31st, 1887, says: "That said local boards shall, within their respective jurisdictions, examine into all nuisances, foul or noxious odors, gases or vapors, and all causes of disease which may be known to them, or brought to their attention, *which, in their opinion, are in-*

injurious to the health of the inhabitants therein, and shall cause the same to be removed or abated." It is clear that the Legislature did not intend to grant the boards of health the authority, nor make it a part of their duty to remove or abate any nuisance unless it was injurious to the public health. The question to be settled therefore, before taking action in cases like that relating to the fat-rendering establishments on the meadows near Atlantic City, is whether the offensive odors are in fact injurious to the health of the inhabitants of the locality.

We may with reason claim that any considerable addition to or alteration in the normal composition of the air will have an unfavorable influence upon the health of persons who are subjected to the influences of such impurities, yet it is not easy to prove to the satisfaction of a jury that the offensive odors which are emitted in the course of fat-rendering and bone-boiling processes are injurious to the health of persons who may dwell a mile away from the works, or who may pass the establishment on the highway or on the railway. A complaint from Burlington county has called the attention of the State Board of Health to the nuisance caused by a chemical works situated in Mount Laurel township, and inquiry has shown that the odors escaping from this establishment are extremely offensive, but the board has no evidence to show that sickness has been or may be caused by the gases emitted. The health laws were not framed to deal with cases of this nature, and it is improbable that the courts will sustain attempts to suppress nuisances of this character under authority contained in these laws. The Grand Jury and the Court of Chancery are empowered to investigate such cases on complaint of any citizen.

LOCAL SANITARY ADMINISTRATION.

The act approved March 31st, 1887, has proved to be well adapted to fulfill the purpose in view when it was enacted. It has stood the test of many trials and under the operation of its provisions great advances have been made in the application of approved methods for preventing the spread of the dangerous communicable diseases, for the introduction of public water-supplies and sewer systems, and for the improvement of many of the other conditions affecting the public health in the various municipalities of the State.

This act still continues to be the most important and useful of all the so-called health laws, and if all of its provisions were faithfully and

intelligently executed by health boards and health officers, there would be little need of further legislation. The practical application of the principles of hygiene having become a highly developed art, the judicious enforcement of the laws and ordinances can only be successfully accomplished under the guidance of persons who have acquired familiarity with the science upon which the art rests, and one of the most urgent requirements which at present demands attention in connection with local sanitary administration in New Jersey is the improvement of this service.

It is in townships that there is greatest necessity for change in the present system for the selection and appointment of these officers, for under the township form of government the composition of the governing body is subject to annual re arrangement, and the health officer must often make room for some new appointee. Under these conditions good service is out of the question, and for their improvement the following suggestions are commended to the consideration of the legislature:

1. By law provide that in each township the sanitary authority shall be exercised by one official.
2. The chief local health officer in townships should be a graduate in medicine and be selected under civil service rules, and his term of office should be five years.
3. The examinations of applicants for the office of chief health officer in townships should be conducted by the State Board of Health.
4. The appointment of the chief health officer in each township should be made by the township committee from an eligible list furnished by the State Board of Health.
5. No township health officer should be removed except for cause, and vacancies should be filled for the unexpired term in the manner provided for original appointments.
6. Township health officers should conduct all official operations in accordance with rules and regulations approved by the State Board of Health, and they should make reports of their doings at stated intervals, and upon request, to said board and also to the township committee.
7. All suits for the violation of any local sanitary rule, regulation or ordinance should be begun at the instance of the township health officer, and they should be brought to trial by the prosecutor of the pleas of the county, but no such suit should be commenced until the

necessity for its being instituted has first been agreed to by the State Board of Health.

8. All sanitary inspectors in cities, towns, boroughs and villages, as well as in townships, should be appointed from an eligible list furnished by some duly authorized educational institution. The State Board of Health has long endeavored to find a way by which some instruction might be furnished to sanitary inspectors to prepare them for the duties of their office, and it is with great satisfaction that we can now announce that an arrangement has been made whereby a beginning in this direction will soon be inaugurated by the authorities of Rutgers college.

THE MILK-SUPPLY.

Under the laws which have thus far been enacted in New Jersey for the protection of the public against the injurious effects attending the use of contaminated milk, but little control has been exercised over the business of dairying, and many of the persons who are engaged in the production of milk for sale altogether disregard the health of their patrons and are heedless of the warnings which recent laboratory discoveries have given concerning the danger of conveying disease in unclean milk. In previous reports this board has drawn attention to the hygienic necessity of securing improvement in the management of dairy premises, and pointed out the advantage to the dairying interests of New Jersey which would follow a general elevation of the business throughout the State to a standard which would be recognized as excellent in the markets of the great cities. "Cleanliness" should be the motto of every milk producer and milk dealer, and the persons who conduct these industries should know that almost all of the diarrhoeal diseases of children are due to impure milk, and that consumers are willing to pay for an uncontaminated article.

During the last session of the legislature the following bill, prepared in accordance with suggestions made by this board, was introduced:

AN ACT to secure the registry of all cattle, and to secure the sanitary condition of cow stables and dairies, and to prevent the feeding to cows and certain cattle of unwholesome food.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. The local board of health of every city, township, borough, town and other municipality shall cause a registry to be made of all

cattle which are kept within the respective jurisdictions of the said local boards of health; said registry shall state the place where said cattle are kept, the number of said cattle kept in each place, and the number of milch cows which may be among said animals, and it shall be the duty of the owner of any such cattle, each year, in the month of May, to file with the local board of health a written statement, over his own signature, setting forth the facts hereinbefore required; and the said board shall cause said statement to be entered upon a book of registry, which shall be kept by said board for that purpose; *provided*, that no such registry shall be made by any such board until said board shall first have caused an inspection to be made of the stable and place where said cattle are kept, nor until the said board shall be satisfied that said stable and stable premises are in a good sanitary condition, nor until the said board shall be satisfied that the water supply of said premises is pure and wholesome; said book of registry shall at all times be open to the inspection of the state board of health and the state dairy commissioner and to their respective officers and inspectors, and every such local board of health shall, when in writing requested, furnish, under the hand of the clerk or secretary thereof, to the state board of health or to the state dairy commissioner, the facts set forth in said book of registry.

2. No person or corporation shall have for sale or sell any milk which is produced by milch cows which have not been registered in accordance with the provisions of section one of this act.

3. Any person or corporation who shall violate any of the provisions of the first or second sections of this act shall, upon conviction, be punished by a fine of fifty dollars.

4. Any person or persons who shall keep cows for the production of milk for market, or for sale or exchange, or who shall keep cows or other horned cattle for the purpose of raising or fattening them for human food, and shall keep such cows or cattle in an unhealthy or crowded condition, or feed them upon any house or hotel swill or garbage, or upon any substance in an impure, sour, fermented or putrified condition, shall be deemed guilty of a misdemeanor, and, upon indictment therefor and conviction thereof, shall be punished by a fine of not less than fifty dollars nor more than two hundred and fifty dollars, at the discretion of the court, and, if the fine be not immediately paid, shall be imprisoned in the county jail for not less than thirty days or until the fine be paid.

5. If any local board of health shall refuse or neglect to enforce the provision of sections two and four of this act, it shall be lawful for the state board of health and for the state dairy commissioner to prosecute the offender, and in cases where the prosecution is begun by an officer of the state board of health or state dairy commissioner, the fine or penalty shall be paid to the treasurer of the state.

6. All acts and parts of acts inconsistent with the provisions of this act be and the same are hereby repealed, and that this act shall take effect immediately.

This bill failed to pass, but public opinion is growing rapidly in reference to this subject, and it now seems probable that some measure for the better regulation of the dairying business, and for the advancement of the dairying interests, will soon become a law. Possibly some better method for securing the end in view may be proposed than that which is provided for in the foregoing bill, and it is to be hoped that the dairymen of the State will interest themselves in the details of the subject, and that they will agree upon the terms of a bill for presentation to the next legislature. The matters which should have consideration in connection with this subject may be summarized as follows:

1. Conditions under which milk is produced and transported are rarely under the control of the sanitary district in which the milk is sold.

2. The sanitary authorities in municipalities are not provided with means for obtaining information concerning the methods of management which are in operation on dairy premises located outside of the boundaries of their respective districts, and, therefore, milk which has been dangerously contaminated before being brought within the municipality may be sold and delivered without detection until disease, and perhaps death, has been produced by its use.

3. The laws for the protection of the public against dishonest milk dealers which have been enacted in the various States are mainly designed to fix a standard below which the quantity of milk solids shall not fall, and to thus limit the adulteration of milk with water. The sanitarian has little interest in this matter if he can have assurance that the water added is uncontaminated by disease-producing bacteria.

The real dangers lie (1) in the state of health of the cows; (2) in the stables in which the cows are kept and milked; (3) in uncleanly cans and utensils; (4) in the habits of the persons who do the milking and who handle the milk; (5) in the cooling process; (6) in the transportation, storage and distribution of the milk.

Few of these conditions are within the control of consumers or their local sanitary representatives.

4. Sanitary authorities in districts in which the production of milk is largely carried on are usually elected or appointed by the very men who are engaged in dairying, and it is unreasonable to expect officials thus created to lead in bringing about a reform in a business which is conducted by their constituents and patrons solely for the money which

can be made from it, and which is managed at a minimum expense under the methods now prevailing.

We must keep in mind the fact that the truths of bacteriology have only recently been demonstrated, and that the non-scientific mind, particularly in the case of an individual who has reached middle life, will not quickly comprehend nor admit the discoveries in this department of study, more especially when the practical application of these principles will cause an extensive revolution in his business.

In view of the foregoing considerations it appears to be essential that the supervision of the milk-supply shall be placed by law in the hands of a central sanitary authority in all cases where the milk is sold in a district other than the one in which it is produced.

Such supervision should embrace every detail connected with the production, handling, storage and transportation of the milk, and authority should be given to make and enforce proper provisions for the water-supply, drainage, ventilation, lighting and cleaning of all dairy buildings; to secure the isolation of cattle suffering from infectious diseases, and to prohibit and prevent the sale and transportation of milk which is unwholesome or which has been produced on premises where there is violation of said regulations.

The assistance, co-operation and education of local health authorities in preventing the production and sale of unwholesome milk can best be exerted by making a registry of all milch cows in the respective sanitary districts, together with a record of the conditions existing on all dairy premises. Such a registry and record should be corrected at least once every six months, and should show:

1. The number of cows and the places where they are kept.
2. The apparent state of health of these animals, and whether they have been examined for tuberculosis by the use of tuberculin, together with the result of the test.
3. The character of the water-supply of the dairy premises.
4. The location, surroundings, size, ventilation and lighting of each cow stable, and the floor space and the air-space allowed for each animal.
5. Disposal of excreta.
6. The food supplied to the cow.
7. The washing of cans, bottles and utensils.
8. The cooling and storage of the milk.

9. Health of the person dwelling on the dairy premises, and of the employees who assist in handling the milk.

An opinion recently rendered by an attorney for one of our local boards of health asserts that the act approved March 10th, 1882, has been rendered void by the enactment of several laws relating to the government of municipalities, and, this being correct, it therefore appears that urgent need exists for legislation which shall regulate the production and sale of milk.

LOCAL BOARDS OF HEALTH.

The degree of protection afforded by local boards of health in various parts of the State against the spread of disease, the use of impure water and food, and against the existence of nuisances injurious to the public health, continues to exhibit striking contrasts. In one district the energies of the board are well applied and result in the promotion of health and the prevention of sickness, while in an adjoining district there may be complete cessation of all endeavor to serve the public interests, or perhaps such injudicious attempts are made to execute the laws and ordinances that only dissatisfaction and failure can result. No single factor is so largely accountable for the varying efficiency of the work of local boards of health as the degree of the ability and industry of the paid employees. These officers represent the board in almost all of its dealings with citizens, and an incompetent inspector will quickly be found out by the public, and the influence of the board will diminish in proportion to the ignorance and lack of tact exhibited by the board's agent.

In Paterson, the local board has secured the construction of a finely equipped and well-located isolation hospital, a description of which appears elsewhere in this report. This institution is not excelled in its appointments by any similar establishment in this country, and we trust that numerous other communities will, in the near future, also provide this essential means for successfully dealing with small-pox and diphtheria. Only experienced health officers seem to realize the difficulty of maintaining isolation of patients outside of hospitals. Even where dwellings are placed under guard, there is still some way found for communication, and the spread of the disease goes on. The popular dread of small pox greatly assists boards of health in securing isolation in cases of this affection, but unfortunately the same fear of

diphtheria does not prevail, although small-pox kills but ten to twenty victims a year in this State, while diphtheria destroys from twelve hundred to sixteen hundred during the same period. During the seventeen years, 1878-1895, the mortality from small-pox in New Jersey was 830; from diphtheria it was 23,905. If every community was provided with an attractive and well-managed isolation hospital where cases of the dangerous infectious diseases could be cared for when necessary, then better progress towards the control of these affection, especially diphtheria, would speedily follow. In one locality in the State several local boards have joined in the erection of a hospital for the treatment of infectious diseases, and thus have minimized the cost for each district.

The neglect of vaccination throughout the State seems to be increasing, and local boards of health should use their best efforts to keep before parents and physicians the public necessity for obtaining and renewing the protection afforded by this precaution. The attention of the district clerk in every school district should especially be called to this subject by local boards of health, and boards of education should be urged to require vaccination before any pupil or teacher shall be admitted to the public schools. Sections 22 and 23 of the act approved March 31st, 1887, are as follows:

22. *And be it enacted*, That any board of education, school trustees or other body having control of the public schools may, on account of the prevalence of any contagious disease, prohibit the attendance of any teacher or scholar upon any school under their control, and may specify the time during which such teacher or scholar may remain away from such school, and may prohibit the attendance of any unvaccinated child who has not had the small-pox, and shall also have power to decide how far re-vaccination shall be required, if a case or cases of small-pox have occurred in the city or district.

23. *And be it enacted*, That at the enrollment of the children by the clerk of the school districts in the townships of this state, or by other proper officers in the cities or municipalities, inquiry shall be made as to how many of the children within the school age are unvaccinated, and the same shall be designated by a mark on the said roll, and in case any are found to be unvaccinated whose parents desire them to be protected from small-pox, and who, in the judgment of the board of education or the trustees of the school districts, are unable to pay therefor, the clerk of said district, or other authorized persons, may give to the said child or children a permit to appear at the office of any regularly licensed physician in said district or municipality to be vaccinated, and such physician, on presentation of said

permit, with his certificate appended thereto that the said vaccination has been successfully performed by him, shall be entitled to receive from the said township or local municipal authority the sum of fifty cents for each case so certified, and the same shall be paid in the same manner that other bills for current expenses are paid therein.

The attention of local boards of health is called to the following opinion, which was recently expressed by a high legal authority :

"I have grave doubts as to the constitutionality of the second section of the act approved February 25th, 1889, which attempts to authorize the local board of health, by resolution, to delegate its powers to any member of the board, or any officer thereof, when the board is not in session. It seems to me quite probable that the courts might hold that such attempted delegation of authority is beyond the power of the legislature." It therefore seems advisable that local boards of health shall refrain from delegating to one of their members the authority granted under the health laws, and in cases where a resolution has been adopted delegating to any member or officer any of the powers of the board, it will be advisable to rescind such resolution. The State Board of Health has been advised that the act approved March 22d, 1895, does not define as clearly as it is desirable that it should, the person or party who may institute a suit to recover any penalty incurred under the provisions of the act. The fifth section provides that the penalty may be recovered "in an action upon contract in any court of record within this State for the use of the State of New Jersey." It appears that any person may maintain a suit for the recovery of a penalty incurred under the provisions of the act, but it seems advisable that the law should make it the duty of the local board of health to institute such proceedings, and that the fifth section should also be amended to provide that in cases where any such suit is begun by a local board of health that at least one-half of the penalty shall go to the board by which the suit is instituted.

HYGIENIC SUPERVISION OF SCHOOLS.

About twenty-eight per cent. of the population of the State of New Jersey are within the age period 5—20, and a very large proportion of these persons are pupils in the public schools. The laws compel parents to send their children to either public or private schools, and it therefore becomes the moral duty of the State to inquire into the

healthfulness of school buildings and premises, and to prevent these institutions from becoming centers for the distribution of the germs of infectious diseases. Conditions which tend to cripple the energies and to shorten the lives of the children should not be allowed, and the system of education should be so adjusted that it will increase the health and strength, as well as the knowledge and intelligence of the rising generation. The grouping together of large numbers of children in school buildings and on school playgrounds necessarily favors the spreading of certain communicable diseases, and the methods by which the infection is conveyed should be understood by the persons who are entrusted with the supervision of the schools. Measures for the early detection of infected pupils, and for the exclusion of those who are affected by the dangerous communicable diseases, should be promptly, faithfully and skillfully employed.

In the city of Boston the epidemic of diphtheria in 1894 led to co-operation between the school authorities and the health department for the establishment of medical examinations of school children. The medical inspectors of schools in that city visit each school daily, during the early part of the morning session, and examine all pupils who complain or who appear to the teachers to be ill. If an inspector finds a pupil showing symptoms of any communicable disease, or is otherwise too ill to remain in school, he advises the teacher to send the pupil home for the temporary observation of the parents or family physician. In 1879 Paris established medical inspection of schools, with periodical reports upon the ventilation, light, heat, cleanliness of rooms and furniture, and upon the health of the children. New pupils are examined upon entering and a record of their physical progress is kept. In Antwerp and Brussels there has also been progress in this department of public hygiene.

The State Board of Health has been in communication with the State Board of Education in reference to this subject, and it seems highly probable that some line of action will be adopted which will have for its purpose the exercise of greater care of the health of school children. The following letter shows the position of this Board in regard to this matter :

OFFICE OF THE BOARD OF HEALTH
OF THE STATE OF NEW JERSEY,
TRENTON, December 23, 1895. }

Jas. Owen, C. E., Chairman State Board of Education :

DEAR SIR—The enclosed memorandum, suggesting steps to be taken by school officers and teachers for preventing the spread of infectious diseases, is

submitted for the consideration of your board. The increasing mortality from diphtheria in this country, and the widespread prevalence and virulence of the epidemics which are at present sweeping through this State, call for the best efforts of health boards and school boards to restrict the progress of this pestilential, but wholly preventable, affection. The law (section 2, sub-section 1, of an act to establish of public instruction, approved March 27th, 1874), seems to authorize your board to make regulations to promote the physical as well as the intellectual interests of pupils.

Yours truly,

HENRY MITCHELL,
Secretary.

MEMORANDUM.

Suggestions for Rules and Regulations for the Prevention of the Spread of Infectious Diseases in the Public Schools.

1. Every pupil and teacher enrolled in any public school in the State of New Jersey shall give satisfactory evidence of protection by vaccination.

2. The date when protective vaccination was secured shall be entered with the name in a record-book kept for that purpose. Re-vaccination shall be required as often as once in five years.

3. Persons affected with diphtheria, membranous croup, scarlet fever (scarlatina, scarlet rash), small-pox, varioloid, measles, whooping-cough and mumps shall be excluded from the schools until permission for their admission is given by the local health authority, and all persons from families where any of said diseases exist shall also be excluded.

4. Every school teacher and school officer having knowledge of any case of contagious disease shall immediately report the same to the local board of health.

Especially Precautions to Prevent the Spread of Diphtheria.

5. In all cases where any pupil exhibits any of the signs of sore throat, and where there is swelling of the glands of the neck and feverishness, and in cases where there is pain in the ears or unusual difficulty in articulating, the child shall at once be directed to return home.

No such pupil shall be again admitted into any public school until a written certificate is submitted from the local health authority showing that such pupil is not affected by any communicable disease, or until other satisfactory evidence shall be furnished.

6. In cases where one or more pupils who may be attending, or who may have recently attended, any public school, shall become affected by diphtheria, the following precautions shall at once be instituted:

a. The exclusion from the school of all pupils sick with diphtheria and also of all persons who dwell in the apartments occupied by the sick, or who have been exposed to the infection of the disease.

b. Each day during the continuance of the outbreak, after the school has been dismissed all doorknobs, doors, casings, railings and all other woodwork, ironwork, seats, desks and furniture that may be within reach of the children shall be scrubbed with hot water, soap and a stiff scrubbing-brush.

c. The floor should be free from open cracks and crevices, and it should be sprinkled daily before being swept.

d. Lead pencils (there should be no slates) should every day be immersed in a five per cent. aqueous solution of carbolic acid, and be wiped dry.

e. During the continuance of the disease, books and other articles should not be passed from hand to hand. Books and other articles which have been used by a pupil affected by diphtheria shall be disinfected by exposure for three hours to formaldehyde gas applied in a closed box.

f. All public drinking-cups should be removed.

DISPOSAL OF REFUSE.

It may be accepted as a guiding principle that garbage has no commercial value. This position is certainly correct so far as the question relates to small cities and towns, and it is also true with reference to summer resorts. Even if the reclamation of the fat and the utilization of the remainder of the garbage for the adulteration of fertilizers can be made profitable where great quantities are handled, it has been conclusively shown that all garbage is so poor in fats during the summer season that the quantity is not sufficient to warrant treatment, and in the case of small communities the cost of the necessary plant for separating the fat is too great to leave any margin for profit from the quantity of garbage produced. Cremation, therefore, becomes the only method worth considering at present for the sanitary disposal of garbage in the thickly populated portions of the State. In too many districts in the State it is still the practice to get rid of

garbage by dumping it into an adjoining township, there to create a festering nuisance. Local boards of health have a serious responsibility in this relation, and it should not be enough for them to get the stuff out of their own territory, but they are morally bound to use their best efforts to cause it to be disposed of in a manner which will give no offence to neighboring communities. The problem in regard to garbage disposal which should most concern health boards is the selection of the best furnace for its inoffensive destruction. The disposal of rubbish receives less attention than it deserves. It is too often used to fill vacant lots and to make roads. Doubtless the mixture of refuse materials which we call rubbish is a possible source of danger at all times, and when infectious diseases exist on the premises, the chances are that the rubbish-barrel will receive a share of the discharges. Nothing but fire will render rubbish safe, but its destruction in this manner gives much annoyance on account of its bulk. Few garbage furnaces are so constructed that they can successfully burn rubbish, but in almost all localities a place can be found where it can be burned in an open fire without creating offence because of the smoke.

CONTAGIOUS DISEASES OF ANIMALS.

This department is under the supervision of E. R. O'Reilly, M.D., a member of the State Board of Health. Following is an extract from a report by A. Clark Hunt, M.D., Inspector:

"In accordance with the requirements of the laws placing the care of contagious diseases of animals under the supervision of the State Board of Health, all cases that have been reported have received prompt attention. Although we anticipated a return of anthrax in Cumberland county on account of the extensive epidemic last year, but five cases were reported from that vicinity. Report was received of one case of supposed infection of a man from handling an animal affected by anthrax. As a result of the extensive inoculation last year and the increased knowledge of safe methods of burial of animals dying of this disease, we have reason to hope that there will not again be an epidemic so far-reaching and destructive as that of 1895. Twelve cases of tuberculosis in cattle were referred to the Tuberculosis Commission. An outbreak of hog cholera at Hasbrouck Heights, Bergen county, was referred to the Secretary of the Board of Agriculture. Forty-five cases of glanders have been reported to us, and

of this number five, upon examination, showed no evidences of the disease, and six had been killed some time before report was made. In the remaining thirty-four cases prompt action was taken. The animals were destroyed and premises disinfected. The most extensive outbreak occurred in a stable located on Broome street, Newark. This stable was kept for boarding horses, and the first case was discovered at the rendering works where the animal had been destroyed. Careful examination of animals which had been exposed led to the destruction of four of them. It was thought best, under the circumstances, to inoculate all the animals with mallein, and in this way it was ascertained that five others had contracted the disease. After these had been destroyed the stable was thoroughly disinfected and no new cases have been reported.

Dr. Runge, of Newark, was authorized by this board to enforce the quarantine, inoculation and disinfection in this case, and it was also necessary to call to our assistance several of the sanitary inspectors of the city of Newark to aid in maintaining quarantine. Dr. Herbert Lowe, of Paterson, reported two cases of inoculation of men caused by handling a horse suffering from farcy.

The year has been one in which glanders has been more prevalent than usual, but in every instance where cases have occurred prompt destruction of the animals and disinfection of premises where they were located has limited the extension of the disease.

PUBLIC WATER-SUPPLIES.

The polluted condition of the Passaic river during the past few years should prove a sufficient warning to communities depending upon the other rivers of the State for water for potable use, and lead to the adoption of some adequate measures for the protection of these streams from further defilement. This board has repeatedly called public attention to the necessity for preserving the purity of the rivers and water sheds which are now used or which may hereafter become available for use as sources of water-supply, and it has strongly urged that crude sewage and other filthy fluids should no longer be permitted to discharge into any water-course which is liable to be needed for supplying water for public uses. The investigation now being conducted by the Passaic river commission will doubtless bring the general question of river pollution prominently before the

citizens of the State, and a popular study of the subject may thus be obtained. As matters stand at present each city and town disposes of its sewage in the manner which is judged by itself to be suitable, and the rights of persons further down stream are not always respected.

In a recent decision in the State of Connecticut the court declared "that the sewerage of the city of Danbury into Still river, fouling the stream, created a public nuisance in a double aspect, as it polluted both the air and the stream; while in addition, as it filled up the mill-pond of Morgan, the plaintiff, it created a private nuisance. It is perfectly proper, he says, that an injunction should be so framed as to protect the plaintiff against every serious and irreparable injury. In such a case also it is not sufficient for the defendant (the city of Danbury) to allege that when discharged after chemical treatment the sewage is innocuous, for, although colorless, sterilized and apparently innocuous, it may yet, by combination with other substances in the river, become injurious. In such cases must be considered not merely the nature of the deposit, but of the place where it is deposited.

The court also holds that when different parties by several acts thus injure the stream, each may be enjoined against the commission of wrong, and closes this part of its finding with the sweeping sentence: "If the stream is, from whatever cause, in such a condition that to discharge its sewage there works a nuisance, the city has no right to use its waters for that purpose."

"Money compensation," the court holds, "is not adequate, and it is sufficient that the Superior Court believed the evils were such as could not be redressed by action for damages."

PREVENTION OF BLINDNESS.

About one-fifth of all cases of blindness occurring in early life are due to the infection of the infants at the time of birth, and in nearly every such case the destruction of the eyes can be prevented by the prompt employment of suitable remedies. To prevent the disastrous consequences of ignorance and neglect on the part of midwives, nurses and other attendants, the legislature enacted chapter 118, laws of 1895, and it is to be hoped that local boards of health will in every instance perform the duty required of them by section 2 of this act. As soon as it may come to the knowledge of any health officer that

any young child is suffering from inflammation of the eyes, and when no qualified physician is in attendance, the parents or persons having charge of the infant should be informed that the disease is curable if treatment is begun early, and the health officer should advise that the child should at once be placed in the care of a registered practitioner of medicine. If the family cannot pay for the necessary service, then the child should be cared for by the medical officer employed by the municipality.

CIRCULARS.

Two new circulars have been issued during the past year. Circular 87 contains general instructions for preventing the spread of diphtheria, scarlet fever, typhoid fever and small-pox. Circular 88 consists of a collection of the laws of New Jersey relating to the public health. The latter is provided with an index and it will doubtless prove very useful to local boards of health.

Very respectfully,

HENRY MITCHELL,
Secretary.

Summary of Reports from Local Boards of Health.

The following memorandum was sent to the secretaries of all local boards of health :

Board of Health of the State of New Jersey.

TRENTON, September 1st, 1896.

To Local Boards of Health :

Section 37 of Chapter 68 of Laws of 1887 reads as follows:

37. *And be it enacted*, That the local board of health of every township, city, borough, town and other municipality, shall, on or before the first day of October in each year, in addition to other reports required, prepare an annual report of the condition of the public health within the limits of its jurisdiction, stating therein any special cause for the deterioration of health or of hazard thereto, and shall therein answer any inquiries which may have been addressed to such local board by the state board of health, and such local board shall forward a copy of such report to the state board of health on or before the fifteenth day of October in each year.

AN ACT APPROVED JUNE 15TH, 1895, REQUIRES THAT THE ANNUAL REPORT OF THE STATE BOARD OF HEALTH SHALL BE PRESENTED ONE MONTH EARLIER THAN HERETOFORE. LOCAL BOARDS ARE THEREFORE URGENTLY REQUESTED TO PLACE THEIR REPORTS IN OUR HANDS AS EARLY AS POSSIBLE, AND IN EVERY CASE TO FORWARD THEM NOT LATER THAN OCTOBER 15TH.

The report blanks, with schedule of subjects, are not sent out this year, but each local board is requested to include replies to the following inquiries in the usual report to be made in accordance with the provisions of the statute above quoted.

INQUIRIES FOR 1896.

1. Names and post-office addresses of members and officers of the local board of health.

2. Is house-to-house sanitary inspection regularly performed? Is a record kept of such inspections?
3. Is there any serious defect in the water-supply or sewer system of your district?
4. Has there been any new construction or extension of water-works or sewer works?
5. Is plumbing (in municipalities) performed in accordance with the provisions of chapter 56 of the laws of 1888?
6. How is garbage, night-soil and cess-pool contents collected, transported and disposed of?
7. Any infectious diseases among animals?
8. Have all cases of communicable diseases been reported to your board by physicians as required by chapter 260 of laws of 1895?
9. Does your board furnish to physicians printed blanks for reporting communicable diseases?
10. Has a record been kept by the secretary of your board of all cases of communicable diseases, as required by section 2 of chapter 260 of laws of 1895?
11. Has a weekly statement of all reports of communicable diseases been regularly transmitted to the State Board of Health, as provided for in the act above referred to?
12. Has gratuitous vaccination been offered to the public by your board during the past year?
13. Has provision been made in your district for isolating cases of diphtheria, small-pox, etc.?
14. What trades or occupations are injuring the health of operatives?
15. Are there factories from which odor or refuse causes a nuisance?
16. Is there any inspection of dairy premises in your district?
17. Is there any inquiry by your board into the adulteration of foods?
18. Is kerosene oil tested? Have any accidents occurred from its use or from the use of gasoline?

Local boards are requested to transmit, when forwarding the annual report, a copy of all ordinances, rules and regulations which have been adopted during the past year.

The State Board of Health desires to publish a comprehensive abstract of the reports of local boards, to show what degree of progress each sanitary district is making in the promotion and protection of

the public health, and to this end local boards are requested to make a clear statement of the needs and sanitary defects of their districts, as well as to record the local hygienic advancement and give an account of official duties performed.

HENRY MITCHELL, M.D.,
Secretary.

The original schedule of subjects suggested for the reports of local boards and heretofore sent out each year, is as follows:

- | | |
|--|---|
| A. Location and population. | N. Almshouses, hospitals and other charities. |
| B. Geology, topography and contour. | O. Police and prisons. |
| C. Water-supply. | P. Fire-guards or escapes. |
| D. Drainage and sewerage. | Q. Cemeteries and burial. |
| E. Streets and public grounds. | R. Public health laws and regulations. |
| F. Houses and their tenancy. | S. Registration and vital statistics. |
| G. Modes of lighting. | T. Quarantine or care over contagious diseases and vaccination. |
| H. Refuse and excreta (how managed). | U. Sanitary expenses. |
| I. Markets. | V. Heat and ventilation for dwellings. |
| J. Diseases of animals. | W. Prevalent diseases of the year. |
| K. Slaughter-houses and abattoirs. | |
| L. Manufactories and trades. | |
| M. School-houses and other public buildings. | |

The following questions have been published from year to year to indicate some of the details relating to sanitary supervision which the local boards of health should learn and record.

- Area of the sanitary district?
- Density of population?
- Natural drainage?
- Needs for additional drainage?
- Are there ponds or stagnant pools or any other interferences with proper drainage?
- Is there a sanitary map, showing the location of all underground pipes and the contour of surface?
- In cities is foresight had as to public parks?
- Are there any free baths?
- Have you facilities for dealing with cases of small-pox, typhus fever, &c.?
- Is there any sanitary inspection of school-houses or other public buildings?
- What trades or occupations are injuring the health of operatives?
- Have factories any system of ventilation?
- Are there factories of which the odor or refuse is a nuisance?
- Are there slaughter-houses which are a nuisance?
- Is there any inspection of stables?
- Is there any inquiry into the adulteration of milk, of food, or of drugs?

Is kerosene ever tested? Are there accidents therefrom?

Is a record kept of diseases, or of deaths and their causes?

Do you aid the assessor or city clerk in securing the returns of marriages, births and deaths?

Is vaccination systematically secured?

Does the health inspector regularly report to you any condition which he regards as hazardous to the public health?

HOUSES.

Conditions of cellars and basements?

What fire-escapes or provisions against fire?

Condition of tenement-houses, railroad stations, assembly-rooms, school-houses, &c.?

Water-supply of each house?

Any cesspools which have been filled up?

How near are cesspool, well and privy vault?

Is there outside ventilation between the house-pipe system and the cesspool or sewer?

Is there a trap between it and the cesspool or sewer?

Sewers—Is their condition thoroughly known? Are they ventilated?

Are house connections watched and carefully superintended when new buildings are erected or when changes are made?

How is storm-water disposed of?

How are ashes, garbage, rubbish and night-soil disposed of?

It is both a privilege and a responsibility to be a member of a local board of health; a privilege because it enables one to do much to prevent disease, and a responsibility because we have the evidence that neglect on the part of local boards has often caused a great prevalence of sickness and the spread of epidemics. We find now and then a board that sees nothing to do, and then, again, a board, in a locality very similar, that does much in removing the causes of disease or in diminishing the number of cases that occur.

This State has plain, excellent and ample laws, giving large powers to local boards of health for preventing or abating nuisances, and in other ways guarding and promoting the health of the people.

It is always best for all boards of health to pass ordinances, since then the people understand what is required, and it is easier at once to collect a fine for disobedience of an ordinance than it is to abate a nuisance and then collect the expense from the offending party.

The townships, as well as cities, boroughs, etc., need a health inspector, care being taken that he not only helps to abate evils to health, but to prevent them. An inspector should always make a written report of the visits he has made and of the work he has done.

It is rarely necessary for an entire board to view a nuisance. (See chapter 68, laws of 1887, sections 31-35, and chapter 213, laws of 1892, section 2.)

Experience is constantly illustrating how necessary sanitary authorities are, and how their importance is recognized, especially in times of epidemic.

Each spring the township health boards should carefully consider any conditions injurious or hazardous to health, and the need of examination of houses or neighborhoods. We have cases where assessors, interested in the public health and having informed themselves as to sanitary matters, have been of great service by their inquiries and advice as they visit for assessment.

In cities the boards need to be fully informed as to the existing evils, and to apply the law as to the inspection and plumbing of buildings.

Great attention should be given to cases of diphtheria. Prompt isolation of cases of diphtheria will do much to prevent the spread of this disease in schools and families.

We always send our reports to the clerk or secretary for the use of the board, and are glad to send circulars or reports, as far as we can, to other members of the board. They should be carefully preserved.

Under the law every municipality and every township must have its board of health. (See Circular 60.)

The board in townships consists of the township committee, the assessor and the medical member of the board.

I. The board should have accurate organization, so as to meet at a stated time, having its chairman and secretary, and keeping a record of its proceedings. Its rules of order are the same as other boards met for the transaction of public business.

II. It is not merely a board to hear complaints, but to get an accurate idea of evils which cause, or are known to prepare the way for, sickness and death. In one place it may be undrained land, so saturated with water and vegetable matter as by changes in temperature and moisture to give rise to fevers; in another locality it may be poor water-supply or defective sewers, or the want of a sewer system; in another, the careless disposal of garbage; in another, too near proximity of wells and outhouses; in another, cesspools which soak the ground with filth. But in any case, such a board should be one of inquiry, to collect accurate facts and deal with real evidence.

In most boards will be found some one who knows how to collect and study facts, or keep them on hand until enough are gathered to make them useful for study.

III. Such a board needs to keep a record from year to year of the localities where sickness and death have occurred, and the causes thereof; to know the number of children born and living in each district, so as to know the age of the material subject to disease, and various other facts which, when observed with care, over a sufficient period, lead to conclusions as definite as those derived from a study of any other of the courses of nature.

Such a board has great value as an educator of the public in the avoidance of the causes of ill health. It is in a position to advise and to acquaint the public with the various laws as to the prevention and abatement of evils prejudicial to health. Many bad household and town arrangements are those of ignorance, and are easily corrected when a better way is shown. The board can also, by its circulars, ordinances and instructions, deter many from the infringements which would otherwise occur and thus prevent disease. All boards need to have a sanitary inspector, upon whose good judgment and knowledge they can rely for the correction of many evils as well as for the enforcement of the law when necessary.

IV. Ordinances are valuable as warnings or as defining more closely the scope of the law, as well as a means of more fully adjusting the privileges granted by the law to the needs of each community. Many of the provisions of the act approved March 31st, 1887, are not operative until they are adopted or approved by ordinance. The so-called health laws and the ordinances made in conformity with these laws do not supersede common law. They provide speedy modes of riddance, leaving any question of trespass to be decided afterward.

It is important that summary legal powers should be exercised in all that class of cases in which the usual process of courts would be too tardy, and by inquiries and investigations and recommendations boards of health should further all efforts made under common law or under statutory provisions for promoting the public health, so far as its protection falls under such jurisdiction.

The duty of discovering and exposing evils, of suggesting relief, of making recommendations, and of giving information, is an important one. Boards of cities and townships do much to prevent and abate

evils by the very facts which are brought out in their discussions and by turning public attention to existing evils.

In repeated experiences with small-pox and other diseases, new evidence has been furnished showing how necessary it is to have sanitary authorities in all localities, so that when any case of contagious disease, or any nuisance hazardous to health occurs, there may be no delay. The citizens of each precinct have the right to be able at once to find some authority charged with the duties specified in the law.

The law makes full provision for all necessary expenses. (See chapter 68, laws of 1887, sections 34 and 35. See Circular 60, page 34.)

Health boards have an important duty in co-operating with the city clerks or assessors in securing complete returns of marriages, births and deaths. With these properly returned, we are able to state from year to year, or through longer periods, the health of any locality. Thus any hearsay as to healthfulness or sickness can be corrected, and if any disease is found to prevail above a general average we detect causes and correct them.

The progress of population and the causes affecting the growth of sections can be studied in the interests of political economy and social advancement. It is thus that whole communities have their health interest under supervision. As health is capital and wages, we thus look after a great condition of success. There is no more important census of population. It can only be secured at the time the events it records are occurring. If left to the end of the year or for semi-decennial record, experience shows that the results are too imperfect for study.

It is important that records of meetings and a copy of reports be kept in the local health books. This aids in future study. The State index and transcriptions of marriages, births and deaths which is kept in full at our office, furnishes data for comparison, and enables localities to know their condition and what evils they need to guard. Cities only need to transcribe the age, sex, date, number of street and cause of death, and to see that the blanks sent for record are promptly filled. City clerks and boards of health should be able to tell each death that has occurred in any house through a series of years, and thus find out local causes of disease.

The several reports of this board clearly indicate the work to be done. Local boards must see to it that all circulars, reports, &c., sent

are not carelessly retained by assessors or others, but passed over to each successive board.

In addition to the duties indicated, local boards should notify us of any contagious diseases among animals, with the names and post-office address of owners. The laws against adulteration of foods and drugs, against poor kerosene and many others, come under the care of these boards.

The requirements of chapter 260 of the laws of 1895 should be carefully complied with by every local board, and physicians who violate section 1 of this act by refusing or neglecting to promptly report every case of infectious disease should be brought to trial by the local board of health for the penalty of fifty dollars.

Where the address of the members and officers of local boards of health is not given in the following summary of reports, they may be reached by mail through the post-office in the town from which the report is made.

ATLANTIC COUNTY.

ABSECON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

E. H. Madden, M.D., Clayton L. Higbee, Elmer C. Bates, John W. Cordrey, Daniel Walters, Jr., Secretary; Japhet Adams, John S. Hackett.

No contagious disease has been reported.

ATLANTIC CITY.

NAMES OF MEMBERS AND OFFICERS.

Wm. G. Hoopes, President; Henry S. Scull, Secretary; Joseph H. Borton, Treasurer; Wm. B. Loudenslager, M. D. Youngman, M.D., Julius Coty, Wm. F. Koeneke, Walter Reynolds, M.D., Health Inspector; Aaron Hinkle, Plumbing Inspector; Mahlon C. Frambes, Assistant Health Inspector; John S. Westcott, Solicitor; Alfred T. Glenn, Registrar of Vital Statistics.

House-to-house inspection is performed annually and a record of such inspections kept.

The water-supply is excellent, being derived from two sources, viz., spring water from the mainland, and water from artesian wells upon the island. Water from these two sources is now being supplied with perfect satisfaction from a sanitary standpoint; diarrhœal diseases of children and other diseases produced by impure drinking-water being very rare amongst the resident population.

ATLANTIC COUNTY—Continued.

The sewer system is not quite satisfactory to the board. The filtering beds upon the meadows do not accomplish all that could be desired. The board is at present engaged in correspondence with the company operating the sewerage plant with a view to remedying the defects, and has employed an expert (Moses N. Baker, C. E.), who, after having thoroughly studied the system, has presented a report to the board embodying his views and suggesting plans for improvement.

There has been no new construction or extension of water works or sewer works.

Plumbing is performed in accordance with the provision of chapter 56 of the laws of 1888.

Garbage is collected daily in June, July, August and September, tri-weekly at other seasons. Collections are made in specially constructed, water-tight, iron wagons, and the garbage conveyed to the crematory and incinerated.

A great improvement in the operation of the garbage crematory has been effected by the employment of skilled gasmakers (white men) in place of the former indifferent colored help.

During the month of August, of this year, the average daily amount of garbage consumed was sixty (60) tons (largest amount in one day, 115 tons), and although the plant is situated in a closely-built-up section of the city, so thoroughly was the work of incineration performed that not a single complaint of offensive odor or other form of nuisance was received from any source. The board indulges the belief that this is the ideal method of disposing of garbage when sanitation is considered. Extensions to the plant are contemplated for the ensuing year.

Night-soil and cesspool contents are collected and transported by the odorless excavator system and the matter composted outside of the city limits. The firms engaged in the work are required to procure a license from the Board and to have a permit for the emptying of each cesspool and privy.

There have been no infectious diseases of animals in our city during the past year.

All cases of communicable diseases are reported to the board.

Printed blanks are furnished to physicians for reporting communicable diseases, and a record of such diseases is kept.

ATLANTIC COUNTY—*Continued.*

Owing to a misunderstanding, consequent upon a change of officials, weekly reports of communicable diseases have not been transmitted to the State Board, but such will be done regularly hereafter.

Gratuitous vaccination has not been offered by this board during the past year. Children are not admitted to the public schools without evidence of having been successfully vaccinated.

A hospital is maintained by the board for the isolation of cases of diphtheria, small-pox, &c.

There are no trades or occupations known to the board which injure the health of the residents of this city.

A bone boiling factory, outside the city limits, situated in Egg Harbor township, has caused a great nuisance in a part of our city by the offensive odors emanating therefrom when the wind is in a certain quarter.

The local board being unable to secure the abatement of this nuisance, and the Egg Harbor township board having thus far failed to render us any assistance, the matter has been referred to the State Board.

There are no established dairies in this city, our milk-supply being derived from the mainland.

Kerosene oil has not been tested in the past year. No accidents have occurred from its use. The use of gasoline is prohibited by city ordinance.

Probably the greatest sanitary defects in this city are the existence of improperly constructed privy vaults and cesspools connected with the smaller houses in the older portions of the town. In many of the cheaper houses no provision whatever is made for the disposal of waste-water, the occupants being compelled to throw dish-water, &c., into the back yard or into the street or under the house. The house-to-house inspection last spring having revealed this exceedingly unsanitary condition, efforts were made to secure abatement of these nuisances, with the result that about three hundred of these houses have been connected with the sewer; hopper closets and kitchen sinks being supplied, and the plumbing of these being carefully inspected. This work is still going on, and several suits against property owners to enforce these improvements are now pending. The aid of the courts has been invoked up to this time against some eighty individ-

ATLANTIC COUNTY—*Continued.*

uals, and judgment has been invariably obtained in favor of the board.

The act of the last session of the legislature, approved May 12th, authorizing boards of health to enforce the connecting of all properties to the sewer along the line of such sewer, has been incorporated into the sanitary code of this city, and its provisions will be taken advantage of to their fullest extent.

Greater promptness on the part of physicians, ministers, justices of the peace, and others, in reporting births, marriages and cases of communicable diseases, has been secured by sending monthly, or oftener if required, stamped, addressed envelopes for the purpose of forwarding returns.

Special attention is given by the inspector to the prompt isolation of cases of communicable diseases, and to the disinfection of infected houses.

Another precaution taken is the notification of the school superintendent (by special blanks provided for this purpose) of the names and residences of families in which communicable diseases exist.

Since the local physicians were notified from this office that the packages furnished by the State Board of Health, containing culture material for making bacteriological examinations of specimens from suspected cases of diphtheria and tuberculosis, could be obtained, they have been used in a few instances, with satisfactory results.

Previous to this year, the duties of health inspector and plumbing inspector were performed by one person. The offices are now separated, the inspection of plumbing being done by a plumber, and the position of health inspector being filled by a physician.

WALTER REYNOLDS, M.D.,
Health Inspector.

BUENA VISTA TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Charles Kohler, President, Buena Vista; Dominick Corsiglia, Vineland; C. A. Gross, Landisville; John Faux, Vineland; Douglas Reed, Secretary Landisville.

EGG HARBOR CITY.

NAMES OF MEMBERS AND OFFICERS.

George F. Breder, President; Valentine P. Hoffman, Secretary; William Mueller, Lawrence Berchtold, Henry G. Regensburgh.

ATLANTIC COUNTY—Continued.

No house-to-house inspection. No public water-supply and no sewerage system. No system for collection of garbage and night-soil.

Hog cholera was prevalent during the summer months. Blanks have been provided for reports of contagious diseases by physicians, and the law in regard to the matter has been generally complied with. A record of all cases reported has been kept by the secretary in a book provided for that purpose.

There were reported four cases of scarlet fever, five cases of typhoid fever and ten cases of whooping cough.

One case of whooping cough, in an individual affected by tuberculosis, terminated fatally.

An annual inspection of the stables of the city where cattle are kept is made by this board.

The board has held regular monthly meetings, and also several special meetings have been called.

An ordinance in regard to reports of communicable diseases was passed November 11th, 1895.

EGG HARBOR TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel A. Smith, President, English Creek; Walter Fifield, Bakersville; John Blackman, Steelmanville; S. C. Edmunds, M. D., Linwood, A. R. Vickers, Secretary, Bakersville.

GALLOWAY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John Huenke, President, Egg Harbor; Daniel Mathews, Oceanville; Joseph Lippencott, Port Republic; H. F. Hankins, M.D., Port Republic; Anthony Kienzle, Egg Harbor.

HAMILTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Luciens B. Corson, Nelson Norcross, Westley R. Wales, M.D.; H. C. James, M.D., Inspector. Address of all, Mays Landing.

HAMMONTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William Cunningham, James Potter, Lewis O'Donnell, Edward North, M.D. Post Office address of all, Hammonton.

No contagious diseases have occurred among animals.

ATLANTIC COUNTY—Continued.

Communicable diseases have been reported in accordance with chapter 260, laws of 1895, but no blanks have been furnished to physicians for reporting these cases. A record has been kept by the secretary, as the law requires, and a weekly report has been made to the State Board of Health.

We have had slight outbreaks of measles and whooping cough.

Three cases of typhoid fever occurred.

BOROUGH OF LINWOOD.

No Board of Health has been organized in this borough.

JAMES FARISH,

Clerk of the Borough.

MULLICA TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Charles Tallman, Egg Harbor City; Reuben Brooker, Elwood; Lee W. Huntsman, Nesco; W. W. Phillips, Elwood; John T. Irving, Secretary, Elwood.

No system has been adopted for the collection of garbage and rubbish.

Three cases of diphtheria have occurred in the township. They were not reported by the attending physician, as required by law.

The board has held but one meeting during the year. There is no resident physician in the township, and the board is therefore without a medical member.

BOROUGH OF PLEASANTVILLE.

NAMES OF MEMBERS AND OFFICERS.

Lewis H. Barrett, President; Samuel Bartlett, Secretary; Samuel B. Jones, James Lafferty, Frank Reiner, Isaac Collins; R. M. Sooy, M.D., Inspector.

One hundred and fifty dollars is annually appropriated for the uses of the board. An epidemic of measles occurred during the early part of the year, followed by whooping cough. No deaths were reported from either disease. Several cases of typhoid fever have occurred, which have been traced to water taken from wells which have been found to be contaminated by waste fluids.

BOROUGH OF SOMERS POINT.

Winfield R. Fox, Borough Clerk, states that no board of health has been organized.

ATLANTIC COUNTY—*Continued.*

BOROUGH OF SOUTH ATLANTIC CITY.

No board of health organized. No communicable diseases have been reported. Waste fluids are stored in cesspools. Water-supply is obtained from wells and cisterns.

WEYMOUTH TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William Hoffman, President, Tuckahoe; Thomas Bailey, Tuckahoe; Andrew Campbell, Tuckahoe; W. H. Campbell, Secretary, Scullville.

Refuse materials collected and disposed of by individuals without official supervision.

No cases of communicable disease have occurred during the year.

The township contains about 37,000 acres of land, and the population is well distributed over this area.

BERGEN COUNTY.

BOROUGH OF ALLENDALE.

NAMES OF MEMBERS AND OFFICERS.

C. Badeau, M.D., President; C. Merrill, M. Henion, L. Brainard, S. Roswell, Robert L. Nimmo, Secretary.

BOROUGH OF BERGENFIELDS.

NAMES OF MEMBERS AND OFFICERS.

W. H. Merkle, W. S. Bogert, S. E. Demarest, James Murray; J. B. Demarest, Secretary.

There is no system in this borough for the collection and disposal of refuse materials.

No cases of communicable diseases have been reported to this board.

BERGEN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William Foose, President; William Fleischmann; A. Richter, M.D., Inspector; Frank Greuter, Secretary. Address of all, Carlstadt.

No contagious diseases have been reported in this township.

BERGEN COUNTY—*Continued.*

BOROUGH OF BOGOTA.

NAMES OF MEMBERS AND OFFICERS.

Peter Bogart, Jr., President; Frederick E. Waller, A. G. Munn, Jr.; Harry W. Jackson, Inspector; Peter F. Hopper, Secretary.

BOROUGH OF CLIFFSIDE PARK.

NAMES OF MEMBERS AND OFFICERS.

O. D. Norton, M.D., President; George W. Laird, S. Wood McClave, Edward George; R. H. Nutt, Secretary.

This borough is supplied with water from the Hackensack Water Co. Surface wells are also in use to some extent. There are no sewers, waste fluids being discharged into cesspools.

A sanitary code was adopted April 14th, 1896.

BOROUGH OF DELFORD.

NAMES OF MEMBERS AND OFFICERS.

Frank Barnes, President, River Edge; Herbert Jones, M.D., Oradell; Wm. Smith, New Milford; J. M. Hill, Inspector; Geo. W. Moore, Secretary, Oradell.

But one case of diphtheria has been reported during the year. Regular meetings of the board are held every three months. Defective cesspools give much annoyance. A system of sewerage for the borough is contemplated.

CITY OF ENGLEWOOD.

NAMES OF MEMBERS AND OFFICERS.

Henry Jones, President; J. Milton Elmore, Samuel I. Demarest, John A. Wells, M.D., Garret Lydecker.

On account of the change in the form of government a re-organization of the board of health has occurred in Englewood.

It is proposed by the board to at once begin a systematic house-to-house inspection of premises and to record all facts which may be brought out by these investigations.

Printed blanks are furnished to physicians for reporting communicable diseases, and records are kept of all reports received.

The number of cases of malarial fever has been materially diminished since the introduction of a public water-supply and general sewerage system.

BERGEN COUNTY—*Continued.*

FRANKLIN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Wm. J. Packer, Wyckoff; Albert Lozier, Wyckoff; Jacob A. Terhune, Oakland; E. W. Hamilton, M.D., Inspector, Oakland; John W. Ackerman, Secretary, Oakland.

CITY OF HACKENSACK.

NAMES OF MEMBERS AND OFFICERS.

Charles Conklin, President; George A. DeLoynes, Secretary; E. S. Emmons, Treasurer; W. P. Ammerman, R. G. Wool, Lemuel Lozier, John MacCallister; Herman Baar, Sanitary Inspector; Robert Ballagh, Plumbing Inspector.

During the year ending October 1st, 1896, twenty-four cases of contagious diseases have been reported, as follows: Typhoid fever, 2; scarlet fever, 6; diphtheria, 13; measles, 3. Resulting in one death from typhoid fever, and one from diphtheria.

House-to-house sanitary inspection is not regularly performed, the appropriation of \$400, annually, being inadequate to compensate more than one sanitary inspector; our population is 8,000. The services of all officers and members are gratuitous, the sanitary and plumbing inspectors being the only persons receiving compensation; the former \$250 per year, the latter \$3.00 for each inspection.

All communicable diseases have been promptly reported by our resident physicians, printed blanks, on postal cards, having been furnished them for that purpose; a faithful record of the same has also been kept, and weekly reports transmitted to the State Board of Health, and in every instance prompt attention has been paid to the disinfection of the premises.

Gratuitous vaccination has been, and continues to be, offered to our people, but few have availed themselves of the privilege, as small-pox is of rare occurrence—but two cases in five years.

Our water-supply is in every respect satisfactory, being furnished by the Hackensack Water Company, which has an extensive plant at New Milford, above tide-water, $4\frac{1}{2}$ miles north of Hackensack.

Our public buildings, such as court house, jail, and schools, are in as perfect sanitary condition as could be desired. Our free hospital is an institution in which the people of Hackensack have taken a great interest, 373 patients having been admitted during the year. The increasing number of inmates has necessitated the enlarging and re-

BERGEN COUNTY—*Continued.*

modeling of the building, so that at the present time it is satisfactory in all its appointments.

The objectionable feature of our town, viz., the creek, which has heretofore been used as an open sewer, is now in a fair way to be removed, the contract for transforming the same into a pipe sewer having been awarded, and the work is to be completed within 75 days.

We have made no change in our ordinances since transmitting the previous report, and, as usual, have held one regular meeting each month, and when special business has required we have met in extra session.

GEO. A. DELOYNES,
Secretary.

HARRINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John H. De Wolf, President, Tappan; John C. Holdrom, Norwood; Ward Varian, Closter; L. B. Parsell, M.D., Closter; R. Newton Saeden, Secretary, Northvale.

A few sporadic cases of diphtheria, scarlet fever and measles were promptly reported to the board by the attending physicians.

The patients were isolated, and after the termination of the disease the houses were in each case disinfected.

Printed blanks are furnished to physicians for reporting cases of communicable diseases and a record of all reported cases kept by the secretary.

HOHOKUS TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jacob J. Young, President, Ramseys; William H. Pullis, Inspector, Ramseys; Charles L. Deyoe, M.D., Ramseys; Andrew J. Winter, Mahwah; John Ackerman, Secretary, Wyckoff.

No complaints have been received by this board.

BOROUGH OF LITTLE FERRY.

NAMES OF MEMBERS AND OFFICERS.

Nicholas J. Schopp, George Soll, Abraham Woods; Silas B. Gardner, Inspector; Elmore N. Mehrhoff, Secretary.

An abundant water-supply is obtained from artesian wells. There are no sewers.

BERGEN COUNTY—Continued.

BOROUGH OF LEONIA.

NAMES OF MEMBERS AND OFFICERS.

Henry D. Vanzandt, President; P. S. Newell, James A. Lowe, Robert Duncan H. M. Thompson, Secretary.

This borough is located on the western slope of the Palisades. The citizens are supplied with water from the mains of the Hackensack Water Company.

More than fifty per cent. of the houses are connected with the public sewer, the remaining dwellings depending upon cesspools for the disposal of waste liquids. A large proportion of the streets are macadamized and they are lighted by electricity. Many dwellings are lighted in the same manner.

Plumbing and drainage is supervised by the board of health.

BOROUGH OF LODI.

NAMES OF MEMBERS AND OFFICERS.

John Haggerty, President; Daniel De Block, James J. Mason, Jos. Pallette, Jacob Van Hook, Secretary; George S. Davenport, Inspector.

A company has been formed to introduce a public water-supply, but operations have not yet commenced.

LODI TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John Pardy, Hackensack; Melchior Hellvig, Woodridge; Peter Koster; I. Pries, Secretary, Woodridge.

There are about eighty houses in this township, and during the past year two cases of diphtheria occurred.

BOROUGH OF MAYWOOD.

NAMES OF MEMBERS AND OFFICERS.

Philipp Thoma, D. R. Brown, D. Price, G. L. Jaeger, E. T. May.

No communicable diseases have occurred in the borough during the past year.

BOROUGH OF MONTVALE.

No board of health has yet been appointed in this borough. Edward Brown is borough clerk.

BERGEN COUNTY—Continued.

BOROUGH OF PARK RIDGE.

NAMES OF MEMBERS AND OFFICERS.

E. J. Jehl, M. D., President; F. Wheaton, C. H. Wardell, B. Coffin, J. Bennet; W. D. Woodley, Secretary.

RIDGEFIELD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel Mable, President, Fort Lee; Joseph Schlosser, Fort Lee; Albert Ravekes, Ridgefield Park; Dr. Joseph Huger, Fort Lee, Inspector; Henry Benecke, Secretary, Fort Lee.

No typhoid fever, diphtheria or scarlet fever have occurred in this township during the past year. Sanitary conditions are unsatisfactory in this district, but improvement is promised.

RIDGEWOOD TOWNSHIP.

The board of health of this township has performed no service, but has depended upon the board of health of the village of Ridgewood for such attention to the sanitary interests of the locality as were required.

RIDGEWOOD VILLAGE.

NAMES OF MEMBERS AND OFFICERS.

Joseph W. Edwards, President, Ridgewood; Geo. M. Ockford, M.D., Health Inspector, Ridgewood; Thomas Terbeun, Recorder of Vital Statistics, Hohokus; William J. Fullerton, Ridgewood; James Cornelius, Ridgewood; Clarence H. Dickson, Secretary, Ridgewood.

The health of this community has been generally good for the past year. A few sporadic cases of typhoid fever have been reported to the board, but investigation failed to discover local conditions to account for the outbreak, and there was strong presumptive evidence of imported infection. Two cases of diphtheria were reported, but no fatalities. An epidemic of rotheln occurred late in the spring and ran a mild course without complications or sequelae. An increase in diseases of a malarial type has been noticed during the past months, generally of an intermittent character.

No house-to-house inspection has been provided by the board.

No public water-supply and no sewers in the village.

Garbage, night-soil and cesspool contents are removed at night in covered vehicles and buried.

BERGEN COUNTY—Continued.

BOROUGH OF SADDLE RIVER.

No board of health is organized.

SADDLE RIVER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

C. E. Martin, Garfield, President; George McDonald, Garfield; S. R. Moak, M.D., Inspector, Garfield; Peter Alyea, Dundee Lake; Peter J. Smith, Rochelle Park, Secretary.

All cases of communicable diseases have been reported by physicians, and a record of the same has been kept by the secretary of the board. Printed blanks for the use of physicians, for reporting cases of infectious disease, have not been provided by the board.

BOROUGH OF TENAFLY.

NAMES OF MEMBERS AND OFFICERS.

J. J. Haring, M.D., President; S. G. Clark, Richard Delhanty, Theodore L. McIntyre; J. B. W. Lansing, M.D., Secretary.

BOROUGH OF UPPER SADDLE RIVER.

John J. Hopper, borough clerk, states that no board has been appointed.

BOROUGH OF WALLINGTON.

NAMES OF MEMBERS AND OFFICERS.

Robert Cook, President; Thomas Denboski, Cornelius Vanderbilt; James Brennen, Secretary.

BOROUGH OF WOODCLIFF.

NAMES OF MEMBERS AND OFFICERS.

John H. Ackerman, President, Woodcliff; John H. Wortendyke, Woodcliff; Garret J. Wortendyke, Saddle River; Garret J. Ackerman, Park Ridge; Christian E. Felter, Hillsdale; Richard Storms, Secretary, Woodcliff.

Drinking-water is obtained from wells.

The only nuisance brought to the attention of the local board of health was caused by offensive odors from hog-pens. An abatement was secured.

BERGEN COUNTY—Continued.

BOROUGH OF WOODRIDGE.

NAMES OF MEMBERS AND OFFICERS.

Joseph H. Schmitt, President; Chas. McQuade, Freeman Rohde; Henry W. Ostrowski, Inspector; Wm. H. White, Secretary.

A house-to-house sanitary inspection has been conducted by the board, and a record has been made of the conditions observed. The water supplied by the Hackensack Water Company is used to some extent; the remaining houses taking their supply from wells and cisterns.

There are no sewers, but most of the dwellings discharge waste fluids into cesspools.

BURLINGTON COUNTY.

BASS RIVER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Amasa A. Mathis, New Gretna; George A. Cramer, New Gretna; William C. Irvin, New Gretna; C. Garrabrant, Atlantic City; Chalkley Haines, Secretary, New Gretna.

CITY OF BEVERLY.

NAMES OF MEMBERS AND OFFICERS.

J. J. Currie, M.D., President; W. K. Vansciver, C. H. Peart, G. H. Smith; C. F. Richardson, Inspector; B. F. Sobey, M.D., Secretary.

No systematic house-to-house inspection has been established by the board, but records are made of all cases investigated. The water-supply is obtained partly from the Delaware river by water-works, and partly from surface wells. There are no sewers in Beverly, but they are much needed, and the expense involved seems to be the only obstacle to their construction.

Communicable diseases are regularly reported and recorded. Blanks for reports are not furnished to physicians.

The board has held eight meetings during the year. Several minor complaints were received and acted upon. Three cases of scarlet fever occurred, and in each instance isolation prevented the spread of the disease. The source of the infection in two of these

BURLINGTON COUNTY—Continued.

cases was traced to a point outside of the city. In the other case the cause could not be discovered. The reports of births by the physicians of Beverly are unsatisfactory.

BEVERLY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

W. W. Weiler, President, Delanco; Thomas W. Hood, Beverly; Wm. T. Baggs, Beverly; H. K. Weiler, M.D., Delanco; Jos. B. Carter, Secretary, Delanco.

Sixteen cases of diphtheria have occurred, four of which proved fatal.

CITY OF BORDENTOWN.

NAMES OF MEMBERS AND OFFICERS.

D. R. Brown, President; Dr. L. D. Tebo, Vice-President; Edwin L. Thompson, Treasurer; Sam'l E. Burr, Robt S. Bantle, H. N. Jobes; Dr. W. H. Shippes, Secretary; H. N. Jobes, Health Inspector.

The year ending November 1st, 1896, will be remembered because of its marked healthfulness, so far as this community is concerned. There has been almost entire freedom from such diseases as typhoid fever, scarlet fever and diphtheria. How much of this immunity is due to the vigilance of the local board of health, or to improved sanitary methods, I cannot say. Fewer complaints than usual have been brought to the attention of the board, and most of these were of a trivial nature. Notwithstanding this, the members of the board are awake to the necessity of needed sanitary reforms in various directions, and will not relax their efforts until they are satisfactorily accomplished.

W. H. SHIPPES,
Secretary.

BORDENTOWN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

J. H. Longstreet, President, Bordentown; Frederick Schaffer, Fieldsboro; H. B. Ford, Bordentown; B. W. McFarland, M.D., Bordentown; William Warrack, Secretary.

CHESTER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John B. Worrick, Hartford; Charles F. Hugg, Moorestown; Charles Collins, Moorestown; F. G. Stroud, M.D., Inspector, Moorestown; Benjamin Rogers, Secretary, Moorestown.

BURLINGTON COUNTY—Continued.

House to house inspection is not regularly performed, but inquiries and investigations are made to some extent, and records are kept of all unhealthful conditions which are discovered. The citizens of the township are to some extent supplied with water for domestic purposes by the water company of Moorestown. There are no sewers in this district.

Communicable diseases have been reported as required by law.

The board has supplied printed blanks on postal cards to physicians for their convenience in reporting to the board, and a record has been kept of all reports received.

CHESTERFIELD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Edward M. Ridgeway, Crosswicks; Edmund Satterthwaite, Bordentown; William J. Folks, Chesterfield; Charles B. Holloway, Secretary, Chesterfield.

Communicable diseases are reported to the board and a record is kept of the same.

DELRAN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jonathan P. Brown, President, Bridgeboro; Robert M. Brock, Bridgeboro; Emerson Haines, Riverside; A. E. Conrow, Moorestown; Robert W. Babington, Secretary, Bridgeboro.

Two cases of diphtheria and one of scarlet fever have been reported to this board.

EASTAMPTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Joseph Powell, Jr., Smithville; Jackson Nippins, Mount Holly; John W. Edwards, Mount Holly; Wm. Caley, M.D., Mount Holly; Joshua M. Reeve, Secretary, Smithville.

EVESHAM TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John M. Dewitt, President; B. S. Lippincott, B. F. Evans, P. V. B. Stroud, M.D.; R. H. Leeds, Secretary; all of Marlton.

BURLINGTON COUNTY—*Continued.*

FIELDSBORO.

NAMES OF MEMBERS AND OFFICERS.

Jos. V. Carter, President; August Zeller, Wm. Leonard, John Malby, Inspector; Wm. Leatherberry.

One case of typhoid fever was reported during the past year.

MEDFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Chas. H. Kirby, R. S. Braddock, M.D., L. L. Sharp, M.D., J. Reeve, M.D., Wm. M. Potts, Medford P. O.

Cases of diphtheria and measles have occurred.

MOUNT LAUREL TOWNSHIP.

OFFICERS AND MEMBERS.

Howard Darnell, Chairman, Mount Laurel; Charles Andrews, Fellowship Robert T. Evans, Masonville; F. G. Stroud, M.D., Moorestown; W. P. Lippencott, Secretary, Hartford.

Several samples of water from suspected wells in the village of Masonville were sent by the board to one of the State chemists for examination, and they were found to be contaminated and unfit for use for drinking purposes.

Cases of typhoid fever occurred in the village of Masonville, and they were investigated, with the assistance of an officer of the State Board of Health. Polluted wells were believed to be the cause of the appearance of the disease, and the use of the suspected water was permitted only after it had been boiled.

The local board of this township has not adopted ordinances, rules or regulations for the control of unhealthful conditions.

NEW HANOVER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

George C. Davis, Wrightstown; James Murphy, Jacobstown; L. D. Woodward, Cookstown; Amos Shaw, Jacobstown; Benj. Remine, Secretary, Wrightstown.

NORTHAMPTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel T. Engle, President; C. C. Cowperthwaite, T. Lacey Akins; R. H. Parsons, M.D., Inspector; Martin H. Gervin, Secretary. All of Mount Holly.

BURLINGTON COUNTY—*Continued.*

During the summer the public water-supply became discolored and unpleasant to the taste, owing to a low level of the headwaters. The difficulty was removed after the rainfalls, which occurred in the latter part of the season.

PALMYRA TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

R. Lowber Temple, President; Henry Kerswill, James E. Russell, L. L. Sharp, M.D.; Frederick Blackburn, Secretary; all of Palmyra.

One fatal accident occurred in the township from the use of gasoline.

BOROUGH OF PEMBERTON.

A statement from the clerk of the borough, James B. Hankins, shows that no board of health exists in Pemberton.

Two cases of diphtheria occurred, one of which proved fatal.

An outbreak of measles also prevailed, and one case of typhoid fever was reported.

The following is a report made to the State Board of Health by an officer of the board, showing conditions existing in Pemberton relating to the disposal of sewage:

To the State Board of Health:

GENTLEMEN—A complaint was received from the Water Company of Mt. Holly, stating that an outlet for the new sewer system at Pemberton discharged into a branch of the Rancocas creek. As the public water-supply of Mt. Holly is taken from the creek, there was danger of contamination.

The sewers of Pemberton have been laid in two sections. The first portion laid was completed last year.

Starting from a point on the main street opposite Dr. Hollingshead's residence, a ten-inch sewer was laid south in Main street, and, after running one-quarter of a mile, was carried westerly through a lane to a point on the property of Mr. Theodore Budd, where the sewage is allowed to flow over the surface of the ground. A short line of pipe was also placed on Elizabeth street.

The point of outfall of this sewer is at least 800 feet from the creek, and the water in the creek could not be affected, as the sewage was only visible at a distance of twenty feet from the outlet.

BURLINGTON COUNTY—Continued.

As there are but five connections on this line of sewer, the amount of sewage is small.

There was no nuisance discoverable at the point of outlet, and, if in the future necessity requires, it is a simple matter to lay out filter-beds or adopt some method of treatment of the sewage so that no nuisance may arise.

The second section of sewer has been completed within the present year.

Starting at a point on Main street, a few feet north of the beginning of the section completed last year, a line of pipe has been run northward.

This new line is necessary, as the elevation at this point on Main street is such that the fall is considerable, either northward or southward, and the sewer outfall must be on or near Budd's run if the houses on the north end of the street are to be provided with sewer connections. The new sewer is about one-fourth of a mile in length and the outfall is into Budd's run, under the bridge on Main street.

Budd's run enters the Rancocas creek a short distance below this point.

There is but one house connected with this main sewer at the present time, but over twenty houses were counted which may be attached in the future.

The distance from Pemberton to Mt. Holly by creek is said to be fourteen miles, but Birmingham, which is much nearer, makes use of the waters of the creek for potable purposes.

The emptying of sewage into a branch of the Rancocas creek, the waters of which are used for potable purposes, is contrary to the laws of the State.

A. CLARK HUNT, M.D.

September 1st, 1896.

Inspector.

The following communication was sent to the authorities of the borough of Pemberton :

OFFICE OF THE STATE BOARD OF HEALTH,
TRENTON, N. J., September 11th, 1896. }

To the Governing Body of the Borough of Pemberton, N. J. :

GENTLEMEN—This board has caused an inspection of the sewers in Pemberton, and we desire to call your attention to certain features as follows:

1. The sewer which has its terminus on the property of Mr. Theo. Budd discharges directly upon the surface of the ground, and no provision is made for

BURLINGTON COUNTY—Continued.

the safe disposal of the effluent. While no nuisance is at present created by this method of disposal, yet, if the quantity of sewage should be considerably increased the point of outfall would become offensive.

2. The new sewer, which discharges into Budd's run, a tributary of Rancocas creek, was found to be connected with only one premises. Inasmuch, however, as the sewage which is carried by this sewer is emptied directly into the stream, it does to some extent pollute the waters which are afterward used by persons further down the stream for the purposes of a public water-supply.

The State Board of Health has always held that there should be no sewage pollution of streams, and the laws of the State (P. L. 1893, page 282) are very clear concerning the rights of persons who may require to use the waters of creeks, ponds or brooks for potable purposes.

It is advisable that provision shall be made for the purification of the sewage of Pemberton before any of it is allowed to enter either of the streams which flow along the borders of the borough.

Very respectfully,

HENRY MITCHELL,
Secretary.

PEMBERTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William H. Smith, Isaac W. Rogers, B. W. Hampton, E. Hollingshead, M.D., J. W. Webb, M.D.; Franklin Keeler, Secretary.

RIVERSIDE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

P. J. Schmidt, President; L. Walter, John Fotz, T. S. Lippincott, M.D.; W. J. Stecher, Secretary. All of Riverside.

BOROUGH OF RIVERTON.

NAMES OF MEMBERS AND OFFICERS.

J. C. S. Davis, President; W. G. Wilson, Chas. A. Wright, A. J. Briggs; Alex. Marcy, Jr., M.D., Secretary.

There has been a noticeable increase in malarial affections during the past year.

SHAMONG TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Delwynn Lippincott, George W. Haines, John W. Haines, Winfield S. Haines, Secretary. Address of all, Tabernacle.

SOUTHAMPTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Allen Fennimore, Amos Middletown, Edwin Dudley; J. C. Brown, M.D., Inspector; Granville S. Woolman, Secretary. Address of all, Vincentown.

BURLINGTON COUNTY—*Continued.*

WASHINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Charles T. Allen, President, Lower Bank; Wm. Taylor, Batsto; Thos. R. Holloway, Jenkins; J. E. Carey, M.D., Inspector, Lower Bank; A. E. Koster, Secretary, Green Bank.

WESTAMPTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William L. Martin, M.D., Rancocas; C. Frank Gaskill, Rancocas; Furman Dubell, Mt. Holly; Japhet B. Deacon, Mt. Holly; J. Barclay Hilyard, Secretary, Rancocas.

WOODLAND TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

George Bozarth, Buchanan; Walter Cloan, Chatsworth; C. L. Adams, Woodmansie; C. Ledue, South Park.

CAMDEN COUNTY.

CITY OF CAMDEN.

NAMES OF MEMBERS AND OFFICERS.

Charles Watson, George F. Hammond, Allen C. Wood, M. F. Middleton, M.D., William S. Moslander, M.D., S. G. Busney, M.D., J. W. Fithian, M.D., and John F. Leavitt, M.D., Health Inspector.

Our board does not require house-to-house inspection, except in cases where contagious diseases exist, or upon complaint of residents who live in houses where unsanitary conditions exist. All complaints made, either in person or in writing, are given immediate attention. A record is kept of all such complaints and inspections in a book provided for that purpose. Our sewer system is satisfactory, the only trouble experienced being in some portions of the city bordering on river front, where the ground, being very low and flat, causes the tide-water to back up at certain seasons of the year.

A contract has been given out for the construction of a new water-supply by means of the artesian well system, costing one-half million dollars. After its completion we will dispense with Delaware river water, by which we are now supplied, and about which so much com-

CAMDEN COUNTY—*Continued.*

plaint has been made during the last few years. The plumbing is done in accordance with the plumbing laws of 1888, which are strictly adhered to. During the year 646 plans of drainage of new work and alterations were filed in the office of the board.

The garbage is collected by contract (made by the city) in tight-lined wagons, with covered tops, and is disposed of by burning in a crematory, which was erected about one year ago, the results being very satisfactory.

Cesspool contents and night-soil are collected and put in tight barrels with screw-top lids, and taken out of city limits and deposited on farm lands.

There have been no infectious diseases among animals during the year.

All contagious diseases among human beings are reported to the board, according to law, upon printed blanks provided for that purpose, a record of same being kept. During the year there were 588 cases of contagious diseases reported, being a decrease of 94 cases over preceding year; 282 of typhoid fever, 48 of scarlet fever, 238 of diphtheria, 1 of small-pox, and 19 of membranous croup. Of the above number there were 27 deaths from typhoid fever, 1 from scarlet fever, 48 from diphtheria, none from small-pox, and 14 from membranous croup, making a total of 90 deaths. Twelve free vaccinations were given by the board in a section of the city where we had a case of small-pox. The only provision made for isolation in case of contagious disease is by means of tents, which are used in small-pox cases, if they occur in warm weather; otherwise the patients are kept in upper story of house, separate from other members of family, and only the attendant being permitted in sick-room. We have no knowledge of any trades or occupations injuring the health of operatives.

Many complaints have been made concerning the odor from Phillips' chemical works, from residents living in the northeastern portion of the city, and the said firm has been indicted by the grand jury and convicted on trial for maintaining a nuisance.

There are no dairies in city limits. We have a capable food and milk inspector, whose duty it is to require that all such articles are up to the proper standard. Oils are not tested, and very few accidents have occurred from the use of gasoline. Number of nuisances reported

CAMDEN COUNTY—Continued.

and abated during the year, 1,108. The board has held regular meetings during the year, and special when deemed necessary. No new rules or ordinances have been adopted.

EUGENE D. ROBERTS,
Secretary.

CENTRE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Howard M. Haines, President, Haddon Heights; Abram E. Rowand, Chew's Landing; Samuel Browe, Snow Hill; Orrin A. Wood, M.D., Magnolia; J. H. Jackson, Secretary, Magnolia.

DELAWARE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John A. Meredith, Haddonfield; Samuel T. Matlack, Haddonfield; Wm. T. Lippincott, Haddonfield; Wm. B. Jennings, M.D., Haddonfield.

One case of scarlet fever has been reported to this board.

GLOUCESTER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Chas. H. Jenkins, Kirkwood; Albert J. Driver, Kirkwood; Edgar J. Coles, Blackwood; Jos. E. Hurf, M.D., Blackwood; Wm. J. Brown, Secretary, Kirkwood.

The county almshouse and asylum, which are located in this township, are provided with water by means of a steam pumping plant from a small running stream. The supply of water is ample and is available in case of fire.

HADDON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John Stoy, Haddonfield; Samuel Wood, Haddonfield; Wm. H. Harrison, Haddonfield; Richard T. Collings, Collingswood; Wm. B. Jennings, M.D., Secretary, Haddonfield.

Communicable diseases are reported by physicians on blanks furnished by this board, and a record is kept of all reports received.

BOROUGH OF HADDONFIELD.

NAMES OF MEMBERS AND OFFICERS.

Wm. J. Boning, President; Morris Roberts, Chas. H. Hillman; Wm. B. Jennings, M.D., Inspector; John R. Stevenson, M.D., Secretary.

CAMDEN COUNTY—Continued.

Street improvements have been made in the borough during the past year for the purpose of securing rapid flow of water through the gutters, and thus prevent stagnant pools.

There were four cases of typhoid fever and one case of diphtheria.

BOROUGH OF MERCHANTVILLE.

NAMES OF MEMBERS AND OFFICERS.

D. H. Bartine, M.D., President; J. W. Marcy, M.D., A. H. Moses, F. W. Kleinz, H. S. Abel, Wm. H. Lewis.

A house-to-house inspection is made by Special Sanitary Inspector W. H. Lewis, and reported in writing to this board, and an alphabetical record kept of same from year to year in a book provided for that purpose.

There is no serious defect in our water-supply. We have no sewer system. The waste-water and all other sewage is emptied into cess-pools, which receive an annual inspection and come directly under the supervision of the board.

Artesian wells, in connection with our former water-plant, have been sunk, ranging in depth from 140 to 170 feet. These four wells give an excellent supply of pure water from beds of white sand.

Plumbing is performed in accordance with the ordinances, the plumbing inspector first approving the plans of all new work and the remodeling of old work. After approval of the plans a permit is issued by the secretary of the board to proceed with the work, which, being completed, is examined and tested by the plumbing inspector, and if found tight it is approved.

Garbage and night soil are collected in covered receptacles under the provisions of our borough ordinance by persons having license to make such collections. The contents of cesspools is also collected in the same manner and transported into the country and disposed of for fertilizing purposes.

There are but very few animals in our borough and no infectious diseases have been reported to the board. Infectious diseases are reported to our board whenever they occur, and a record of the same is kept.

We do not furnish blanks to physicians, but they usually report by card or letter.

CAMDEN COUNTY—Continued.

We have no place for the isolation of contagious or infectious diseases. For years no small-pox has existed here, and but very few cases of diphtheria were reported.

W. B. STEWART,
Secretary.

TOWN OF STOCKTON.

NAMES OF MEMBERS AND OFFICERS.

W. E. Hancock, President; H. H. Sherk, M. D., Charles Irle, James Jarvis, D. E. Todd; D. Austermuhl, Secretary.

This board was organized in June, 1896. A water-supply is obtained from artesian wells, but no sewer system has been provided. The board of health has presented the necessity for the construction of sewers, and the subject is now being considered by the council of the town. Garbage is collected by private parties and is mostly fed to pigs, although some of it is disposed of by dumping into vacant lots. The board has protested against this practice, and has posted notices prohibiting offenders from continuing this method of disposal of refuse.

Cesspools are emptied under supervision of the board, and the filthy contents are deposited outside of the town limits. Since June, 1896, sixty nuisances have been investigated, and all sections of the town have been inspected.

Five cases of contagious disease have been reported, four of them being diphtheria and one scarlet fever.

WINSLOW TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Joseph G. Strock, Cedar Brook; Charles Allbright, Elm; Enoch Cordrey, Elm; Michael G. Burdsall, Secretary, Wilton.

CAPE MAY COUNTY.

CITY OF CAPE MAY.

NAMES OF MEMBERS AND OFFICERS.

Alonso L. Leach, M. D., President; Walter S. Ware, J. Stratton Ware, Chas. P. Foster, Thos. W. Millet; Lewis T. Stevens, Secretary.

CAPE MAY COUNTY—Continued.

BOROUGH OF HOLLY BEACH.

NAMES OF MEMBERS AND OFFICERS.

Wm. T. Garrison, President; W. E. Forcum, A. W. Elurguist; J. H. Dowler Inspector; Chas. Bridges, Secretary.

MIDDLE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

V. N. Erickson, Dias Creek; Luther Swain, Swainton; T. W. Garretson, Cape May Court House; Julius Way, M. D., Cape May Court House; Stillwell H. Townsend, Secretary, Cape May Court House.

BOROUGH OF SEA ISLE CITY.

NAMES OF MEMBERS AND OFFICERS.

Albert S. Steelman, J. D. Norerom, L. Cauffman, M. D., Chas. Shick; Thomas Donovan, Secretary.

UPPER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Josiah W. Baker, Tuckahoe; Reuben A. Robinson, Tuckahoe; Theophilus Corson, Petersburg; Anthony Smith, Busby's Point; Randolph Marshall, M. D., Secretary, Tuckahoe.

Measles prevailed during the month of January. It was mild in character and no deaths occurred.

It is estimated that less than one-third of the children of the township are vaccinated.

BOROUGH OF WILDWOOD.

NAMES OF MEMBERS AND OFFICERS.

G. J. R. Miller, President; Chas. H. Seaman, Frank H. Jones, Lewis S. Grosscup; Wm. R. Prentiss, Secretary.

Except whooping cough, no communicable diseases have prevailed in the borough.

The population is small in winter, but in summer a large number of visitors reside in Wildwood.

CUMBERLAND COUNTY.

CITY OF BRIDGETON.

NAMES OF MEMBERS AND OFFICERS.

Joseph H. Powell, President; Alfred S. Sharp, James S. Ware; Jesse C. Davis, Inspector; Charles F. Reeves, Plumbing Inspector; M. K. Elmer, M.D., R. W. Hewitt, D.V.S.; Clarence M. DuBois, Secretary.

There have been no epidemics, and very little malaria. The contagious diseases reported have been of a mild type and scattered.

The secretary's report shows a slight increase in the number of cases of typhoid fever over that of last year, but fewer deaths.

It is impossible to trace the origin and cause of these cases as fully as desired in every instance. Several cases last fall were traced to the drinking water of a single well. Out of the six specimens of well-water submitted for examination, four were found unfit for use and three of these showed sewage contamination.

This is our greatest source of danger and will continue to be, as long as wells are used, especially in the central portions of our city, with a dangerous cesspool drainage.

Our water-supply has been improved the past year by the construction of a new spring-water collecting gallery. This now gives us a pure and sufficient supply of spring water the year round, so that we are not compelled to use the pond-water during the summer months, as heretofore.

It is to be regretted that our city is without proper sewerage. With the exception of a number of private sewers all drainage must be by means of cesspools. This requires the constant attention of the sanitary inspector to see that they are kept clean.

These are now cleaned by licensed scavengers at night, and the contents removed to suitable places without the city limits. An ordinance should be passed to have all such work done by the improved odorless carts now in use in larger cities.

Every effort has been made the past year to keep the city in as clean and healthy a condition as possible, and all complaints are carefully investigated and nuisances promptly abated.

It is evident that there is a growing disposition on the part of the people to recognize the value of preventive measures to maintain the health of our city, and the board is receiving the hearty co-operation of the citizens to aid them in the preservation of the public health.

CUMBERLAND COUNTY—Continued.

The sewerage of our city still continues to be a serious problem with our board. The absence of a system of sewerage to carry off the waste creates nuisances in the gutters and streets, lanes and alleys of our city, and the requirements of the board are only a temporary relief and it may cause us trouble in the future. The private sewers, which are being used to quite an extent in some parts of our city, I anticipate will cause us considerable trouble. Complaints have already been made to the board in regard to the outlets emptying into the Cohansey river in the center of the city. However, at present, the nuisance is comparatively small.

JOSEPH H. POWELL,
President.

COMMERCIAL TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

N. P. Love, President; H. C. Mayhew, Mauricetown; William H. Berry, W. D. Robbins; G. C. Andrews, Secretary, Port Norris.

DEERFIELD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Elijah R. Parvin, Deerfield street; Pierce A. Krespack, Rosenhayn; William S. Garrison, Finley; James Hand, Seeley; Charles C. Phillips, M.D., Secretary, Deerfield street.

For convenience in conducting the sanitary investigation in this township, the local board has divided it into two districts and has appointed Pierce A. Krespack inspector of the eastern portion and Elijah R. Parvin of the western.

The Jewish colonies of Rosenhayn and Carmel are located in this township. Constant supervision has led to improved sanitary conditions in these communities.

Several cases of diphtheria appeared in Carmel, only one of which proved fatal.

DOWNE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Reuben H. Leaming, President, Newport; George E. Butcher, Secretary, Dividing Creek.

No cases of anthrax have appeared in this township during the past year, notwithstanding its prevalence during 1895.

CUMBERLAND COUNTY—Continued.

GREENWICH TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Isaac D. Brown, President; George S. Watson, S. M. Snyder, M.D.; Wm. A. Bacon, Inspector; Wm. H. French, Secretary. Address of all, Greenwich.

LANDIS TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Orange H. Adams, M.D., President, Vineland; George W. Lewis, Vineland; Joseph Hadsell, Vineland; Richard Hewitt, Jr., South Vineland; Eben H. Foote, Secretary, South Vineland.

There have been several cases of typhoid fever during the past year, only two of which were due to unsanitary conditions on premises. The other cases were all imported.

LAWRENCE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Ephraim Bateman, M.D., H. O. Newcombe, Jacob Mulford; C. C. Foster, Secretary.

There has been no return of anthrax among cattle during the past year.

CITY OF MILLVILLE.

NAMES OF MEMBERS AND OFFICERS.

Edwin Conover, President; S. C. Smith, Richard Radcliffe, J. W. Simmons, Frank Bullock, J. W. Wade, M.D.; L. H. Hogate, Secretary.

Infantile and children's diseases have been few in number. Printed blanks are furnished to physicians for reporting cases of communicable diseases. Records are kept of all these reports by this board and weekly statements are forwarded to the State Board of Health. No reports have been received of contagious diseases of animals. House-to-house inspection is not regularly performed, but the inspector promptly investigates complaints, and during the year he has made 740 inspections.

Among the cotton-weavers and spinners, many of whom are females, we have observed that the impure air of the mills and other conditions which they are subject to in pursuing this avocation, impair health and tend to shorten life.

No action has been taken during the past year in regard to the construction of sewers.

CUMBERLAND COUNTY—Continued.

The water-supply continues excellent and abundant. An extension of several hundred feet of water-pipe has been made in the eastern part of the city.

BOROUGH OF VINELAND.

NAMES OF MEMBERS AND OFFICERS.

J. B. Lukens, President; W. G. Hislop, Robert Pond, T. D. Eilenberg Stewart Morris, Wm. Porter; John S. Halsey, M.D., Secretary.

Until the present year a house-to-house inspection has been regularly made. The time consumed in making this inspection was two months, and the inspector's salary was annually discontinued after the regular inspection was finished, but at present the inspector is paid for continuous service during the whole year, and the inspections are therefore repeated and continued without cessation.

The records of inspections are uniformly made, and they are kept in full for reference.

The water-supply of the borough continues to be satisfactory.

Plumbing and drainage is supervised by the board. The bucket-system for disposal of excreta continues to be employed.

Printed blanks for the convenience of physicians in reporting cases of communicable disease are supplied by the board, and a record is kept of all cases reported, as required by law.

No provision is made by the board for the isolation of the dangerous communicable diseases. During the past year three cases of diphtheria occurred in the borough, and also four cases of scarlet fever, three of which were in one family.

During the spring an outbreak of measles occurred.

Many nuisances have been abated during the past year.

An examination of numerous wells throughout the borough showed contamination in many instances. Several wells were filled up by order of the board.

There have been fewer cases of typhoid fever this year than last.

ESSEX COUNTY.

BELLEVILLE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Henry W. Underwood, President; Percy Jackson, James T. Boylan, John Prout, I. A. Finare, William Connolly; D. M. Skianer, M. D., Secretary.

New water mains have been laid in several streets not heretofore supplied with water. The township has no sewers, but depends upon surface drainage. Garbage is destroyed by burning. Cesspool contents are emptied into the river or spread upon the surface of the ground.

Five cases of diphtheria have been reported, two of which died. Care is taken to prevent the admission to school of children from infected houses.

BLOOMFIELD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

G. Lee Stout, President; Benjamin Haskell, John A. Lawrence, Frank Foster, Seymour P. Gilbert, Charles W. Powers, George Fisher, Samuel H. Baxter, Charles H. Bailey, M.D.; William L. Johnson, Secretary.

The East Orange Disposal Works which has so long been a menace to the health of the citizens of this township has been abandoned. Further extensions of the lateral sewers in streets have been made during the year.

The report of the Health Physician is as follows:

"I beg to present the following report for the year ending April 1st, 1896. On the organization of the board a year ago, several new propositions presented themselves to us, viz.: A new sanitary code for the township; a better mode of keeping our vital statistics. Reports of contagious diseases from the different physicians in conformity with chapter 260, laws of 1895, approved March 22, 1895, have been made. The placarding of houses containing cases of the dangerous contagious diseases, namely diphtheria, small-pox, scarlet fever and measles, have been required. The removal of garbage, and the licensing of scavengers to engage in the work has received attention.

"A new health code, after due publication, was adopted. The clerk of the health board was appointed registrar of vital statistics, to whom all reports of contagious diseases are sent within twelve hours after the first visit of the attending physician.

ESSEX COUNTY—Continued.

"A resolution was adopted ordering the placing of a card on houses containing any of the four diseases mentioned, not to be removed, except by an officer of the board, under a penalty of fifty dollars.

"The question of extending the sewer system was one of the most important brought before the board. Without such extension it would be impossible to relieve the unsanitary condition of the several school buildings, especially the high school. After due deliberation, it was voted to request the township committee to order the work done. We are now in a position to have plumbing put in the school-houses and connections with the sewer made. Berkeley school is already finished in this respect.

"Early in September, an isolated case of scarlet fever was reported, and efforts were made to check the disease; but after a few weeks another case occurred, and from that day to this, the township has never been free from the disease. As the schools are largely the spreaders of contagious diseases among children, and as some persons are so criminally careless as to conceal cases, or to send other children from such families to school, postal cards were printed, and when a case was reported, we immediately notified the school authorities of the fact, and all children from such families were excluded until they brought a certificate from the attending physician.

"In spite of all our precautions the number of contagious diseases has been large, as the appended table will show. Later the board authorized the purchase of a disinfecting spray pump, which is now used by the health inspector in places where scarlet fever and diphtheria have been present.

"There have been fifteen cases of diphtheria. Six have been croup cases. All these have been treated by antitoxin injections, and all recovered.

"REPORT OF COMMUNICABLE DISEASES FOR THE YEAR ENDING APRIL 1ST, 1896

	CASES.	DEATHS.
Scarlet Fever.....	70	3
Diphtheria.....	15	...
Measles.....	37	...
Chicken Pox.....	16	...
German Measles.....	3	...
Whooping Cough.....	13	...
Typhoid Fever.....	6	2
Tuberculosis.....	2	1
Membraneous Croup.....	1	1
From all Other Causes.....	...	97
Total.....	163	104

ESSEX COUNTY—Continued.

"The board has lately passed an ordinance requiring sewer connections when, in the opinion of the board, the same are necessary."

BOROUGH OF CALDWELL.

NAMES OF MEMBERS AND OFFICERS.

James Best, President; Charles E. F. Hopwood, J. H. Budd, George B. Jacobus, E. E. Peck, M.D., W. J. Gould; Thomas W. Biggs, Secretary; Samuel Botterill, Inspector.

Four cases of diphtheria were reported to the board during the past year, and each case was traced to a source of infection outside of Caldwell. The measures taken by the board restricted the disease to the houses in which it first appeared.

Three cases of typhoid fever were reported.

Water-supply of the borough is from wells. There are no sewers. Blanks have not been furnished to physicians for reporting cases of contagious diseases, but the board intends to provide them in future. A record of these cases is kept by the secretary, and a weekly statement of all reports is sent to the State Board of Health.

CLINTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William C. Ward, M.D., President, Irvington; Merten B. Owen, Irvington; M. D. Dorer, Irvington; Lewis Voorhees, Irvington; William R. Ward, Lyons Farms; William R. Ward, Jr., M.D., Lyons Farms; James R. Maitland, Secretary, Irvington.

Regular meetings are held each month. Nuisances are promptly abated when they are brought to the attention of the board. A sanitary code has been adopted and will soon be ready for distribution.

EAST ORANGE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William C. Schmidt, President; George E. Clymer, Counsel; William Cardwell, Edward I. Condit, John H. Palmer, Edward E. Bruen, Ferdinand Cayne, Jr., Stephen W. Ougheltree, Edward O. Stanley, George Dover, Edward E. Crippen, Harry Miller, I. L. Dodd, William F. Poucher, D. C. Whitman, Philip Williams, Charles Matthews; William T. Bowman, Health Inspector; Winthrop D. Mitchell, M.D., Secretary.

The construction of a new outlet to tide-water for the sewer system of East Orange has been completed and the disposal-works

ESSEX COUNTY—Continued.

which were originally in operation have been abandoned. Garbage is disposed of by depositing it upon low-lying lands, where it is sprinkled with lime and finally covered with six inches of fresh earth. Night-soil and cesspool contents are transported in covered wagons to the works of the fertilizing company in the city of Newark.

BOROUGH OF GLEN RIDGE.

NAMES OF MEMBERS AND OFFICERS.

H. C. Harris, M.D., President; J. Alex. Brown, F. C. Ousterout, H. R. Metcalf; H. K. Benson, Secretary.

The board has exercised control in all cases of communicable disease which have occurred in Glen Ridge during the past year, and have isolated patients and enforced the necessary restrictions.

A serious nuisance has been caused by the dumping of refuse upon property along the boundary lines of the borough, and the board is considering measures which shall be effectual in putting an end to this annoyance.

VILLAGE OF IRVINGTON.

NAMES OF MEMBERS AND OFFICERS.

William R. Adams, President; Mahlon Drake, Josiah Hitchcock; Ira Meeker, Inspector; William Laird, Secretary.

A number of cases of diphtheria have appeared during the past year, but the measures taken by the board prevented the extensive spread of the disease. Three cases of scarlet fever and three cases of typhoid fever also occurred. The village is in great need of a system of sewers.

The construction of plumbing and drainage is controlled by ordinance.

The board has undertaken to prevent the spread of disease through milk, and has made a regulation which requires that bottles or other receptacles shall not be removed from infected premises until permission has been given.

LIVINGSTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Isaac S. Crane, Chatham; William H. Harrison, Roseland; David Grannia, Livingston; George Moorehouse, Livingston; William R. Johnson, Livingston; E. E. Peck, M.D., Caldwell; George E. De Camp, Secretary, Roseland.

ESSEX COUNTY—Continued.

One case of scarlet fever was reported and prompt action taken. Dairies have been inspected and suspected wells have been closed.

TOWN OF MONTCLAIR.

NAMES OF MEMBERS AND OFFICERS.

David D. Duncan, President; Moses N. Baker, Vice President; Richard P. Francis, M.D., Secretary; James S. Brown, M.D., Chas. D. Thompson, Edwin B. Goodell, Attorney; Marshall O. Leighton, Health Inspector. Address of all, Montclair, N. J.

In presenting our third annual report to the State Board of Health we are pleased to state that the past year has been one of much progress in all departments of our work, and the present sanitary condition of Montclair is the best since the organization of the board.

The total number of deaths since October 1st, 1895, is 188, an increase of one over the previous year. The population of Montclair according to the census of 1895 being 11,800, the death-rate is 15.92 per thousand. The number of deaths from communicable diseases is five, or 2.6 per cent. of the total. This is a decrease of one per cent. from the rate of last year, and the lowest since the beginning of the records in the year 1879. With the exception of those occurring in the year 1885-86, it is also the lowest actual number of deaths from communicable diseases, in spite of the fact that the population of Montclair has more than doubled since the beginning of the record.

The following is a protocol of deaths from the ten most fatal causes:

Disease.	Total deaths from each.	Percentage of each to total mortality.
Consumption.....	27	14.67
Pneumonia.....	17	9.24
Heart Disease.....	13	7.06
Enterocolitis.....	12	6.52
Nephritis.....	7	3.80
Asthenia.....	7	3.80
Meningitis.....	6	3.26
Cancer.....	5	2.72
Bronchitis.....	5	2.72
Apoplexy.....	5	2.72

With the exception of a slight outbreak of measles, which was in no case fatal, there has been no epidemic in the past year. Fourteen cases of typhoid fever have occurred, and of these seven were traced to sources of infection outside of Montclair. Physicians are supplied

ESSEX COUNTY—Continued.

with blanks for reporting cases of communicable diseases, and a record of such cases is kept. Weekly statements of such reports are regularly transmitted to the State Board of Health. A thorough system of quarantine is maintained during sickness. A new isolation ward has been completed at the Mountainside Hospital. This will accommodate a limited number of patients and is open especially to the residents of Bloomfield, Montclair and Verona.

A complete sanitary house-to-house inspection was made during July and August. It is gratifying to note the general excellence of the sanitary conditions, and the records which are kept on file show that the householders, as a rule, appreciate the value of health regulations. The inspection has, however, served other purposes than securing the abatement of divers nuisances. It gave us facts concerning the extension and condition of the water and sewerage systems. The former was found to be in very general use. The water is in good condition, as analyses show, and is supplied partly from artesian wells and partly from the reservoirs of the East Jersey Water Company. The latter gives some trouble in the fall of the year on account of the sediment which comes from the bottom of the reservoirs during vertical circulation. The house-to-house inspection was also the means of ascertaining the number of houses still unconnected with the sewers. With this in hand, we may with greater facility apply our new ordinance, adopted in conformity with the act approved May 12th, 1896, entitled "An ordinance to compel owners of property in the town of Montclair along the line of any sewers to connect their houses and other buildings therewith."

The following blank forms are used for recording inspections.

SANITARY INSPECTION, BOARD OF HEALTH, MONTCLAIR, N. J.

Date.....	Inspector.....	Premises.....
1. Description of property.....		
2. Owner.....		
3. Occupant.....		
4. No. residents, over five years..... under five years.....		
5. Sleeping rooms, number..... condition..... ventilation.....		
6. Water-Supply: Source..... If well, driven or dug.....		
depth..... diameter..... How near any cesspool, privy,		
manure heap..... Their relative position as regards slope of		
surface..... Can surface water find its way to		
well?..... Is well water used for drinking purposes?.....		
If so, how treated before using?.....		

ESSEX COUNTY—Continued.

7. Sinks, Baths, Basins, Urinals, &c. : Clean? Properly tapped? Taps free? Do the waste pipes conform to Ordinance No. 4, Section 14? Are traps vented in accordance with Ordinance No. 4, Section 19?
8. House drain: Is it in accordance with Ordinance No. 4, Section 10?
9. Soil and main waste pipe: Is it in accordance with Ordinance No. 4, Sections 11, 12, 13, 15?
10. Cellar and Basement: Dampness..... Ventilation..... Light..... Floor..... Depth below surface..... Wells..... Tanks..... Plumbing fixtures..... Do they conform to Ordinance No. 4, Sections 9 and 10?
11. Heating.....fresh air entrance.....is it air-tight?
12. Sewer: Any in street or under construction?..... Are all or any plumbing fixtures connected?..... Any cesspool or privy in use?
13. Water-closet: Description.....Location..... Ventilation..... Light..... Cleanliness..... Does it flush well?..... What deodorizer or disinfectant used?..... Does it conform to Ordinance No. 4, Section 16?..... Does it conform to Ordinance No. 4, Section 19?
14. Yard: Cleanliness..... Drainage.....
15. Privy: Description..... Location..... Ventilation..... Light..... Cleanliness..... How emptied?..... What deodorizer or disinfectant used?
16. Cesspool: Material..... Size..... Covering..... Ventilation..... Is it water-tight?..... How emptied?..... Does its position conform to Ordinance No. 2, Section 7?
17. a. Rain-water Pipe: Where does it lead?
- b. Pressure tank in attic?..... Location..... Material..... Size..... Cleanliness..... Sources of contamination..... For what purpose is water used?..... If for drinking, how treated before using?
18. Stable: Relation to dwelling..... No. Horses..... Cows..... Cleanliness..... Drainage..... Disposition of Manure..... Is Manure Pit covered?..... and dry?
19. Chicken Yard, Pig Pen, &c. : Relative to dwelling..... Cleanliness..... Drainage.....
20. Garbage and Other Refuse: Are iron or steel receptacles used for garbage and offal in accordance with Ordinance No. 3, Sections 7, 8 and 9?
- Are waste fluids disposed of any other way than by drain?
- If so, how?..... Is there any deposit or accumulation of putrescible matter?
- Are ashes and garbage mixed?..... Disposal of ashes..... Disposal of garbage.....

ESSEX COUNTY—Continued.

- Miscellaneous: 21. Character of soil?..... 22. Any made ground?
23. Any cesspool, privy or vaults, &c., abandoned and not filled up?
24. If filled, how?..... 25. Have there been any cases of infectious disease since January, 1894?..... What disease?..... Time of year?.....

Remarks :

Although the garbage and night-soil is still collected by private scavengers, it cannot be said that no progress has been made in that direction. During the past winter a conference upon this subject was, at the suggestion of the board, held by a joint committee of two members appointed from the town council and two members from the board of health. The question was carefully investigated and the result may be learned from the following extract from the report of the joint committee :

"In conclusion, we recommend that the town council include in the tax levy for the ensuing year the sum of \$3,500 for garbage disposal ; \$1,000, or as much of it as may be necessary, to be expended for metal carts, and the balance for collection and final disposal, the whole sum to be included in the health board appropriation, with the specific understanding that such course be taken because no other means are available for carrying out a much-needed public health measure, which will also be greatly for the public good in other respects."

Although no immediate action was taken upon the report of this committee, there is good reason to believe that such an appropriation will be made in the near future. Extreme measures have been taken in order to make the present system of disposal as unobjectionable as possible. The scavengers are forbidden to remove garbage when mixed with ashes, and are required to provide a water-tight box or tank for the reception of garbage. It is disposed of by burial on a farm provided by the local board for that purpose.

There are no factories or trades existing in Montclair which are injurious to the health of the operatives. The one small factory which exists causes no nuisance, and has no refuse to dispose of.

A regular and careful inspection of dairies is carried on. The dairymen themselves are alive to the dangers of uncleanness and are making efforts to keep the sanitary condition of their premises above reproach. Due attention is paid to the method of washing and sterilizing bottles, and the cooling and preserving of milk.

ESSEX COUNTY—*Continued.*

Regulation and inspection of plumbing form an important part of the work of the board. A preliminary test with water is made on all new work, when the soil, waste and vent-pipes are in position, and a final test with peppermint is made when the plumbing is completed.

MARSHALL O. LEIGHTON,
Health Inspector.

REPORT OF COMMITTEE ON GARBAGE DISPOSAL.

To the Town Council and the Board of Health of Montclair, New Jersey:

GENTLEMEN—Last fall the board of health requested the town council to appoint two of its members to confer with a like number from the board on the subject of garbage disposal. The town council appointed Messrs. Decatur M. Sawyer and Edward P. Simms, and the board of health named Dr. James S. Brown and Mr. M. N. Baker. This committee has given the matter careful consideration, and now submits its report.

Garbage, as we shall use the term, denotes the organic wastes from our kitchens and tables which are liable to offensive decomposition if not properly treated, but it does not include ashes, nor such inflammable wastes as paper, rags, shavings, leaves of trees and grass.

For the collection of garbage elsewhere three general methods are in use: (1) Private contract; (2) public contract; and (3) collection by men and teams employed and paid by the municipality.

The objection to the first of these, or private collection, is that under it a small proportion of the garbage of a community is removed, and that in an unsatisfactory manner, the people needing the service most being unable or unwilling to pay the high charges which the system entails, while the collectors are not generally equipped for good work. Besides all this, proper public supervision of private collection is very difficult.

The public contract system theoretically provides free service for all, but, as generally practiced, the contractor takes the work at so low a figure that he cannot do it thoroughly, while in any event he must be continually watched by municipal inspectors.

Collection by the city is susceptible of the best results of any of the three methods, but it increases the capital outlay and the number of public employees.

ESSEX COUNTY—*Continued.*

Private collection may be dismissed from further consideration as affording practically no service to those portions of a community living in its most crowded sections, and incomplete service everywhere. As between free collection by public contract or directly by the municipality the choice is often a matter of local expediency, with the preference, other things being equal, for municipal service.

The garbage collected—what is to be done with it? Dumping in vacant lots or any out-of-the-way places can no longer be tolerated. Burial is only practicable for small quantities. The only two satisfactory methods of public disposal in practical use are cremation and utilization, or burning on the one hand and an attempt to secure grease and fertilizing material on the other.

Either process, properly conducted, is inoffensive and sanitary, but utilization can be practiced to advantage only where there are comparatively large quantities of garbage to be handled, owing to the large capital outlay required for the proper machinery and buildings.

It is claimed by some that the ashes from a garbage crematory are worth from \$4 to \$10 a ton as a fertilizer. While analyses shows that the ashes are of value for this purpose, and while some have been actually sold at a fair price, there does not seem to be any regular trade yet established in this line.

Another source of revenue claimed for garbage crematories is the utilization of some of the resultant heat in useful work, such as power for electric lighting. There are indications that something may yet be accomplished in this way, but the matter is still in the developmental stage. The chief practical difficulty seems to be that a good garbage-burner is not a good steam-producer and *vice versa*. Moreover, prudence demands a steam plant sufficient to develop all the power needed, in addition to and entirely dependent of the crematory, as the latter may, during parts of the year, run short of garbage, especially during the winter, when the long nights make the greatest demand upon lighting plants.

Regarding all schemes for recovering a part of the cost of conducting sanitary operations, it must be remembered that they are more feasible for large than for small places, and that sanitary considerations should invariably be placed first and commercial second.

Coming now to our local conditions, we are confronted by the fact that we have no systematic collection of garbage. Such information

ESSEX COUNTY—Continued.

as is available (given later on) indicates that perhaps 35 to 40 per cent. of our population has its garbage removed more or less regularly by private collectors, the only means available. The balance either have no system of disposal or else burn it in their ranges or bury it in the ground. Either methods may be satisfactorily employed on a small scale, taking care, in the case of burning, that the garbage is put in a hot fire, with drafts well open, and, in the case of burying, that the garbage is not put too far below the surface in too deep layers, nor too often in one place. From six to twelve inches of dirt above six to eight inches of garbage is safe; while probably garbage should never be put in the same place twice within the same year, and possibly not so often. If the garbage can receive air through the pores of the soil, the bacterium, known as the nitrifying organism, will carry on a harmless and inoffensive process of decomposition, but if air is excluded the noisome putrefying bacteria will slowly do the work, with possible offense or long delays.

But while disposal on one's own premises may be accomplished under the careful personal supervision of the man or woman of the house, such conditions do not exist in all cases, and possibly if more people attempted to burn garbage the result would not be satisfactory in closely built-up sections. The long and short of the whole matter is that carts must be used to collect a large portion of the garbage, or it will not be properly disposed of.

The carts used by the private collectors in Montclair are not suitable for garbage collection, but they are about the best that can be expected under the private system. Moreover, a householder who has his garbage removed regularly is put to an unnecessarily large expense, owing to the fact that the work is not economically done, and cannot be with carts not suitable to it, and with numerous collectors following in each other's tracks, instead of one cart serving a whole street.

With one removal a week half the year, and two the balance of the time, 73 calls per household are required, which at the common price of fifteen cents each, aggregates \$11.70 a year. The man who gets satisfactory service for \$12 a year is in luck. Assuming such service for the whole town the annual outlay for garbage collection and removal in Montclair would be about \$25,000, estimating the number of houses to be in the vicinity of 2,000, which is perhaps too low.

ESSEX COUNTY—Continued.

We shall show below that in our opinion this work can be performed for about one-tenth the sum named, if a free system of town collection is established.

The best is none too good for Montclair. At present we constantly have the unpleasant spectacle of a nondescript collection of carts passing through our beautiful streets, while these same carts give out no uncertain odor.

Serviceable metal carts are in the market, adapted especially for this work. They are water-tight, covered, dump easily and can be washed inside and out, and thoroughly disinfected. Carts with broad tires can be secured and would save our roads.

The wooden carts now used leak at times and their covers often get out of repair, exposing the garbage to view and allowing it to scatter through the streets. The wood absorbs moisture from the garbage, making effectual cleansing impossible. A change should be effected at once.

There seem to be but two ways to effect this change. (1) Either let a contract for the collection of garbage in carts to be provided by the town and leased to the contractor, or, (2) instead, a town system of collection by means of such carts and the requisite labor, the services to be rendered without charge to the householders, in either case, and thus make available to all, much to the advantage of the cleanliness, health, comfort and beauty of the town.

We believe public collection would give the most satisfactory results, and unhesitatingly recommend the installation of such a system before hot weather sets in.

So far as we can learn, the town council has no power to raise money directly for this purpose, but under the general health act (laws of 1887, chap. lxviii, section 34), the local board of health in any community must present to the "governing body" each year "an estimate of the appropriations which it shall believe to be needed for health purposes." The governing body must allow five cents per capita, and is authorized to grant as much in addition as it sees fit.

The health board members of this joint committee are averse to undertaking any work which properly belongs to the town council and feel confident that they voice the sentiment of the full board in this respect. Garbage disposal, like sewage disposal, should be provided for by the council rather than the board, and not charged up against the health board appropriation, unless it is necessary to do so.

ESSEX COUNTY—Continued.

It is customary in some communities, however, to entrust garbage disposal wholly to health boards, and our local board has already been forced to hire and care for land for the reception of cesspool matter and garbage, at an annual expense of, perhaps, \$250. If necessary or desirable, the health board members of this committee have reason to believe that the board will take up the work of garbage collection, as it has felt compelled to take up its ultimate disposal; and doubtless the additional step would greatly advance the sanitary interests of the town. This is, of course, dependent upon the feeling of the town council on the wisdom and expediency of the measure, and its willingness to make the necessary appropriation.

What appropriation would be required, as well as more information regarding the actual status of garbage collection in the town, may be made more clear by the presentation of extracts from a report on the subject made by the Health Inspector, Mr. W. H. Ledger. The figures given by Mr. Ledger are mostly taken from reports on file, embodying the results of a house-to-house inspection made by temporary assistant inspectors last summer. Mr. Ledger writes as follows:

"The total population of the town by the last census (1895), was 11,753.

"The population represented by the inspector's reports was 4,905, of which 3,457 have no system of collection.

"I have taken the following streets as representative of the remainder of the town: Christopher street, Church street, Fullerton avenue, Grove street, Harrison avenue, James street, Midland avenue, Park and Walnut streets. These show that 47 per cent. have their garbage collected. The remainder shows only 28 per cent., who have scavengers."

From these figures Mr. Ledger estimated that 35 per cent. of the population of the whole town have their garbage collected. This is not as it should be.

A careful consideration of these and other figures, and correspondence with a large manufacturer of garbage wagons, leads us to believe that for the present, at least, three metal carts, in continual use, would serve Montclair most admirably, making two collections per house each week during the hot weather. This would be equivalent to nine carts in daily service. These carts can be bought, according to quotations from two concerns, for less than \$300 each. Allowing for incidentals, we estimate that a capital outlay of \$1,000 would

ESSEX COUNTY—Continued.

furnish the necessary equipment to establish a town system of garbage collection. For operating expenses we estimate one man and one horse per cart, to be hired at an estimated price of not over \$3 a day. During the six summer months three carts would be employed continually, and during the winter half that number, on the average, entailing an annual expenditure of about \$2,000.

This is for collection only. For final disposal we think the present system of burying the garbage on an isolated tract of land in the north end of the town would do for another year, although the haul is such a long one that a more central location would be desirable in order to save expense. The rental of land for burying the garbage, the care of the land, possibly extra inspection during the hot months, and a little leeway for contingencies, and a possible increase in the amount of work involved in collection, would require, say, \$500 more, making \$2,500 a year as the total cost of collecting and disposing of the garbage of Montclair. It does not seem reasonable to expect that the work could be done for less, and after the first year it may be expected to cost more; but we believe the actual cash saving to our citizens will warrant any expenditure that may prove necessary, under proper management, to say nothing of the benefit to health and the æsthetic and moral tone of the community.

Burial will not long suffice after the installation of a proper system of collection. When it becomes necessary to adopt some other means we think that cremation will be the proper system. We have at our disposal a large amount of detailed information relating to the thirty-five to forty garbage crematories now in use in the United States and Canada, and without having gone into the matter in detail we believe that a garbage crematory sufficient for our needs for a few years to come could be erected and housed for \$10,000.

We do not advise the purchase of a garbage crematory now, for the following reasons:

- (1.) We can tell better just what we need after having installed systematic collection.
- (2.) Meanwhile more definite data regarding the ultimate disposal of garbage may become available, although we should lay no stress on this if there were no other reasons for delay.
- (3.) The expense of installing systematic collection seems to be all that should be undertaken the first year.

ESSEX COUNTY—Continued.

(4.) Within a year some plan may possibly be devised for a joint disposal system for Montclair and some of our neighboring towns.

Regarding the latter point, we would say that we have given it some consideration, and that a New York concern has been negotiating with this end in view, but with no special promise of success. This concern desires a three or five year contract on a lump sum basis, and proposed to take both ashes and garbage. Its system has never been put in practical operation, and the plant would have to be located in some one community, while disposing of the garbage of several, an arrangement which might present difficulties. The haul might be a long one for Montclair, and we certainly would not wish to pay for hauling and treating ashes, which in themselves are perfectly sanitary, and when clean can be used to advantage for filling in many localities in Montclair.

Regarding the power of the town council to raise money for a garbage crematory, the attorney for the board of health, Mr. William Whitney Ames, is of the opinion that there is no such power, except on a vote of the people. We doubt if it would be possible in that way, and believe that it could be done only as has been outlined above in connection with raising money for garbage collection. The sum involved seems too great to be raised in such a manner, and we think that specific legislation should be obtained authorizing towns to build garbage crematories, singly or in conjunction with other municipalities.

In conclusion, we recommend that the town council include in the tax levy for the ensuing year the sum of \$3,500 for garbage disposal, \$1,000, or as much of it as may be necessary, to be expended for metal carts, and the balance for collection and final disposal; the whole sum to be included in the health board appropriation with the specific understanding that such a course is taken because no other means are available for carrying out a much-needed public health measure, which will also be greatly for the public good in other respects.

Respectfully submitted by the joint committee on garbage disposal.

DECATUR M. SAWYER,

EDWARD P. SIMMS,

From the Town Council.

J. S. BROWN,

M. N. BAKER,

From the Board of Health.

ESSEX COUNTY—Continued.

REPORT ON FLUSH TANKS.

MONTCLAIR, N. J., April 17th, 1896.

To the Town Council of the Town of Montclair:

GENTLEMEN—Some time ago the board of health was informed that the flush tanks connected with our sewerage system were not being operated. After verifying the statement we addressed a communication to your honorable body expressing the opinion that the flush tanks should be put into use. In response, we received the following:

MONTCLAIR, N. J., April 18th, 1896.

To the Honorable the Board of Health of the Town of Montclair:

GENTLEMEN—The Committee of the Council on Sewerage and Drainage reported last Monday as follows:

"That at present the flush tanks were put in operation once a month. That this was deemed sufficient to the committee, and recommended that the same policy be continued for the present."

The report was received, and on motion, the clerk was directed to refer the same to your board for further report.

By order of the Town Council,

HARRY TRIPPETT,

Town Clerk.

We have learned from Mr. Malcolm H. Smith, superintendent of sewers, that there are now forty flush tanks connected with our sewerage system. The capacity of these at each discharge Mr. Smith assumes as an average of 400 gallons. New tanks are being added with the extensions of laterals. Mr. Smith states that he has been giving special attention to the condition of the sewers, inspecting them once in two months and flushing them at each inspection. He believes them to be in good condition.

Mr. Smith believes that eventually the flush tanks should be connected with the water mains, so the tanks can be filled and discharged by simply turning a faucet, but believes that even then flushing once a month will be sufficient. He estimates that this plan would require 250,000 gallons of water a year, which he says would have to be paid for by the town, first as water and later as increasing the flow of sewage through the joint outlet sewer. "To allow the flush tanks to run automatically," he says, "would immensely increase the amount of water required." We may say in passing that if daily, instead of

ESSEX COUNTY—Continued.

monthly, flushing should be employed it would, of course, increase the amount of water thirty times, assuming that no more water was required for one monthly than one daily flushing. But more than one discharge of the flush tank might be needed for monthly flushing, and the tanks quite probably would have to be supplemented by flushing from man-holes at other points. The effect of the flush water upon our proportion of the cost of maintaining the outlet sewer would be very small in any event, especially as the use of the sewers increases. With forty flush tanks discharging 400 gallons each per day, the total quantity of water would be 16,000 gallons a day, which would be a small proportion of the total flow from the Montclair sewer, and smaller yet of the combined flow of Montclair, Bloomfield and Orange. The total cost of maintaining the outlet is small, and this addition to our share would be insignificant.

The object of sewer flushing is to prevent the formation of deposits in the sewers. These deposits are undesirable because when they occur the sewage is not speedily removed, but remains in the sewers, and through decomposition gives off foul odors which may escape through man-hole covers into the streets, or, worse yet, through defective plumbing into our houses. Should the deposits become large enough they may cause stoppages. But this is not the greatest danger, nor is the prevention of this the chief object of flushing, especially where automatic flush tanks are used.

When a sewerage system is first put in use, the number of connections is often so small as to give a mere dribble of flow through the laterals. This is especially true of the upper reaches, or dead ends, of laterals, of which we have many. The smaller the flow the less the velocity and momentum, and the greater the liability of a slow accumulation of solid organic matter in the sewers. Both theory and practice teach that our conditions are such as to require flushing. The fact that few stoppages have occurred is not proof to the contrary.

All sewer flushing was originally done by hand. This practice is oftentimes very inconvenient, and where frequent flushing is necessary it may prove very expensive. To obviate these difficulties the automatic flush tanks have been devised. These tanks discharge either by their siphon or tilting principle, whenever full, and they can be set to fill quickly or slowly by regulating the flow of water into them. When full they discharge suddenly, filling the sewer partially

ESSEX COUNTY—Continued.

or wholly to its top for some distance, and sweeping all deposits before the rush of water, until the force of the latter is exhausted.

The existence of flush tanks on our sewerage system is evidence of one of two things: either they are needed and should be put into continuous operation, or our engineers made gross errors and caused needless expense in providing tanks.

As the plans for our sewerage system were made by two eminent members of the American Society of Civil Engineers, Messrs. James Owen and Carrol Ph. Bassett, and approved by a third, Mr. Rudolph Hering, one of the highest authorities on this subject in the world, the board of health would be very loath to assume that the flush tanks are a blunder and a needless expense.

Mr. Owen we shall leave to speak for himself. Mr. Bassett kindly writes as follows:

SUMMIT, N. J., April 5th, 1896.

MR. M. N. BAKER:

MY DEAR SIR—Your letter of the 30th ult. arrived here during my absence. I am now able to reply. For satisfactory cleansing of the sewer system of Montclair the flush tank should discharge at least once in twenty-four hours.

Very truly yours,

CARROL PH. BASSETT.

Mr. Hering has also very kindly given us a letter on the general subject of flushing, as follows:

NEW YORK, March 31st, 1896.

DEAR MR. BAKER:

Yours of to-day is received. Kindly read my discussion on Odell's paper in the Transactions of the American Society of Civil Engineers for last September. Of course, the oftener you cleanse a sewer by flushing, the better; but if you ask how often it is necessary, I would say that depends on local conditions. In England sewers are not generally flushed oftener than once a week, and that keeps sewers in fair condition. Also in our country, where automatic flush tanks are *not used*, flushing by hand is not done even that often, and the results are satisfactory to the department. I should say weekly flushing is nevertheless desirable. Where automatic tanks are used, it is almost necessary to have them discharged daily, because they are so small. The small flush and the minimum size of the opening which feeds the tank makes this necessary. If you have an automatic tank—say the Miller or Rhoades-Williams—I should say that daily flushing would be necessary, unless you can make them work less often.

Very truly yours,

RUDOLPH HERING.

ESSEX COUNTY—Continued.

Mr. Hering here makes three main points: (1.) Frequency of flushing depends on local conditions. (2.) As a general proposition, at least weekly flushing is desirable. (3.) Automatic flush tanks should be discharged daily, unless they can be made to discharge automatically less often.

Mr. Bassett states unqualifiedly that our tanks should be discharged "at least once in twenty-four hours." He is intimately acquainted with our sewerage system, while Mr. Hering merely approved the plans several years ago, and in his letter is laying down general principles, without attempting to discuss our local case.

Our engineers have not put in so many flush tanks as is sometimes done elsewhere. For instance, Mr. George H. Frost, chairman of the sewerage committee of the Plainfield city council, informs one of us that on twenty-five miles of sewers Plainfield has seventy-five flush tanks, but with a discharging capacity of only 150 gallons each. These were first set to discharge once daily, and later, at the recommendation of the engineer of the sewerage system, twice daily.

In the discussion to which Mr. Hering refers at the beginning of his letter, some engineers held that automatic flush tanks were unnecessary, and others that their effective work extends for but a short distance below the tanks themselves. We cannot go into this discussion here. The impression conveyed by it is that those who seemed to argue against the necessity of frequent flushing were in the minority and were thinking more of absolute stoppage than of the prevention of slighter deposits, which might give rise to so-called sewer gas.

In conclusion, we would recommend: (1.) That a thorough examination of the interior of our sewers be made at once, by means of special mirrors, or other improved methods, in order to determine their actual condition, and where flushing is most needed.

(2.) That in connection with such inspection experiments be made on the range of influence of the present flush tanks, filling the latter from fire hydrants for this purpose, and observing the effect of the flush upon the volume of flow at man-holes below the flush tanks; also observing the time required to empty a tank, and any other points of value.

(3.) Unless the inspection and experiments throw some new light upon the subject, we recommend that all the flush tanks on the

ESSEX COUNTY—Continued.

system be connected with the water mains, and put into continuous operation, to discharge once in twenty-four hours.

(4.) In case the last-named recommendation be carried out, that subsequent inspections be made from time to time to determine the actual interior condition of the sewers, in order to ascertain whether more or larger tanks or different modes of flushing are needed.

We think that the inspection and experiments recommended could be made by the superintendent of sewers and health inspector, under the direction, at least at the start, of the town engineer or some other person accustomed to such work.

The health board will be pleased to co-operate with your honorable body in any way that may be desired, and if any of our assumptions are wrong, or arguments unfounded, we shall be pleased to be corrected.

(Signed)

R. P. FRANCIS,
M. N. BAKER,
For the Montclair Board of Health.

CITY OF NEWARK.

NAMES OF THE OFFICERS AND MEMBERS.

Dr. H. C. K. Herold, President, 75 Congress street; Dr. D. L. Wallace, 192 Clinton avenue; Dr. R. G. P. Dieffenbach, 222 South Orange avenue; Dr. R. J. Marshall, 82 Congress street; Dr. C. M. Zeh, 481 Broad street; Mr. M. Straus, 1085 Broad street; Mr. J. A. Furman, 65 South Tenth street; Mr. W. B. Guild, 81 Lincoln Park; Mr. J. H. Hines, 53 North Seventh street; Mr. R. B. Sutphen, 257 South Eighth street; D. D. Chandler, Secretary and Health Officer, 74 North Seventh street.

EMPLOYEES OF THE BOARD OF HEALTH.

D. D. Chandler, Health Officer and Secretary, 74 North Broad street; Dr. R. N. Connolly, Bacteriologist, Newark City Hospital; Herbert B. Baldwin, Chemist, 215 Market street; Wm. A. Smith, Apothecary, 75 Pennsylvania avenue; John B. Jacobs, Assistant Apothecary, 29½ Rector street; Wm. Moore Gould, Dentist, 89 Ha'sey street; John J. Greene, Clerk, 275 Academy street; Eugene W. Bellar, Clerk, 45 Congress street; Marie Perier, Stenographer, 372 High street.

Meat Inspectors.

Werner Runge, V. S., 130 Union street; Chas. Wolz, 81 Ferry street.

Plumbing Inspectors.

John B. Sullivan, 204 Second street; Wm. H. Grier, 37½ Third street.

Milk Inspector.

Wm. H. Lyle, 63 Newton street.

ESSEX COUNTY—Continued.

Sanitary Police.

*John Ball, 107 Warwick street; Andrew J. Brady, 115 William street; Louis H. Bridgem, 59 Court street; Robt. J. Edwards, 514 Central avenue; *Thos. E. Freeman, 42 Crawford street; Saml. Knott, 279 Plane street; Thos. F. Newton, 32 Clifton avenue; John McKenna, 194 Newark street; Wm. Rawding, 40 Essex street; *Daniel Studer, 24 Bowery street; Morris Seidl, 411 South Eighth street; *John Wright, 70 Arlington street; Wm. Young, 179 13th avenue.

District Physicians for 1895.

First District—Dr. Louis Hoffman, 223 Ferry street, deceased, successor to Dr. H. Wintsch, 45 Hamburg Place. District lines: Hamburg Place, Lafayette street, Polk street and Passaic river.

Second District—Dr. H. M. Long, 119 Madison street. District lines: Hamburg Place, Lafayette street, Polk street, Passaic river, Railroad Place, Ferry street, Union street, Pacific street and Avenue "D."

Third District—Dr. T. B. Hopper, 203 Mulberry street. District lines: Broad street, Market street, Ferry street, Union street, Pacific street and Avenue "D."

Fourth District—Dr. O. S. Roth, 295 Market street. District lines: High street, Central avenue, Broad street, Park Place, Centre street, Passaic river, Railroad Place, Market street, Broad street, Lincoln Park, Washington street and Spruce street.

Fifth District—Dr. E. J. Isenburg, 63 Springfield avenue. District lines: Hillside avenue, Charlton street, Springfield avenue, Rankin street, Richmond street, Bank street, High street, Spruce street, Washington street and Lincoln Park.

Sixth District—Dr. F. Webner, 1 Belmont avenue. District lines: Fifteenth avenue, Springfield avenue, Charlton street and Hillside avenue.

Seventh District—Dr. V. Nager, 23 Bacon street. District lines: Fifteenth avenue, Springfield avenue, Rankin street, Richmond street, Bank street, Wallace Place, Warren street and Central avenue.

Eighth District—Dr. E. E. Worl, 295½ High street, resigned, successor to Dr. E. Staehlin, 493 High street. District lines: High street, Orange street, Norfolk street, Central avenue, Hudson street, Wallace Place and Bank street.

Ninth District—Dr. E. Everitt, 587 Warren street. District lines: Bloomfield avenue, Clifton avenue, Norfolk street, Central avenue, Hudson street, Warren street and Central avenue.

Tenth District—Dr. E. Zeh Hawkes, 481 Broad street. District lines: Centre street, Park Place, Broad street, Central avenue, High street, Orange street, Clifton avenue, Bloomfield avenue, Passaic river.

VITAL STATISTICS FOR 1895.

Total number of births reported 4,014. Of these 3,936 were white and 98 colored; 1,991 were males and 2,018 were females, and in 5

* Detailed to Disinfecting Corps.

ESSEX COUNTY—Continued.

the sex was not stated; 3,975 were legitimate and 39 were illegitimate. The birth rate per thousand of the population is 18.58, and is less than the death rate for the year.

MARRIAGES FOR 1895.

There were recorded 1,791 marriages. This represents a rate of 8.43 per thousand, which must be considered below the actual rate. Neglect on the part of those whose duty it is to report these facts is the cause.

DEATHS FOR 1895.

There were recorded during the year 4,616 deaths, which represents a death rate of 21.37 per thousand of the population. Of these 3,294 were native born, and 1,288 foreign born, and in 34 cases the nativity was not stated.

The social state of the descendants was as follows:

Married.....	1,244
Single.....	2,659
Widow.....	446
Widower.....	197
Not stated.....	70

Total..... 4,616

Six hundred and twenty-four deaths occurred in institutions.

INFECTIOUS DISEASES REPORTED.

WARDS.	Estimated Population.	Diphtheria, including Membr. Croup.	Scarlatina.	Typhoid Fever.	Small-Pox.
First.....	13,011	32	54	12	4
Second.....	12,543	55	32	12	.....
Third.....	19,615	221	43	5	2
Fourth.....	11,243	25	20	7	.....
Fifth.....	13,837	90	32	12	.....
Sixth.....	14,778	60	55	6	3
Seventh.....	13,476	37	35	11	2
Eighth.....	10,514	94	37	11	.....
Ninth.....	10,646	33	20	10	1
Tenth.....	10,586	124	36	20	1
Eleventh.....	15,592	55	65	6	.....
Twelfth.....	14,557	177	73	17	.....
Thirteenth.....	15,903	149	51	8	.....
Fourteenth.....	20,640	189	39	6	.....
Fifteenth.....	12,861	52	31	6	.....
Total.....	215,802	1,393	623	149	13

ESSEX COUNTY—Continued.

NEWARK, N. J., November 18th, 1895.

To the Honorable the Board of Health:

DEAR SIR—In accordance with your request, I herewith submit a condensed statement of the work done in my department during the year ending December 31st, 1895:

Analyses of milk.....	29
“ “ wall and cistern water.....	130
“ “ city aqueduct.....	20
“ “ special samples of water from the Pequannock water-shed.....	6
“ “ pond water from which ice is cut.....	5
“ “ ice.....	10
“ “ bread.....	8
“ “ tea.....	1
“ “ butter and tyrotoxin.....	1
“ “ wall paper for arsenic.....	1

In addition to the above, I inspected two gold and silver refining establishments and analyzed some condensed smoke from one of them.

The 130 analyses of well-water include the examination of 119 wells. Of these, 62.18 per cent. were marked “contaminat-ed”; 28.57 per cent., “suspicious”; 9.25 per cent., “passable.” Most of the “suspicious” class could very properly be termed “contaminated,” but it was thought advisable to subject them to a re-analysis.

Very respectfully,

HERBERT B. BALDWIN, *Chemist.*

WORK PERFORMED BY THE MILK INSPECTOR, 1895.

Number of wagons inspected.....	1,955
“ “ cans of milk inspected.....	1,843
“ “ lactometer tests.....	822
“ “ stores visited.....	1,020
“ “ cans of milk inspected.....	985
“ “ lactometer tests.....	682
Samples found suspicious and delivered to the Chemist.....	15
Total number of permits for cows, goats, swine.....	360
Total number licensed.....	1,243
Number of cow stables in the city.....	246

NEWARK, N. J., November 19th, 1895.

To the Honorable the Board of Health:

DEAR SIR—The Bacteriological Laboratory of the Board of Health was completed and routine work begun there on March 23^d, 1895.

The routine work consists of the production and preparation of diphtheria antitoxin; preparation of culture outfits and examination of cultures from suspected cases of diphtheria; the sterilizing of receptacles for the collection

ESSEX COUNTY—Continued.

of sputum from suspected cases of tuberculosis, and the examination of the material collected for tubercle bacilli; also the examination of water and milk for the presence of typhoid bacilli.

The first antitoxin was ready for me on June 20th, 1895, and from that period to December 31, 1895, about 900 vials of 10 cc. each were produced. During this time 567 vials were used in cases of diphtheria in the city of Newark, and 94 vials were sold to persons living outside of the city limits. Regarding the influence of this remedy on the disease, some conclusions may be arrived at when we separate the cases of diphtheria occurring within the above period into two groups, *i. e.*, those in which antitoxin was administered, and those in which it was not used. In the first group, of over 500 cases, we find a mortality of 13 per cent., while in the second group, of about 250 cases, we find that over 41 per cent. died.

The number of diphtheria cultures examined from the opening of the laboratory in March, 1895, to December 31st, 1895, was 2,742; of these, 1,513 were received as primary cultures from suspected cases, and in 833 the diphtheria bacilli were found. Between 61 and 62 per cent. of all primary cultures received contained the germs of true diphtheria.

Examination of sputum from 152 suspected cases of consumption were made and in 75 the tubercle bacillus was found. Sterilized receptacles each containing a blank form for data regarding the personal and family history of the patient, and directions for the collection of the sputum, are to be obtained from the various culture stations throughout the city, and the specimens are brought to the laboratory daily by the special collector of the board. A report of the result is forwarded to the physician in charge of the case the following day, and recommendations regarding the disinfection of apartments occupied by tuberculosis patients can be obtained on application at the health office.

Examinations of milk and water, suspected of containing the germs of typhoid fever, were made in twenty-seven cases, and in five specimens the typhoid bacillus was found. One case is especially noteworthy. In early August, 1895, an epidemic of typhoid broke out in the city; seventeen cases were reported and diligent inquiry on the part of the health authorities, aided by the physicians attending the cases, revealed the fact that the disease was confined to families that had been served with milk, the product of one dairyman, whose place was located outside the city limits. Examination of a sample of the milk gave negative results, and water from two wells located on the premises was tested. In one sample of water from a well located near the house, typical typhoid bacilli were found, and when the health inspector visited the place again he was told that the water from this well had been noticeably bad, and was only occasionally used for washing milk pails, pans, &c. Only one or two cases of the disease that could be traced to this source developed after the use of the milk had been stopped, which, about this time, was effectually done by the accidental destruction of the stable by fire.

Respectfully submitted,

R. N. CONNOLLY, M.D.,
Bacteriologist.

ESSEX COUNTY—Continued.

MEAT INSPECTOR'S REPORT.

Slaughter-House Inspections.

Number of cattle inspected.....	13 035
“ “ calves “	13,454
“ “ sheep and lambs inspected	14,915
“ “ swine inspected.....	4,666

Condemned.

Number of cattle.....	36
“ “ calves.....	28
Horses on account of glanders.....	3

Inspection of Butcher-Shop, and Condemnations.

Number visited.....	9,577
Carcasses of beef inspected.....	13,849
“ “ lambs and sheep inspected.....	90,497
“ “ calves inspected	17,161
“ “ swine “	11,030

Condemned.

Bob veal, carcasses.....	33
“ “ quarters.....	1
“ “ loins.....	5
Beef, pounds.....	22
Corned beef, pounds.....	170
“ “ and pork, barrel.....	$\frac{1}{2}$
Lamb, carcasses.....	$2\frac{1}{2}$
Hind-quarters.....	7
Fore-quarters	10
Mutton, fore-quarters.....	32
“ hind-quarters.....	8
“ loins.....	3
Smoked ham, pounds.....	1,466
Pigs-feet, box	1
Chickens, pounds.....	2,712
Chickens, barrel.....	1
Ducks, pounds.....	8
Turkeys, pounds.....	250
Cheese, “	52
Cherries, baskets.....	10
Spinach, barrel.....	$\frac{1}{2}$
Peas, bushel.....	1
Apples, bushel.....	1
Raspberries, crates.....	6
Complaints attended to.....	29

ESSEX COUNTY—Continued.

SANITARY INSPECTIONS.

Number of citizens' complaints.....	2,021
“ “ “ “ verified.....	1,587
“ “ “ “ no cause found.....	434
“ “ “ original inspections.....	11,953
Total number of inspections made.....	13,974
Number of written orders served	2,378
“ “ abatements from same.....	1,958
“ “ verbal notices given.....	1,383
“ “ abatements from same.....	1,263
“ “ hours in court.....	233
Permits issued for cleaning privy vaults.....	1,656
“ “ “ cesspools.....	177
Sewer drains inspected	1,035
Houses disinfected.....	1,723
“ “ phthisis.....	405
Wells inspected.....	178
Wells closed.....	40

PLUMBING DEPARTMENT.

Permits issued to construct plumbing system.....	1,264
Number of plans and specifications filed.....	1,180
Plans rejected	165
Number of water tests.....	2,378
“ “ peppermint tests.....	60
“ “ plumbing inspections.....	1,401
“ “ final plumbing inspections.....	1,224
“ “ permits for McClellan vents.....	426
“ “ violations served.....	1

SUMMARY OF REPORT OF CITY APOTHECARY.

Total number of new cases treated at City Dispensary.....	7,181
“ “ “ “ “ “ for skin diseases (clinic).....	902
“ “ “ “ “ “ men	542
“ “ “ “ “ “ women	264
“ “ “ “ “ “ surgical	743
“ “ “ “ “ “ children	792
“ “ “ “ “ “ medical	3,938
Vaccination.....	1,100
Total number prescriptions from Dispensary.....	33,486

NUMBER OF PRESCRIPTIONS PRESCRIBED BY DISTRICT PHYSICIANS.

First District.....	496
Second “	1,388
Third “	846
Fourth “	692

ESSEX COUNTY—Continued.

Fifth District.....	1,773
Sixth "	645
Seventh "	535
Eighth "	769
Ninth "	542
Tenth "	876

8,562

SUMMARY OF SERVICES RENDERED BY DISTRICT PHYSICIANS.

	Cases.	Visits.	Sent to Hospital.	Deaths.
First District.....	162	293	12	6
Second "	526	1,108	41	30
Third "	383	973	20	15
Fourth "	517	703	35	11
Fifth "	855	1,795	48	26
Sixth "	459	886	13	10
Seventh "	263	383	15	11
Eighth "	401	680	34	10
Ninth "	350	501	11	2
Tenth "	500	1,039	19	20
Total.....	4,416	8,361	248	141

No reports for November and December, 1895, as the City Dispensary was under the control of the Poor and Alms Committee.

RECEIPTS, 1895.

Balance on hand January 1st, 1895.....	\$89 90
Appropriation by Common Council.....	32,500 00
Dead animal contract.....	1,620 00
Fines collected for violation.....	713 69

Office Receipts.

Filing plans, plumbing department.....	2,360 00
Scavenger permits, P. V. & C. P.....	183 30
Scavenger license.....	240 00
Animal permits.....	141 70
Sale of antitoxin.....	114 20
Bacteriological examinations.....	43 50
Sale of vaccine.....	15 00
Plumbing work, ordered by Board, and interest.....	246 87
	\$38,268 16

SANITARY DEPARTMENT.

Salaries.

Health Officer.....	\$2,249 97
Superintendent.....	1,500 00

ESSEX COUNTY—Continued.

Clerks (2).....	\$1,782 50
Stenographer.....	312 00
Chemist.....	750 00
Meat Inspectors (2).....	2,000 00
Plumbing Inspectors (2).....	2 000 00
Milk Inspector.....	687 50
Sanitary Police.....	10,134 50
Janitress.....	165 00
Meteorologist.....	36 00

\$21,617 47

Expenditures.

Rent of office.....	799 92
Paid physicians (reporting infectious diseases 1894-95).....	746 45
Stationery and printing.....	600 58
Printing Annual Report 1894.....	375 50
N. Y. and N. J. Telephone Co. (2).....	259 65
Petty cash for office.....	256 35
Furnishing plans (Sterilizing Plant).....	250 00
Electric lights for office.....	72 08
Remington Typewriter (Exchange).....	62 00
Advertising.....	60 50
Preparing contagious disease maps.....	60 00
Forman J. Reynolds (by resolution).....	57 50
Edison's Automatic Mimeograph.....	45 00
Coal and wood for office.....	35 75
Office furniture.....	33 88
Ice for office.....	33 70
Cost of court (District Court cases).....	22 51
Utensils (maps, brooms, etc.).....	22 37
Expenses to Cumberland county (anthrax).....	15 00
Binding fifty copies Annual Report.....	12 50
Typewriter supplies.....	12 35
American Public Health Association.....	10 00
Professional services (veterinary surgeon, purchase of horse).....	10 00
Incandescent lamps for office.....	7 55
Operator on typewriter and dictation.....	7 00
Expenses to water-shed.....	5 35
Carriage hire.....	5 00
One directory.....	5 00
Taking down and putting up office awnings.....	3 00
Shades for incandescent lamps.....	2 40
Bottles.....	2 40
Expressage.....	2 10
One year's subscription (Annals of Hygiene).....	2 00

\$25,512 86

ESSEX COUNTY—Continued.

Disinfecting Corps.

Board of horse and wagon hire.....	\$334 00
Supplies (disinfectants).....	264 06
Purchase of two horses.....	170 00
Purchase of wagon.....	90 00
Harness, blankets, etc.....	57 40
Horseshoeing.....	23 50
Rubber gloves.....	5 25
Repairing harness.....	5 10
Canton flannel.....	1 88
Total.....	\$26,464 05

Dispensary.

Apothecary's salary.....	\$1,000 00
Assistant Apothecary's salary.....	500 00
Janitress.....	165 00
District Physicians (10).....	3,333 30
Dentist.....	125 00

Expenditures.

Drugs.....	1,123 72
Vaccine.....	270 00
Liquors.....	131 28
Coal.....	71 00
Surgical instruments.....	56 16
Plumbing.....	38 65
Gaslight.....	33 41
Ice.....	25 00
Corks.....	19 00
Bandages and cotton.....	17 75
Washing towels.....	17 34
Carpenter work.....	15 30
Stationery.....	3 00
Repairing clock.....	2 00
Total.....	\$6,946 91

SMALL-POX.

Superintendent Isolation Hospital.....	\$50 00
Nurse, " ".....	500 00
Assistant Nurse, " ".....	100 00
Cook, " ".....	50 00
Orderlies, " " (2).....	350 00
Orderly, " " (from June 1st to December 31st),	319 00
Special officers—quarantine guard duty.....	519 65
Board of small-pox patients (by Poor and Alms Committee of Com-	
mon Council).....	744 87
Fuel (for Isolation Hospital and quarantine houses).....	348 55

ESSEX COUNTY—Continued.

Clothing (Discharged patients, Isolation Hospital).....	\$301 83
Medical attendance (Isolation Hospital).....	270 00
Medical consultation.....	18 00
Groceries (furnished quarantined houses).....	225 21
Meat " " ".....	94 63
Coach-hire.....	49 10
Drugs (Isolation Hospital).....	46 08
Goods destroyed and replaced in quarantined houses.....	23 00
Fish (quarantined houses).....	26 48
Nurse quarantined (services and loss of time).....	10 00
Kitchen utensil (Isolation Hospital).....	8 44
Newspapers " ".....	7 58
Plumbing " ".....	4 25
Tobacco (quarantined houses).....	3 20
Total.....	\$4,069 87

BACTERIOLOGICAL DEPARTMENT.

Appropriation by Common Council.....	\$5,000 00
Salaries.....	\$1,094 81
Purchase of antitoxin.....	207 00
Laboratory supplies.....	507 99
Purchase of horses (5).....	140 00
Professional services and maintenance of horses.....	928 77
Incubators for laboratory.....	168 00
Petty cash.....	100 00
Guinea-pigs.....	98 00
Carpenter work.....	8 05
Plumbing ".....	81 15
Stationery.....	46 55
Wire cages.....	36 00
Wooden boxes and culture tubes.....	34 45
Flasks.....	30 84
Office furniture.....	29 50
Syringes and needles.....	19 00
Blood serum apparatus.....	15 00
Alcohol.....	13 29
Horseshoeing.....	12 75
Rubber corks.....	11 52
Horse-blankets.....	11 00
Imperial Mail Case Company (cases).....	8 64
Hardware.....	7 86
Oils.....	7 50
Thermometers.....	6 50
Glass jars.....	5 62
Pocket-scales.....	3 50

3,713 29

\$1,286 71

ESSEX COUNTY—Continued.

RECAPITULATION.

Total receipts.....	\$38,268 16
“ expenditures.....	37,480 83
Balance on hand January 1st, 1896.....	\$787 33

BIRTHS REPORTED FOR 1895, COMPLETE.

Total.	COLOR.		SEX.			NATIVITY OF PARENTS.						NAME OF CHILD.			LEGITIMACY.			
	White.	Colored.	Male	Female.	Not Stated.	Native.	Foreign.	Foreign Father Only.		Foreign Mother Only.		Not Stated.	Stated.	Not Stated.	Legitimate.	Illegitimate.		
								Nativity of Father Stated Only.	Nativity of Mother Stated Only.	Native.	Foreign.						Native.	Foreign.
4014	3936	78	1991	2018	5	1677	1798	393	197	0	8	23	15	3	2838	1176	3975	39

STILL-BIRTHS FOR 1895.

Total.	COLOR.			SEX.			FATHER.			MOTHER.		
	White.	Colored.	Not Stated.	Male.	Female.	Not Stated.	Native.	Foreign.	Not Stated.	Native.	Foreign.	Not Stated.
272	258	6	8	144	102	26	114	144	14	115	146	11

MARRIAGES FOR 1895.

Total.	White.		Colored.		NATIVITY.						First Marriage.		Second Marriage.		Third Marriage.		Fourth Marriage.		Not Stated.		
	Male.	Female.	Male.	Female.	Native.		Foreign.		Not Stated.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
					Male.	Female.	Male.	Female.													
1791	1754	1754	37	37	1020	1058	761	693	10	40	1445	1434	214	186	12	9	2	1	118	161	

ESSEX COUNTY—Continued.

NATIVITY OF DESCENDANTS.

United States.....	3,294
Germany.....	519
Ireland.....	480
England.....	83
Austria.....	27
Hungary.....	4
Russia.....	22
Isle of Man.....	1
Canada.....	3
Norway.....	2
Switzerland.....	17
Italy.....	57
France.....	15
Holland.....	3
Belgium.....	2
Denmark.....	3
Finland.....	1
Bohemia.....	4
Scotland.....	24
Poland.....	11
Sweden.....	8
Greece.....	2
Not stated.....	34
	<hr/> 4,616
Native born.....	3,294
Foreign born.....	1,288
Not stated.....	34
	<hr/> 4,616

DEATHS IN INSTITUTIONS.

City Hospital.....	159
German Hospital.....	70
St. Barnabas Hospital.....	53
St. Michael's Hospital.....	201
City Almshouse.....	24
Home for the Aged.....	5
Essex County Hospital for Insane.....	54
Essex County Jail.....	3
Home of "The Little Sisters of the Poor".....	35
Home for Incurables.....	4
Eye and Ear Infirmary.....	2
House of the Good Shepherd.....	9
Isolated hospital.....	1
Eighth Avenue Day Nursery.....	1
Home for the Aged and Helpless.....	1
Elexian Bros.' Hospital.....	1
Baptist Home.....	1

ESSEX COUNTY—Continued.

DEATHS IN PUBLIC PLACES.

St. Joseph's R. C. Church.....	1
Plane Street Presbyterian Church.....	1
St. Mary's Academy.....	1
Palace Hotel.....	2
Newark Electric Light and Power House.....	1
Police Ambulance.....	1
Avon avenue and Fifteenth street.....	1
Newark Meadows.....	1

Report of Chemical Examination of Well-Waters.

LOCATION OF WELL.	Sample No.	Kind and Depth.	Manufacturing or Domestic Purposes.	Privy Vaults and Cesspools within			Result of Analysis.
				30 Feet.	50 Feet.	100 Feet.	
Avon Place, 26.....	562	Pump.	Domestic.	1 P. V.	1 P. V., 1 C. P.	1 P. V., 1 C. P.	Badly contaminated.
Barbara street, 47.....	568	Bucket, 25 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
Barbara street, 92.....	578	Bucket, 18 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Boyd street, 12.....	478	Cistern.	"	2 P. V.	1 P. V.	1 P. V.	Suspicious.
Broome street, 272.....	498	Pump, 20 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
Barclay street, 187-189.....	506	Bucket, 25 ft.	"	1 P. V., 1 C. P.	1 P. V.	1 P. V.	Badly contaminated.
Belmont avenue, 168.....	503	Cistern.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
Belmont street, 98.....	567	Pump.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
Raidwin street, 10.....	468	Bucket, 26 ft.	"	1 P. V.	1 P. V., 1 C. P.	1 P. V.	Contaminated.
Crawford street, 16.....	632	Pump, 10 ft.	"	1 P. V.	1 P. V., 1 C. P.	1 P. V.	Badly contaminated.
Calumet street, 10.....	505	Cistern, 9 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Charlton street, 205.....	481	Well-cistern.	"	1 P. V.	1 P. V.	1 P. V.	"
" " 194.....	473	Pump, 80 ft.	"	2 P. V., 2 C. P.	1 P. V.	1 P. V.	Contaminated.
Eighteenth avenue, 226.....	491	Pump.	"	1 P. V.	1 P. V.	1 P. V.	"
Fourth avenue, 165-167.....	506	Pump.	"	2 P. V., 2 C. P.	1 P. V.	1 P. V.	"
Fifteenth avenue, 125.....	491	Cistern, 9 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Front street, 88.....	537	Pump, 35 ft.	"	2 P. V.	2 P. V.	2 P. V.	Passable.
Fifth street, 514.....	583	Bucket, 25 ft.	"	1 C. P.	1 P. V.	1 P. V.	Contaminated.
Fillmore street, 18.....	561	Pump, 25 ft.	"	2 C. P.	1 P. V., 2 C. P.	1 P. V.	"
Goble street, 64.....	485	Bucket, 20 ft.	"	1 C. P.	1 P. V.	1 P. V.	"
" " 30-32.....	486	Bucket, 20 ft.	"	1 C. P.	2 C. P., 2 P. V.	2 P. V.	"
" " 28.....	477	Bucket, 16 ft.	"	1 C. P.	1 P. V.	1 P. V.	"
" " 22.....	488	Bucket, 16 ft.	"	1 C. P.	2 C. P.	2 P. V.	"
" " 37.....	489	Bucket, 30 ft.	"	1 C. P., 1 P. V.	1 P. V.	2 P. V.	"
" " 31.....	531	Open, 32 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
*Garrison street, 20-22.....	525	Pump, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Halsey street, 427.....	525	Pump, 18 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
High street, 770.....	515	Bucket, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
*Houston street, 46.....	554	Pump, 15 ft.	"	2 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 37.....	579	Pump, 13 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Hunterdon street, 498-500.....	533	Pump, 35 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 488-488.....	534	Pump, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
" " 478.....	535	Pump, 35 ft.	"	2 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 87.....	563	Open.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
Jay street, 25.....	475	Bucket, 90 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
Koeb street, 25.....	475	Pump, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Kosuth street, 69.....	539	Bucket, 25 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
* " 65.....	555	Bucket, 20 ft.	"	2 P. V.	3 P. V.	1 P. V.	Suspicious.
" " 13.....	570	Bucket, 20 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 84.....	571	Pump.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 96.....	572	Bucket, 25 ft.	"	1 P. V.	1 P. V.	2 P. V.	Contaminated.
" " 96.....	572	Pump, 20 ft.	"	1 P. V.	1 P. V.	2 P. V.	Badly contaminated.

*Premises where typhoid fever occurred.

LOCATION OF WELL.	Sample No.	Kind and Depth.	Manufacturing or Domestic Purposes.	Privy Vaults and Cesspools.			Result of Analysis.
				30 Feet.	50 Feet.	100 Feet.	
Kosuth street, 85.	573	Pump, 15 ft.	Domestic.	1 P. V.	1 P. V.	2 P. V.	Contaminated.
" " 92.	574	Bucket, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 81.	575	Pump, 20 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
" " 85.	576	Pump, 18 ft.	"	1 P. V.	1 P. V.	3 P. V.	Badly contaminated.
Lillie street, 118.	577	Pump, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Montgomery street, 58.	580	Pump, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
" " avenue.	584	Bucket, 60 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
Main street, 91-93.	584	Bucket, 20 ft.	"	1 P. V.	1 P. V.	1 C. P., 2 P. V.	Badly contaminated.
Magnolia street, 109.	584	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
" " 111.	470	Bucket, 100 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Mulberry street, 211.	474	Artesian, 211 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Morton street, 29.	479	Bucket.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Marcer street, 26.	472	Bucket, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
Moroe street, 28.	482	Bucket, 16 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
" " 85.	523	Pump, 15 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Myrtle avenue, 91.	511	Bucket.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
New Jersey Railroad avenue, 174.	484	Driven well, 40 ft.	Manufacturing.	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
" " 504.	528	Bucket, 14 ft.	Domestic.	1 P. V.	1 P. V.	2 P. V., 1 C. P.	Badly contaminated.
Niagara street, 17.	463	Pump, 35 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
" " 21.	494	Pump, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
" " 31.	465	Open well, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 18.	480	Pump, 17 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
" " 32.	496	Pump, 60 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
New street, 95.	500	Pump.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
Nassau street, 30-32.	559	Pump, 60 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
Oxford street, 18.	565	Pump.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
O'Connell street, 15.	580	Bucket, 8 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Piane street, 67.	565	Pump.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
Plank road or Kiple's row.	540	Pump.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
" " 43.	560	Bucket.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 41.	493	Pump, 19 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 37.	494	Bucket, 21 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
Prospect street, 91-93.	495	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Pacific street, 160-162.	490	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
Roland street, 35.	482	Bucket, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
Riverside avenue.	477	Bucket, 45 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " "	502	Bucket, 60 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " "	516	Bucket, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
" " "	517	Bucket, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.

* Premises where typhoid fever occurred.

LOCATION OF WELL.	Sample No.	Kind and Depth.	Manufacturing or Domestic Purposes.	Privy Vaults and Cesspools.			Result of Analysis.
				30 Feet.	50 Feet.	100 Feet.	
Riverside avenue.	518	Bucket, 60 ft.	Domestic.	1 P. V.	1 P. V.	1 C. P.	Passable.
" " 781.	519	Bucket, 50 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
" " 9.	520	Bucket, 20 ft.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
" " 521.	521	Bucket, 50 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
" " 522.	522	Bucket, 45 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Stone street, 13.	538	Pump, 60 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
St. Francis street, 66.	527	Pump, 25 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Spr. field avenue, 413-415.	505	Bucket, 36 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
Sixteenth avenue, 242.	499	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
South Eighth street, 466-488.	529	Bucket, 38 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 193-225.	568	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
South Tenth street, 631.	550	Pump, 60 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 583.	551	Pump, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
" " 549.	557	Pump, 40 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 569.	552	Pump, 45 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
South Eleventh street, 605.	523	Bucket, 45 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 587-589.	547	Bucket, 25 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
South Twelfth street, 590-592.	540	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 584.	541	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 576.	542	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
" " 577.	543	Pump, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
" " 602-604.	545	Pump, 22 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
" " 594-598.	548	Bucket, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
*South Nineteenth street, 676.	604	Pump, 35 ft.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
Third street, 619.	507	Bucket, 50 ft.	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
" " 610.	508	Bucket, 35 ft.	"	1 P. V.	1 P. V.	1 P. V.	Suspicious.
" " 608.	509	Bucket, 35 ft.	"	1 C. P., 1 P. V.	1 C. P., 1 P. V.	1 P. V.	Very suspicious.
" " 615-620.	510	Bucket, 35 ft.	"	1 C. P., 1 P. V.	1 C. P., 1 P. V.	1 P. V.	Passable.
" " 639.	512	Pump.	"	1 C. P., 1 P. V.	1 C. P., 1 P. V.	1 P. V.	Contaminated.
" " 622.	513	Bucket, 28 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
" " 628.	514	Bucket, 18 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
*Wilsey street, 87.	466	Bucket, 18 ft.	"	1 P. V.	1 P. V.	1 P. V.	Contaminated.
" " 87.	467	Bucket, 50 ft.	"	1 P. V.	1 P. V.	1 P. V.	"
Washington street, 390.	497	Pump	"	1 P. V.	1 P. V.	1 P. V.	Badly contaminated.
Waverly avenue, 207-209.	469	Pump, 25 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
Walnut street, 417-419.	540	Bucket, 20 ft.	"	1 P. V.	1 P. V.	1 P. V.	Passable.
Wallace street, 38.	524	Pump, 30 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very suspicious.
West street, 16.	582	Cistern, 6 ft.	"	1 P. V.	1 P. V.	1 P. V.	Very badly contaminated.

* Premises where typhoid fever occurred.

AREA OF CITY AND EXTENT OF PUBLIC IMPROVEMENTS.

Census population 1895.....	181,830
Estimated population 1895.....	215,802
Total area of city, square miles.....	18
Built-up portion.....	12
Meadow land.....	6
Length of river and bay front, miles.....	10.5
Number of miles of granite block pavement.....	24 40
" " " " trap block pavement.....	12 34
Number of miles of brick pavement.....	1.26
" " " " telford pavement.....	10.94
" " " " cobblestone pavement.....	17 21
" " " " asphalt pavement in streets.....	11.67
Total length of paved streets.....	76 82
Number of miles of unpaved streets.....	140 50
Length of Electric Railway, miles.....	109.5
" " steam railroad, miles.....	28.38
" " brick sewers, miles.....	54.23
" " private pipe sewers, miles.....	18 59
" " public pipe sewers, miles.....	55 25
Total length of sewers, miles.....	128.07
Length of water mains, miles.....	227.18
Average daily consumption of water, gallons.....	22,200,000
Capacity of water-supply per day, gallons.....	46,000,000
Number of buildings.....	27,615

RETURN OF DEATHS FROM ALL CAUSES AND CERTAIN SPECIFIED DISEASES, IN THE STATISTICAL DIVISIONS OF THE STATE OF NEW JERSEY, FOR THE YEAR ENDING JUNE 30, 1896.

Newark, Essex County, Statistical Divisions.	DEATHS AT ALL AGES.		PRINCIPAL CAUSES OF DEATH.	
	Under one month.	826	739	731
	Between one month and one year.	731	370	1678
	One to five.	731	370	1678
	Five to twenty.			
	Twenty to sixty.			
	Over sixty.	783		
	Undefined.	20,487		
	Total, including unclassified.	21,672		
	Population, census of 1896.	216,725		
	Death-rate per 1,000.	21.26		
	Remittent fever, etc.	18		
	Enteric fever.	52		
	Small-pox.	.....	
	Scarlet fever.	20		
	Measles.	46		
	Whooping-cough.	17		
	Diphtheria and croup.	305		
	Erysipelas.	26		
	Diarrhœal diseases of children.	366		
	Consumption. M.	347		
	Consumption. F.	213		
	Acute lung diseases.	831		
	Brain and nervous diseases of children.	370		
	Diseases of heart and circulation.	360		
	Renal and cystic diseases.	210		
	Adult brain and spinal diseases.	348		
	Digestive and intestinal diseases.	262		
	Cancer.	164		
	Acute rheumatism.	10		
	Puerperal.	24		
	Violent deaths.	44		
Total.....	826	739	731	370

ESSEX COUNTY—Continued.

CITY OF ORANGE.

NAMES OF MEMBERS AND OFFICERS.

John T. Platt, President; James H. Brown, John Burke, Stephen Collins, G. H. Richards, M.D., P. J. Hannagan, Augustus Eichorn, Thomas F. Phelan, M.D., Chief Health Inspector; William Schluer, Secretary and Assistant Health Inspector; Thomas Shannon, Deputy Health Inspector; Samuel D. Philpot, Plumbing Inspector; J. W. Stickler, M.D., Pathologist.

House-to-house inspections are made and records of such inspections are kept in book-form, a separate book for each street. With every subsequent inspection the records are revised and changes in the condition of the premises noted.

Our water-supply is satisfactory in quality and quantity. The system has been extended to a few newly-made streets, less than a mile in all.

Our sewer system is in good working order. The six miles to be added, as reported in our last report, are about completed. Many connections have already been made in the new section. No serious defects in the system have been detected thus far.

All plumbing is controlled and inspected by an officer of the board.

Garbage is collected by the city scavenger and taken away by a fertilizer manufacturing company. The night-soil and cesspool matter is taken away by licensed scavengers, and removed beyond the city limits, each scavenger providing his own dumping-ground.

We had one case of suspected bovine tuberculosis, and the animal was removed to Newark by the owner. We gave due notice to the board of health of Newark.

Physicians report promptly all cases of contagious diseases; printed postal cards being furnished for the purpose. A record is kept by the secretary, and weekly reports to the State Board of Health have been made promptly.

We have not offered gratuitous vaccination.

We have no hospital for the isolation of contagious diseases, except small-pox.

We have no trades which are especially dangerous to health. Soft felt hats are extensively manufactured here, but the factories do not emit odor or cause nuisance.

We have no dairy premises except two or three places where milk is supplied to neighbors.

ESSEX COUNTY—Continued.

No special inquiry has been made by the board regarding the adulteration of food.

Kerosene oil is not tested; we know of no accidents in this city which occurred from its use.

The abatement of nuisances in general has been vigorously pursued during the year. Aside from the many unsanitary conditions permanently removed by sewer connections, we succeeded in ridding the city of several nuisances which had menaced the health of the public for years. Noteworthy is the brook from Oakwood avenue to Farrow street. It had been converted into an open sewer by premises abutting on its banks, and the Oakwood avenue public school is in the immediate vicinity. Frequent communications to the common council, persistent agitation among the people, finally prevailed, so that to-day the brook has been entirely obliterated. A twenty-inch pipe, laid many feet below the former brook-bed, now carries the storm-water into the storm-sewer. The condition of the other brooks running through the city has also been improved. Four hundred and thirty-three sewer connections were made, making fifteen hundred and fifty four in all. While the waste-water from so many premises now discharges into the sewer, the abandonment of the privy-vaults is not as universal as we would like. It will take a long time ardently devoted to this work before the last of these unclean, unsightly structures has been removed.

The contagious disease cases reported during the year are: Diphtheria, 181 cases, with 35 deaths; membranous croup, 9 cases, with 6 deaths; scarlet fever, 85 cases, with 1 death; typhoid fever, 18 cases, with 2 deaths.

The large increase in contagious disease reports is greatly due to the fact that in former years physicians did not report cases following the first case in a family, but, that we might be in possession of authenticated statistics, proving the necessity of an isolation hospital, we caused all subsequent cases to be reported, and find by the reports that in many cases the entire family was attacked by the disease, due to the inability of isolating the first case. We will use these statistics in our next report to the common council, to again forcibly demonstrate to them that such a hospital is needed. Another probable cause is the condition of our public schools. The three principal structures used as public schools in this city still maintain the old unsanitary privy

ESSEX COUNTY—Continued.

vaults, long since condemned by all sanitarians. These nasty pits are cavernous structures of immense capacity; when full, they contain the accumulated filth of a year or two; when empty, the large area exposed to the atmosphere causes foul and dangerous gases or vapors. The marked increase in cases of contagious disease as soon as the public schools are opened is proof of our assertion. Our private schools, which are all provided with the most approved sanitary appliances, give further proof in the absence of this marked increase in sickness among their scholars. We have requested, urged and ordered the board of education to abandon the pits and substitute sanitary fixtures connected with the sewer, but, up to date, deaf ears have been turned to our solicitations, and the board of education has taken no action.

Our method of disposing of the garbage collected by the city scavenger is the best we can employ until the city authorities shall appropriate sufficient funds to improve the service. We suggest that local boards of health take up the subject of garbage cremation, and believe that much good would follow a general agitation in favor of the destruction by fire of all waste and filth which is not discharged into sewers.

The most important rule adopted by the board of health is that relating to diphtheria cases. In November of last year an ordinance was passed requiring the presentation of a certificate from the pathologist of the board, establishing, by bacteriological examination, the absence of diphtheria bacilli in the throat of the patient, before quarantine shall be raised. To facilitate this work and to lighten the burden thus imposed upon the physicians, the tubes necessary to make the cultures are kept on hand at the laboratory and at the office of the board. An agreement was made with the pathologist, whereby the latter agrees to examine all cultures sent by physicians from patients residing within the city limits, the board paying a stipulated amount annually to defray the cost. This places within reach of every physician ample opportunities to assist in making a diagnosis in suspected cases, without cost to patient or physician. While it is optional with physicians whether they avail themselves of these advantages or not, we demand a certificate, as stated above, before we remove card or fumigate premises. In this manner we think that we have prevented the

ESSEX COUNTY—Continued.

spread of the disease by forbidding convalescent patients to be at large while the germs were still present.

Our board meets on the fourth Thursday in every month.

The annual appropriation from the common council is \$2,500.

THOMAS F. PHELAN, M.D.,
Chief Health Inspector.

WILLIAM SCHLUER,
Secretary.

VILLAGE OF SOUTH ORANGE.

An ordinance recently passed by the trustees of the village abolished the former board of health and authorized the appointment of a new board, but delay has occurred in confirming the names presented by the president of the trustees, and consequently there is at present no board of health in the village. Wm. J. Chandler, M.D., continues to perform the duties of inspector.

SOUTH ORANGE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Wm. Palen, Jr., President, South Orange; S. B. Tillon, South Orange; John Walker, South Orange; Wm. Hogan, South Orange; W. W. Hebberton, M.D., South Orange; W. F. Kent, Maplewood; F. C. Baker, Maplewood; J. F. Osborne, Secretary, Hilton.

New water mains have been laid through some of the streets of the Maplewood district. New ordinances have been prepared by the board for the regulation of the deposit and disposal of night-soil and garbage, and they will soon be adopted.

VERONA TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

C. S. Simonson, President, Verona; Fillmore Condit, Verona; C. A. Williams, Verona; J. E. DeCamp, Verona; John Smith, Singac; W. L. Scott, Verona; H. B. Whitehorne, M.D., Secretary, Verona.

Ordinances have been adopted by the board. Intestinal troubles among children have not been prevalent during the past year. The Newark city home, which is located in this township, is maintained in a good sanitary condition.

ESSEX COUNTY—Continued.

WEST ORANGE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

George S. Dodd, President, West Orange; Carl Fentzloff, Montclair; Levi Van Buskirk, Orange Valley; Abram S. Osermiller, Orange Valley; William M. Brien, M. D., Health Inspector, Orange Valley; John Reid, West Orange; Frank C. O'Connor, Secretary, West Orange.

During the past year there have been nineteen cases of scarlet fever, resulting in one death; thirty-six cases of diphtheria, with five deaths; and five cases of typhoid fever, with one death.

The death from typhoid fever occurred in a milkman's family. No cause could be assigned, and no other case developed which could in any way be traced to this source.

A yearly inspection is made of all dairies by our health inspector, under the supervision of the State Dairy Commissioner. A house-to-house canvass is made in the more thickly settled portion of the township, and in the farming locality the dairy inspection takes its place.

January 1st, 1896, the board hired a bacteriologist, and cultures are made for all physicians free of charge.

W. M. BRIEN, M.D.,
Health Inspector.

GLOUCESTER COUNTY.

BOROUGH OF CLAYTON.

NAMES OF MEMBERS AND OFFICERS.

D. W. Moore, Jr., President; A. G. Silver, A. H. G. Buckingham, M.D., Secretary.

The borough is supplied with water from a new system of water-works, but many families continue to use water from surface-wells. All premises are inspected once each year.

DEPTFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Adon W. Muller, Almonesson; Jos. Noblet, Wenonah; Benjamin F. Haines, Westville; H. H. Stout, M. D., Wenonah; William C. Cattel, Secretary.

GLOUCESTER COUNTY—Continued.

EAST GREENWICH.

NAMES OF MEMBERS AND OFFICERS.

John Rambo, Jr., Paulsboro; Edward H. Steward, Clarksboro; Charles Dorrman, Mickleton; Chalkley Haines, Secretary, Mickleton.

FRANKLIN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jacob Richman, Malaga; Walter Rice, Zanzvier; Samuel Lowder, Newfield; Nelson Jones, Franklinville; A. A. Smith, M.D., Malaga; Joshua C. Richman, Secretary, Malaga.

GLASSBORO TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Thos. G. Allen, President; John P. Whitney, Ira Iszard, David Paulin; Chas. S. Heritage, M.D., Secretary.

Water-works are at present under construction.

There are no sewers in the township.

Communicable diseases have not been reported to the board.

GREENWICH TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John Rambo, Paulsboro; Daniel Ackley, Paulsboro; Wm. H. Duncan, Gibbstown; George C. Laws, M.D., Paulsboro; Jacob Ballinger, Secretary, Paulsboro.

There have been a few cases of typhoid fever, and also several of diphtheria.

HARRISON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

W. W. Justice, Richwood; Samuel Stratton, Mullica Hill; Ira Coles, Mullica Hill; S. F. Ashcraft, M.D., Mullica Hill; Eli Heritage, Richwood.

SOUTH HARRISON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Chas. Horner, President; Alfred Lippincott, George Conover, Amos T. Eastlack; Samuel F. Stanger, M.D., Secretary. All of Harrisonville.

Communicable diseases have been promptly reported and a record has been kept.

GLOUCESTER COUNTY—*Continued.*

WASHINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

B. F. Allen, President, Hurffville; Albert Williams, Turnerville; George Rowan, Crosskeys; Charles Nicholson, Turnerville; C. B. Phillips, M.D., Secretary, Hurffville.

WEST DEPTFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Joseph Lowe, Thoroughfare; Joseph A. Moore, Woodbury; James Hunter, M.D., Westville; R. M. Plum, Westville; Mark Clement, Secretary, Woodbury.

WOODBURY.

NAMES OF MEMBERS AND OFFICERS.

Warner Underwood, President; Wm. M. Carter, A. L. Terry; T. E. Parker, M.D., Secretary; Charles Walton, W. C. Williams, M.D., Inspector.

No epidemic diseases, except a few sporadic cases of scarlet fever and diphtheria, and no deaths from these diseases. There was no house-to-house inspection made, as the citizens generally have shown a willingness to co-operate with us. The water-supply has been plentiful and pure, and the city council endeavor to maintain it in this condition. On account of no sewerage, dirty gutters and drains are a source of annoyance, but during a protracted dry spell the fire-plugs are occasionally opened, flushing the street gutters, thus cleaning them out and removing the collected filth.

The garbage, night-soil and cesspool contents are gathered by private parties and carried outside of city limits or buried in places remote from any house or well.

All cases of communicable diseases are required to be reported on blanks furnished by the board, and the secretary reports the same to school superintendent and to the Secretary of the State Board of Health. Children are not required to present a certificate that they have been vaccinated, when entering the public schools.

We have no means of isolating infectious diseases. We have no factory or other places where the employees are liable to injure their health by remaining or continuing their occupation. There are but few cows kept within the city limits, and no inspection is made of stables.

T. E. PARKER,
Secretary.

GLOUCESTER COUNTY—*Continued.*

WOOLWICH TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

James M. Batten, President; A. P. Bradshaw, James Homer, Samuel Ains, E. F. Buzby, M.D. P. O. address of all, Swedesboro.

Four cases of diphtheria, three cases of scarlet fever, and two of typhoid fever, occurred during the year.

HUDSON COUNTY.

CITY OF BAYONNE.

NAMES OF MEMBERS AND OFFICERS.

Egbert Seymour, Mayor, President; William J. O'Brien, President of the City Council; Henry Meigs, Frederick F. Martinez, Jr., Secretary; Vedder Van Dyck, James Brady, James Foerst, Archibald C. Forman, M.D., Health Inspector; John H. Nevins, Deputy Inspector; Andrew T. Gill, Sanitary Inspector.

Since our last annual report, the work of the board has shown a very great improvement, the several departments having been systematized, and a thorough report kept of all transactions, complaints, diseases, nuisances, etc., in books gotten up especially for the purpose. House-to-house inspection is regularly performed. The water-supply is vastly improved, but at present is only temporary. A permanent supply is expected by the first of January, 1897. Water and sewer systems are being gradually extended as the needs of the city demand. Plumbing is performed in accordance with the provisions of chapter 56 of the laws of 1888, and our sanitary inspector is very active in requiring that the provisions of the law shall be carried out. Inspections have been frequent and the tests have been rigid. The collection and disposal of garbage, while showing an improvement over last year, is still done in a primitive manner. We must very soon take this matter seriously in hand and adopt the modern method of cremation. Night-soil and cesspool contents are collected by our licensed scavengers in closed wagons and disposed of out of the city. With the exception of a case of glanders, there have been no infectious diseases among animals. All physicians now report all cases of communicable diseases on printed blanks furnished by our board, and a record

HUDSON COUNTY—Continued.

of the same is kept in a special book provided for that purpose. Our health inspector transmits a weekly statement to the State Board of Health, as required by law. As is our custom, gratuitous vaccination has been offered to the public during the past year. No provision has been made for isolating cases of diphtheria, small-pox, typhus fever, etc. At the present time all malignant cases are sent to the county pest-house. There are no trades or occupations in our city injurious to the health of operatives, neither are there any factories from which odor or refuse cause a nuisance, though the smoke from the oil refineries is sometimes disagreeable. We, however, are seriously annoyed by the odors coming from the bone factories on the meadows, across Newark Bay, and, unfortunately, over which we have no jurisdiction. We consider them a menace to health. Our board makes no inquiry into the adulteration of foods.

Our city is to be congratulated on the vast improvements being made in school accommodation. The lack of room, causing overcrowding, and the generally unsanitary condition of the old school-buildings caused this board to take early action in the matter, and the people had their eyes opened to the fact that a dangerous state of affairs existed. We are now in a fair way of averting all danger. Much-needed extensions are being made to two of the school buildings, and a commodious school-house is being erected in the Third ward at a cost of over \$50,000. The old buildings also have been thoroughly renovated and improved, and the authorities are to be commended for the activity they have shown in making these improvements.

F. F. MARTINEZ, JR.

CITY OF HOBOKEN.

NAMES OF MEMBERS AND OFFICERS.

E. T. Steadman, M. D., President; L. S. Fugazzi, Treasurer; Palmer Campbell, August Graismann, S. A. Helfer, M. D.; W. J. Arlitz, M. D., Health Warden; G. M. Sinclair, Plumbing Inspector; H. L. Allen, Attorney; Antonio Granelli, Health Inspector; James Havron, Clerk.

A house-to-house sanitary inspection is made once a year.

There is no serious defect in the water-supply.

A trunk sewer has been constructed from the meadows to the Hudson river.

HUDSON COUNTY—Continued.

Garbage is collected by contract and is dumped on the meadows. Night-soil is collected by licensed scavengers and transported to scows at Jersey City. The refuse from cesspools is dumped on the meadows.

There have been a few cases of glanders.

All cases of contagious diseases are reported by physicians, and blank forms for contagious diseases are furnished by the board.

A record is kept of all cases of contagious diseases, as required by the law of 1895.

A weekly report of all contagious diseases has been sent to the State Board of Health.

Free vaccination is offered to the public every year when the schools are about to open.

Provision has been made at St. Mary's Hospital for the isolation of contagious diseases.

JAMES HAVRON,
Secretary.

COUNTY OF HUDSON.

NAMES OF MEMBERS AND OFFICERS.

W. W. Varick, M. D., President; C. B. Converse, M. D., John Connell, M. D.; C. J. Rooney, Jr., Secretary and Chief Inspector. Address of all, Jersey City.

The report from the secretary of this board deals fully with the statistics received by them during the year, and carefully-prepared tables were attached.

JERSEY CITY.

NAMES OF MEMBERS AND OFFICERS.

H. H. Abernethy, President; P. W. M. West, J. B. Feeney, F. D. Gray, M. D., H. H. Brinkerhoff, M. D.; D. W. Benjamin, Secretary.

Within the past year this board has adopted a plumbing code substantially the same as that in force in five of the largest cities within this State, and in accordance with the statutes and supplementary acts of 1887-'88. It has been in operation for four months, and has proved to be entirely satisfactory.

Two practical plumbers have been appointed as inspectors to inspect all plumbing work, for which permits are issued by this department, and to see that the rules and regulations of the code are faithfully

HUDSON COUNTY—Continued.

complied with. All persons to whom these permits are issued are made personally responsible for the manner in which the work is done, which precludes the possibility of doing plumbing work in a careless and unworkmanlike manner.

During the past year our city has been comparatively free from contagious diseases, with the single exception of diphtheria, which has been quite prevalent; but our records of these cases cannot be depended upon, as there were no cultures taken prior to December 1st, 1896. There is no doubt in my mind that if a bacteriological examination had been made of all cases reported to this board it would decrease the number about fifty per cent. I think we have reason to congratulate ourselves upon the fact that not a single case of small-pox has been reported to this board during the entire year. The few cases of scarlet fever reported have been of a very mild form and few cases terminating fatally.

One of the most frequent sources of complaint made to this board is the want of sewers in the hill portion of our city. I am pleased to report that we have been successful in the past year in securing in the hill portion or section of our city the building of a number of sewers, both public and private. There should be a law passed compelling the building of sewers in all streets that are occupied. The draining of waste-water in the gutters of streets is a vile and dangerous nuisance.

Considering the force of inspectors at our disposal, a great many premises were inspected during the past year and a large number of nuisances found, consisting of filthy cellars and broken sewer-pipes. Hundreds of nuisances would never have been discovered but for the house-to-house inspection, and the value of this kind of work cannot be overestimated.

During the past year we have been successful in having a great many sunken lots filled. These nuisances exist in several parts of the lower portion of our city. The worst cases were along Montgomery street, Mercer and Wayne streets, and Newark avenue at the heads of Sixth and Seventh streets. The work of filling in these places has been going on for some time and will soon be completed.

D. W. BENJAMIN,
Health Inspector.

HUDSON COUNTY—Continued.

KEARNEY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

James M. Lowden, President; William Bardsley, Isaac L. Newberry, Michael M. Forrest, William J. Rogers; James A. Exton, M.D., Health Officer; Clark W. Boach, Inspector; James M. Matthews, Secretary.

House-to-house inspection is made each year and a card posted upon the premises states the conditions observed at the time of the inspection.

HUNTERDON COUNTY.

ALEXANDRIA TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jeremiah Reed, Little York; John C. Davis, Little York; John C. Cronic, Everittstown; Reuben A. Williamson, Mount Pleasant; M. D. Knight, Clinton.

BETHLEHEM TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

A. L. Shrope, President, Junction; E. L. Reigle, M.D., Bloomsbury; J. V. Willever, Bloomsbury; William W. Swayze, Secretary, Glen Gardner.

Heavy rainfalls led to a disturbance of the river banks, uncovering new soil and the causing of malarial diseases. Dysentery also prevailed to some extent.

A complaint received in reference to a mill in Warren county just over the boundary line of the township was investigated and the conditions were not considered to be detrimental to health.

BOROUGH OF CLINTON.

NAMES OF MEMBERS AND OFFICERS.

W. H. Johnson, President; S. Van Sickle, M.D., W. H. Baker; C. Tomson Secretary; J. W. Berry, Inspector.

A few cases of measles occurred in the borough, but they were not reported to the board.

HUNTERDON COUNTY—Continued.

CLINTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

David Rinehart, Lebanon; George W. Kinney, Sunnyside; Theodore J. Starner, Annandale; Austin Cramer, Annandale; Willard E. Berkaw, M.D., Annandale. The officers of the board are: W. E. Berkaw, M.D., Chairman; Austin Cramer, Secretary; W. E. Berkaw, M.D., Health Inspector.

The physicians have had their attention called to the law requiring the report of all communicable diseases in our district, but an improvement could be made in this respect with advantage to both the local and State board. At present, however, physicians are making their reports more promptly.

Our board, however, furnish no blanks to physicians upon which to make the reports, which may account for some of the laxity referred to.

When the reports are received, a record is made of them by the secretary.

He also forwards the tabulated reports to the State board.

The efficiency of vaccination has never been more pronounced than at present. The prompt manner in which the scourge, small-pox, has been almost stamped out in recent epidemics teaches us a lesson. While the laws of the State are in almost mandatory terms, yet the absence of any recent "scare" has caused the necessity of both vaccination and re-vaccination to be nearly wholly ignored by the people. This is especially true so far as children are concerned. There should be a hearty co-operation of parents, teachers, township school boards and local boards of health in this matter. Gratuitous vaccination has not been offered to the public by our board, yet something should be done in behalf of the non-vaccinated children attending public schools.

Our board is prepared to take action concerning cases of contagious diseases.

Although our board is located in a large dairy country, no inspection of dairy premises has been made by the board.

At the time of making our annual report in October, 1895, the attention of the board was called to a water-supply in a creamery at Sunnyside, N. J. The board acted promptly, and called the assistance of both the Secretary of the State Board of Health and the State Dairy Commissioner. The water-supply was examined and

HUNTERDON COUNTY—Continued.

was found to be dangerously polluted. The creamery was closed by the board and the managers were directed to obtain a new water-supply. It has not been opened since.

W. E. BERKAW, M.D.

DELAWARE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Lewis Case, President, Sergeantsville; Samuel Robinson, Raven Rock; Peter S. Hockenbury, Sergeantsville; George N. Best, M.D., Inspector, Rosemont; Hiram D. Hoppeck, Secretary, Sergeantsville.

Nuisances complained of have been abated.

Diphtheria, scarlet fever and whooping cough have appeared in a few localities and isolation has been in each case secured.

EAST AMWELL TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William B. Prall, M.D., Wertsville; Edward W. Larowe, Ringoes; William Nixon, Wertsville; P. C. Young, M.D., Secretary, Ringoes.

Measles and diphtheria have occurred during the past year. Also an epidemic of influenza and an unusual number of other cases of sickness. The attention of the board was called to but one nuisance. Abatement was secured.

FRANKLIN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Peter H. Conover, President, Sidney; Isaiah Mathews, Pittstown; William L. Scott, Quakertown; E. Snyder, M.D., Quakertown; George W. Snyder, Secretary, Quakertown.

BOROUGH OF FRENCHTOWN.

NAMES OF MEMBERS AND OFFICERS.

H. M. Harman, M.D., President; Wm. P. Loper, E. H. Fulmer, Robert McIntyre, Inspector; Wm. Hoffman, Secretary.

Water-supply for this borough is from surface wells and cisterns.

Complaints have been investigated promptly and all nuisances reported have been abated.

HUNTERDON COUNTY—*Continued.*

HIGH BRIDGE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

H. Latimer, High Bridge; Percival Chrystie, High Bridge; P. A. Bunn, Wood Glen; Wm. C. Alpaugh, M.D., High Bridge; D. H. Hummer, Inspector, High Bridge.

An epidemic of measles occurred during the months of May and June; also, numerous cases of whooping cough, one case of scarlet fever and two of diphtheria. There were seventeen cases of typhoid fever and two deaths.

BOROUGH OF JUNCTION.

NAMES OF MEMBERS AND OFFICERS.

D. W. Anderson, W. C. Sandenberger, H. M. Biglow; H. Servis, M.D., Inspector; M. R. Albright, Secretary.

KINGWOOD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John N. Smith, President, Locktown; A. B. Chamberlain, Baptisttown; Thomas A. McAlone, Raven Rock; Frank S. Grim, M.D., Inspector, Baptisttown; Samuel J. Snyder, Secretary, Locktown.

A few cases of scarlet fever and measles occurred during the year.

CITY OF LAMBERTVILLE.

NAMES OF MEMBERS AND OFFICERS.

Gervas Ely, President; John L. Coryell, Health Inspector; William A. Cole; Francis W. Larison, M.D., Medical Inspector; W. Wayne Robinson, Clerk; John Sproat, Greshom L. Swallow.

A general house-to-house sanitary inspection is made about every three years, but special sanitary inspections are made from time to time throughout the year, as occasion may require. A record is kept of all such inspections.

A new filter has been placed in the water-works reservoir at an expense of about \$7,000 which was a much-needed improvement.

We have no public sewer system.

Garbage is collected by contract, in open wagons, twice a week during July, August and September; and once a week during the remainder of the year. It is dumped outside the city limits during the hot summer months. Night-soil and the contents of cesspools are col-

HUNTERDON COUNTY—*Continued.*

lected by a person who is authorized by the board of health, in airtight receptacles, and is removed beyond the city limits.

Physicians attending cases of contagious diseases isolate the patients whenever it is possible to do so, and immediately upon notice of such disease, the board of health causes a red card to be placed upon the dwelling, with the name of the contagious disease printed thereon.

A rubber reclaiming mill, where such stock is ground up and re-vulcanized, is located in the city. The odor from these works is very unpleasant to persons residing in the immediate vicinity, but it is not considered injurious to the public health.

The proprietors are doing all that lies in their power to remedy the nuisance.

No new rules, regulations or ordinances have been adopted during the past year.

Our city is very much in need of a public sewer system. The matter is under consideration by the city authorities, surveys and plans having been made by a sanitary engineer and purchased by the city. It is estimated that the cost will be about \$30,000; but as yet no attempt has been made by the city officials to carry out the plans.

W. WAYNE ROBINSON,
Clerk.

RARITAN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

E. Wyckoff, President; Wilson Moore, Asa Fisher, John H. Ewing, M.D.; Chas. Alpaugh, Secretary. All of Flemington.

The town is only partly supplied with sewers, and there is need of the adoption of some plan that will secure the extension of the system. The public water-supply continues to be satisfactory.

TEWKSBURY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Calvin Castner, Changewater; Jacob Force, Glen Gardner; David C. Anderson, Wood Glen; Theodore B. Fulper, M.D., Glen Gardner; A. S. Banghart, Secretary, Glen Gardner.

Measles is the only contagious disease which has prevailed during the year.

HUNTERDON COUNTY—*Continued.*

UNION TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

H. A. Dalrymple, Pattenburg; Jonas Tharp, Pattenburg; Sylvester Taylor, Pattenburg; N. B. Boileau, M.D., Jutland; Morris Stockton, Secretary, Pattenburg.

MERCER COUNTY.

BOROUGH OF HIGHTSTOWN.

NAMES OF MEMBERS AND OFFICERS.

President, W. I. Norton; Inspector, Fred. B. Applegate; David Cole, Elmer J. Rogers, William L. Wilbur, M.D., John G. Schieble and Charles E. Stults.

The board endeavors to see that houses, streets and yards are kept in good sanitary condition and inspections are frequently made, either by the inspector or the board in a body, of the properties of the town. At such times nuisances are noted for action by the board and little trouble is found in getting the co-operation of citizens.

Our water-works pipe-lines have been extended this summer and the artesian water is rapidly growing into public favor.

The water-supply is shown by analysis to be most satisfactory and is in excellent condition. There are no public sewers, and in consequence there is almost no plumbing.

Garbage and night-soil are gathered by private contract and are used by farmers for feeding hogs or for fertilizers. They are carefully collected in wagons and cause little trouble, although there is not much system about the work.

No infectious disease among animals has been reported.

So far as known, all contagious diseases have been reported, although printed blanks are not furnished physicians.

A record of reported cases of contagious disease is kept, showing result and length of illness, name of physician, and (in case of diphtheria) whether or not antitoxin was used. A number of times, when patients were too poor to try this medicine, it was purchased by the board on recommendation of attending physician.

Weekly statements of communicable diseases were sent to the State Board whenever there were such cases.

MERCER COUNTY—*Continued.*

Gratuitous vaccination has not been offered, nor have any new provisions been made for isolating contagious cases.

Have not noticed that any particular class of workmen have been affected by their occupations, and can report that our factories furnish no cause for complaint.

Have no dairies in town.

The town seems to be in excellent sanitary condition, but sewers are badly needed. The subject is now being agitated, and the Board hopes that some definite action may soon be taken.

The borough is supplied with water from public works, the supply being obtained from artesian sources. No sewers have yet been introduced. Cases of contagious disease are reported and a statement is regularly sent to the State Board of Health.

FRED. B. APPELEGATE,
Inspector.

EWING TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

H. G. Hough, President, Trenton; James T. Herbert, Trenton Junction; Samuel Atchley, Ewingville; J. S. Hough, Trenton; J. M. Mathews, Secretary, Trenton.

The board received complaints in two cases only. The action taken secured immediate abatement of the nuisances.

BOROUGH OF HOPEWELL.

NAMES OF MEMBERS AND OFFICERS.

N. N. Drake, President; E. P. Hawke, T. A. Pierson, S. S. VanZandt, N. I. Phillips, Secretary.

The board has been requested to take action in but few cases and has been able to promptly secure improvement in the conditions complained of.

HOPEWELL TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

T. R. Voorhees, President, Harbourton; N. Stout, Glenmore; J. P. Hart, Pennington; William M. Radcliffe, M.D., Woodsville; W. D. Hunt, Secretary, Harbourton.

MERCER COUNTY—Continued.

LAWRENCE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Clark Flock, President, Lawrence Station; S. H. Van Cleef, Lawrenceville; Charles J. Carr, Slackwood; Edmund De Witt, M.D., Lawrenceville; Isaac D. Baker, Secretary, Lawrence Station.

Four cases of scarlet fever occurred during the year. All recovered.

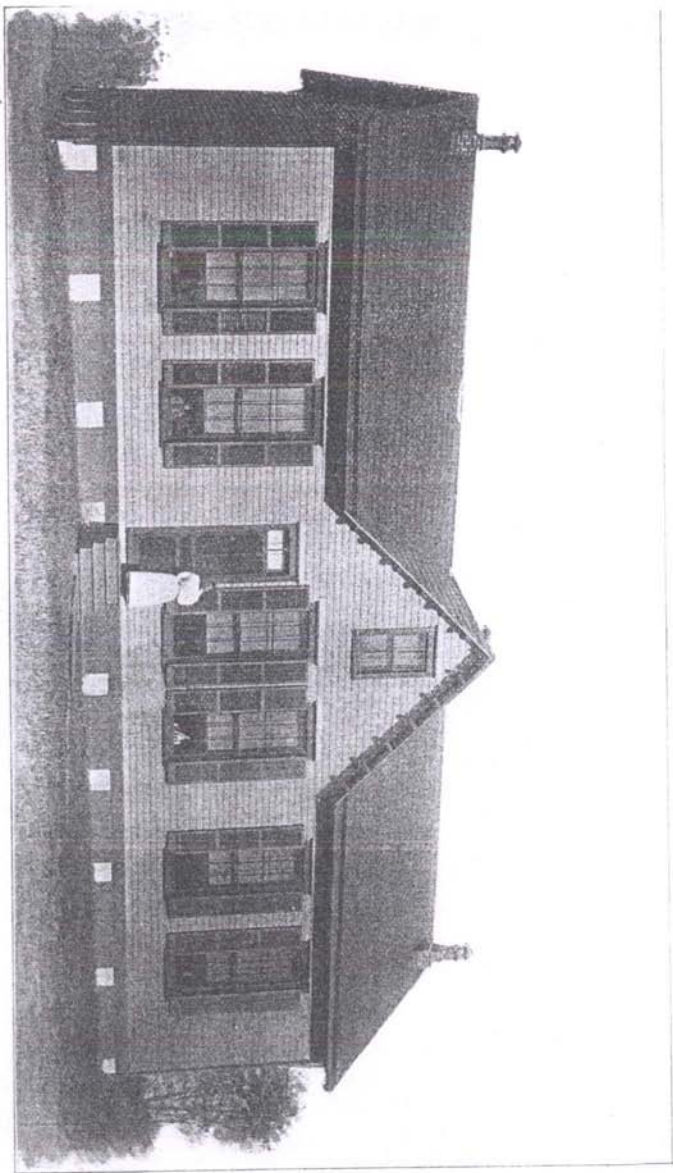
CITY OF TRENTON.

NAMES OF MEMBERS AND OFFICERS.

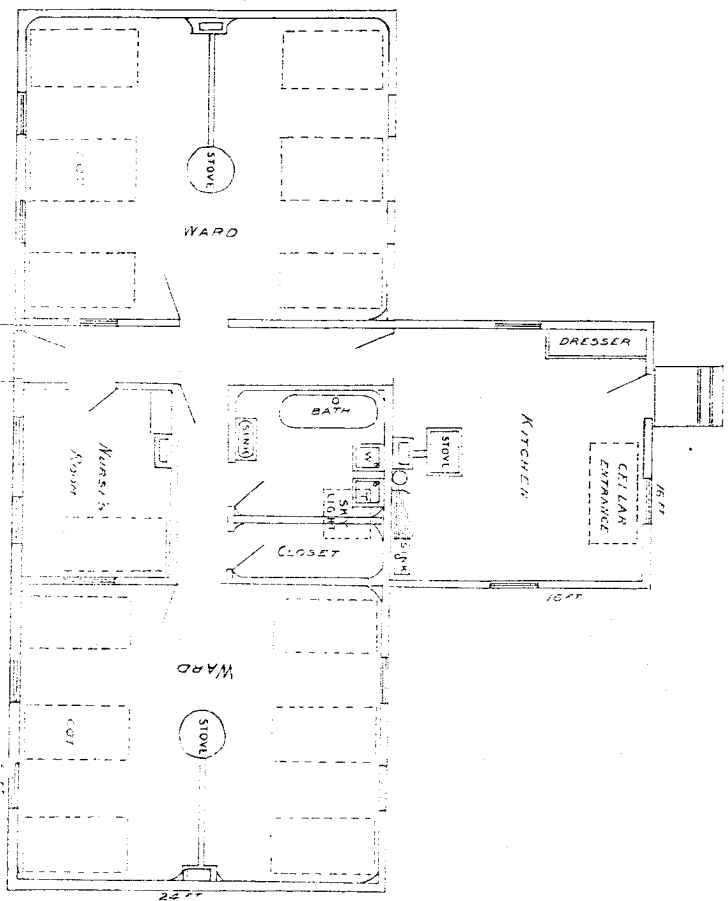
Garret D. W. Vroom, President; Thomas S. Chambers, Treasurer; Frank V. Cantwell, M.D., William Golding, Frank J. Epple; B. W. McCalliard, M.D., Health Officer; W. C. Allen and Edward L. Titus, Assistant Health Officers; Joseph Schaefer, Inspector of Plumbing; William Cloke, Secretary.

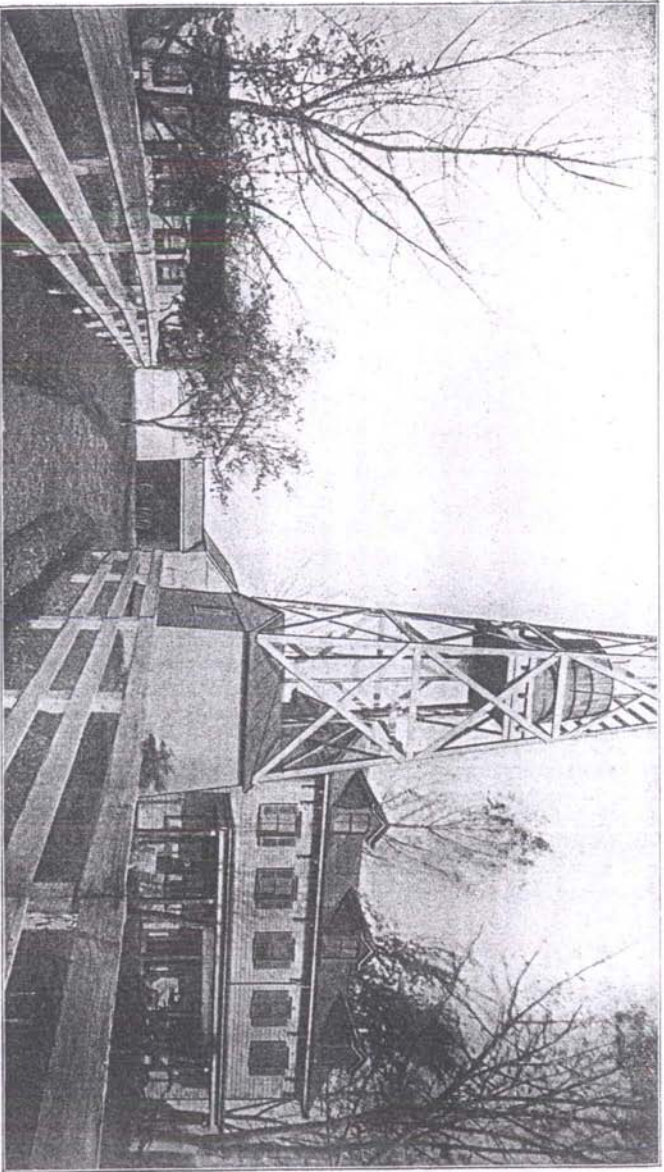
The board has performed its function as the conservator of the health of this city with faithfulness and efficiency. It has exercised vigilance in detecting sources of foulness, and energy in compelling their removal. The most serious problem it has had to encounter has been the outbreak of diphtheria, which last year assumed epidemic form, and has only been kept within limits by constant vigilance and carefulness. The board has derived great advantage, in fighting this dread disease, from the new municipal hospital, built under its auspices and managed under its direction. This institution was in course of construction when my last annual report was sent in. It has more than served the useful and beneficent ends that were anticipated. Though small, it contains all the appliances of the best modern hospitals for cases of contagious diseases. It is in charge of a trained nurse, and is ready, at all hours of the day or night, to receive patients. The board, since the completion of the hospital, have merged the offices of health inspector and medical inspector in the health officer, and this official is required to be a physician, with bacteriological and other essential knowledge. He is also required, if necessary, to give his services at the hospital. In most cases, however, the patients at the hospital prefer to be treated by their own family physicians. The board has also purchased a new ambulance, which is stationed at the hospital, and ready for immediate service, in going after patients to any part of the city on notice to the health office in the City Hall, which is connected to the hospital by telephone. There is also another ambulance for small-pox patients.

ISOLATION HOSPITAL, TRENTON, N. J. FIG. NO. 1.

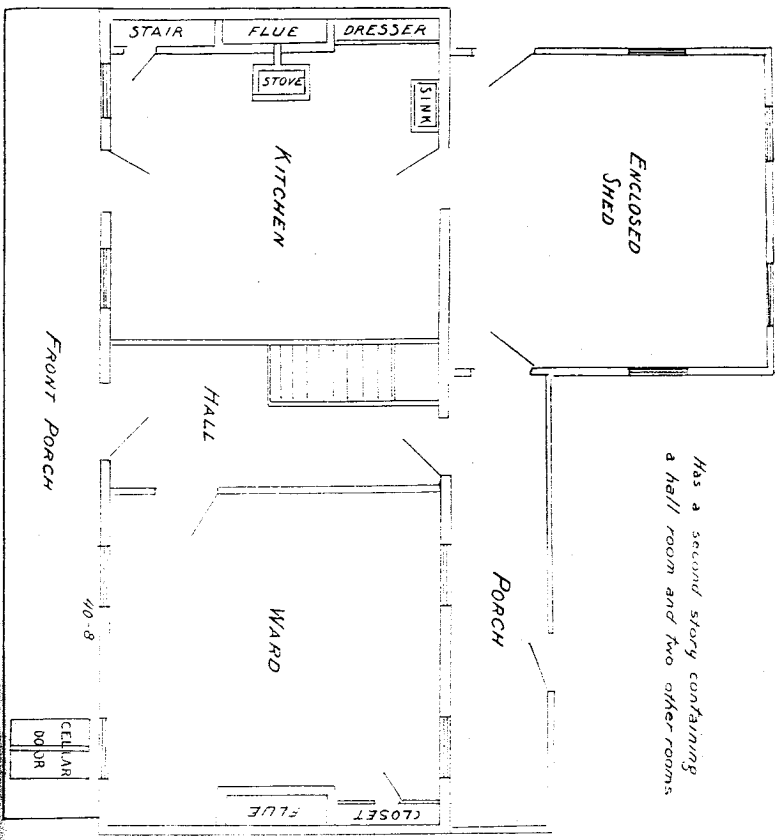


MUNICIPAL HOSPITAL, TRENTON, N. J.





MUNICIPAL HOSPITAL GROUNDS, Trenton, N. J. Small-Pox Hospital on right, Hospital for other Contagious Diseases on left.



*Has a second story containing
a hall room and two other rooms*

SHAW-WALK HOSPITAL, NEWTON, N. J.

MERCER COUNTY—*Continued.*

The new hospital, a cut of which follows, was constructed on the plan of a model institution at Morristown, New Jersey. It is a one-story building and contains two wards for patients—one for males and the other for females. Each ward contains six beds, and there are all the necessary adjuncts, such as bath-rooms, etc. There is also a room and bed for the nurse in charge, and a kitchen completely supplied with cooking and washing appliances. A cement floor cellar connects with the latter apartment. It is the design to enlarge the hospital from this nucleus, as it were, as necessity may require.

The diagram of the interior construction and economy of the hospital exhibits its entire plan so completely that any further description is altogether unnecessary. The total cost of the hospital building was \$2,449.51; of the furniture, including bedding and kitchen utensils, \$450.38, and of the ambulance, \$225.

The small pox hospital, located immediately contiguous to the municipal hospital, has also been completely renovated and refitted, and is in excellent condition for the care and treatment of patients if there should be an outbreak of small-pox the coming winter. This structure, as will be seen from the accompanying cut and diagram, is a handsome and pleasantly situated, as well as commodious building, and is most admirably adapted to the purpose in hand.

The tank seen in this cut gives both hospitals a copious supply of pure and wholesome water.

These hospitals are located in the open country, about three miles from the center of Trenton, and are in the midst of healthful surroundings, with abundance of fresh, pure air.

The board last winter secured the enactment by the Legislature of a law compelling people living on the line of completed sewers to connect therewith on orders from the local board of health. It is a singular fact that there was no legal way in which this obviously necessary power could be exercised by boards of health, or other local authority, until the passage of this act. The Trenton board constantly ran against this snag and resolved, if possible, to remove it. After three years' futile efforts they have at last been successful, and the law is already found to be of great service in the abatement of nuisances. It is really wonderful how many people there are who prefer to put up with obsolete and disease-breeding conditions rather than go to the little trouble and expense of connecting their premises with the sewer.

MERCER COUNTY—Continued.

It is altogether right that the local board of health should be invested with the power of compelling such people, when necessary for the protection of the public health, to make such connections.

Another very gratifying advance step that has been made in the sanitary government of Trenton since last year is the erection of a garbage crematory. This crematory now consumes all the garbage of Trenton. It does this work well, and the only complaint in connection with its operation is the failure of the garbage-contractor to collect all the garbage regularly and thoroughly. But this can and will be remedied.

The board still wants, and hopes to secure, before another year elapses, a steam sterilizing plant, in which clothing and other things, infected with diphtheria and other disease germs, may be disinfected. The want of such a plant has greatly added to the difficulty of fighting and stamping out diphtheria.

The amount and character of the administrative work done by the board and its excellent and most competent corps of officers during the year is indicated by the statistics of their annual reports, recently made to the board.

The health officer reports that during the year 752 complaints of nuisances were investigated. Of contagious diseases, he reports: Diphtheria, 391 cases and 73 deaths; scarlet fever, 21 cases; typhoid fever, 63 cases, 7 deaths; small-pox, 2 cases.

The board has ordered 14 sewer connections made under the new law, which has only been in effect about six weeks.

These statistics show a marked improvement over last year, when we had 436 cases of diphtheria, with 108 deaths; 79 cases of scarlet fever and 4 deaths; and 33 cases of typhoid, of which 5 resulted fatally.

The inspector of plumbing, Mr. Joseph Schaefer, gives the following complete record of the operations of his department during the year:

Number of plans filed.....	774
Number of plans filed rejected.....	61
Permits issued.....	713
Violation of plans.....	28
Violation of plans corrected.....	28
Violation of ordinance.....	1
Violation of ordinance corrected.....	1

MERCER COUNTY—Continued.

Notices sent to reconstruct plumbing.....	78
Reconstructed as per notice.....	67
Premises examined on complaint.....	98
Compulsory reconstruction.....	7
Water-closets condemned and removed.....	31
New plumbing systems put in.....	642
Additions to existing systems.....	34
Alterations of existing systems.....	37
New buildings connected to sewer.....	38
Old buildings connected to sewer.....	559
Old buildings connected to cesspool.....	24
New buildings connected to cesspool.....	20
Drain connections for surface water.....	5
Number of inspections made.....	2,287
Air tests.....	642
Inspections of terra cotta pipe.....	688
Amount received for permits.....	\$1,216 00

The rapid extension of the city sewer system and of the new brick and other pavements has had a markedly beneficial effect upon the public health as well as upon the comfort and convenience of the people.

WILLIAM CLOKE,
Secretary.

WASHINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Forman Hutchinson, President, Windsor; William Coleman, Windsor; Laban Brown, Robbinsville; George A. Silver, M.D., Windsor; J. P. Hutchinson, Secretary, Windsor.

BOROUGH OF WILBUR.

NAMES OF MEMBERS AND OFFICERS.

Henry Rhead, President; Henry Whitter, Frank Higgins, John Coxon, J. F. Brooks, Secretary.

Seven meetings were held by the board during the year. Action was taken for the abatement of several nuisances, and in each case conditions complained of were removed.

MIDDLESEX COUNTY.

CRANBURY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

W. Irving Stults, President; Henry C. Symmes, M.D., J. E. Burnett, A. M. Davison, Frank A. Brown, Secretary.

BOROUGH OF DUNELLEN.

NAMES OF MEMBERS AND OFFICERS.

C. D. Boice, President; G. W. Churchill, J. Peters, Inspector; G. E. Lowrie, Secretary.

EAST BRUNSWICK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John O. Cozzens, President, Spottswood; George F. Kohlhepp, Milltown; Samuel Watts, South River; Daniel Herbert, Secretary, Jamesburg.

MADISON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

James Fountain, President, Browntown; Ambrose Green, Browntown; W. H. Lamberson, Cheesequakes; A. J. Jackson, M.D., Matawan; D. H. Brown, Secretary, Browntown.

CITY OF NEW BRUNSWICK.

NAMES OF MEMBERS AND OFFICERS.

Henry R. Baldwin, M.D., President; J. B. Smith, Ph.D., F. B. Kilmer, G. K. Parsell, G. J. Litterst, P. A. Shannon, M.D., City Physician; A. Van Nest Baldwin, M.D., Secretary and Inspector.

We report a decided increase of public interest in sanitary subjects. The demand by the people for better sewerage, the increase of complaints of nuisances, and the desire to isolate communicable disease, all show a healthy public feeling in sanitary matters.

The board of health does not carry on a regular house-to-house inspection, but takes up certain portions of the city at a time. The water-supply is, as it has been with us for years, good. There is a decided decrease in the use of the old wells and pumps, much to the improvement of the health of city. There has been an extension of the sewerage of the city, which, when completed, will afford an almost perfect system for four-fifths of the city.

MIDDLESEX COUNTY—Continued.

In the system now under construction all sewage will be carried to tide-water, and streams which have been polluted within the city will be relieved from all sewerage material, and will only carry surface water.

The plan of sewerage adopted is one which has been advocated by this board for several years, and with the aid of public demand it has been accomplished.

This board has not put in operation a plumbing ordinance, although we have one drawn up and all ready for passage, but lack of funds has prevented its accomplishment.

Night-soil and cesspool contents are transported beyond the city limits in tight-covered wagons.

In regard to garbage, we still have complaints to make. Contrary to request of this board, ashes and garbage are mixed in the same wagons and used to fill up streets and low places. It is the aim of the board to compel a complete separation of garbage and ashes and then secure removal in separate wagons.

During the year there have been two cases of glanders in horses reported to this board, notice of which was sent to the State Board and the cases were promptly disposed of. We can report a growing interest in the subject of tuberculosis in cows, and a demand for pure milk. This board can do nothing in the way of inspection of cattle used for public milk supply, as the dairies are out of the jurisdiction of the board, and we can only do good by calling public attention to the subject.

The reports from physicians of contagious diseases have been more prompt than for years. This board furnishes blanks, together with stamped and directed envelopes, to the physicians.

A complete record of all such reports is kept, together with the original report. A weekly statement has been transmitted to the State Board except in a few instances. This board has not offered gratuitous vaccination. The fund at the disposal of the board is so limited that it would be impossible, but the school board, at the request of the board of health, refused permission to attend school to all children not vaccinated.

As was reported last year, this board has induced the common council to build an isolation hospital outside of the city limits for the reception of contagious diseases.

MIDDLESEX COUNTY—Continued.

The only epidemic which we have had was one of measles, but the cases were mild. Four hundred and sixty-eight cases were reported, attended by sixteen deaths. Diphtheria has not been as prevalent as in former years. Forty-six cases have only been reported, with fifteen deaths.

Typhoid fever has appeared a little above the average. Twenty-four cases were reported, with eleven deaths. There were fourteen cases of scarlet fever, with no deaths.

A. VAN NEST BALDWIN,
Secretary.

CITY OF PERTH AMBOY.

NAMES OF MEMBERS AND OFFICERS.

Geo. W. Mercer, President; Frank Neer, Jas. Growney, John Toft, S. W. Schoonover, Fred J. Richters, E. V. R. Sofield; Geo. E. Mills, Secretary; E. A. Hulst, M.D., Health Inspector. Postoffice address of each, Perth Amboy.

Special attention has been given to making house-to-house inspections in those portions of the city where filth is most likely to accumulate and thus endanger the health of the whole city.

About two-thirds of our population is made up of individuals who have never known what it is to keep clean. Being physically vigorous and reared in localities where sanitary measures are almost wholly ignored, they have imbibed the spirit of uncleanness. The condition of the privies and yards has been looked after very carefully, and the law in reference thereto has been enforced with good success. Most of the houses in these localities are without adequate plumbing systems, except in new houses, where they are required to construct such works according to the code. Most of the houses in these sections have a kitchen sink, and where there is a sewer connection they have also a yard drain. A record is kept of all inspections, as to street and number, owner, condition of privy-vault, yard and general surroundings. These are reported to the local board, and wherever nuisances are found they are promptly abated.

Our water-supply nearly failed this summer, partially owing to the lack of rain and the lack of means to store the water. We have no way of storing water other than the stand-pipe on the other side of the river. The requisite supply was pumped each day until the springs began to lower, but much of it was lost by leakages in the main across the Raritan river. A second main was laid this summer

MIDDLESEX COUNTY—Continued.

which will no doubt prove satisfactory and furnish us all the water we need, thus obviating the necessity of resorting to the use of the "old water," as has so often been done in the past.

If some means of removing the debris (decayed grass, etc.) could be provided we would have much better water next year when the streams are low than we have had the past year.

The water-supply at present is abundant, and as clear as crystal.

The board has in many instances called the attention of the city aldermen to the importance of more sewers, and they have heeded our requests so far as possible. Two new sewers begun this year are now nearly completed.

These are among the best that have ever been constructed in this city. They are known as the South First street and State street sewers, and we may well feel proud of them. The property-owners in this part of the city have long been asking for these very necessary conveniences.

These sewers are constructed of brick, well laid in cement, and are impervious to water. They are two by three feet in diameter and egg-shaped in form.

The combined length of these sewers will be about 7,700 feet, or nearly one and one-half miles. They will drain all that portion of the city lying south of Smith street and west of the Central R. R. of N. J., thus affording drainage facilities equal to about one-fourth of the area of the whole city.

As to extension of water-works, the city has under consideration the further improvement of our water-supply by enlarging the area of its water shed and replacing or repairing the pump, and they are also considering the advisability of putting down wells near the water plant, all of which would furnish us with a better and larger supply of water.

Plumbing is constructed in accordance with the code of the local board. Nearly all of our plumbers are prompt in filing their plans and specifications, but some are still tardy in complying with the rules, and the board in several instances was compelled to bring suits in order to bring about a better observance of the law.

I believe these cases have taught the violators a useful lesson. Plumbers, as well as property-owners, ought to realize the necessity of thorough sanitary plumbing, drainage and ventilation of buildings.

MIDDLESEX COUNTY—*Continued.*

During the past twelve months 146 plans and specifications have been filed in the office of this board, mostly for new work.

The garbage question still continues to be a difficult one to solve. Ashes, refuse food and various other things that collect in and around all households are thrown promiscuously into the barrels and boxes. Even dead chickens and cats are sometimes found, but these have been promptly thrown out and the parties ordered to bury them. The collectors have been very diligent in reporting to the inspector cases of this kind.

I must say a good word for our efficient Chief of Police and his assistants for the aid they have rendered this department in ferreting out the owners of carcasses. A number of complaints were sent in from residents in the vicinity of the dumping-grounds used in the early summer. It was too near many of the houses, and refuse was not properly covered and disinfected. After a number of protests from the board the city decided to dump garbage elsewhere. Now they are using ground on the outskirts of the city and are taking better care of the garbage by covering with earth and lime.

The garbage is collected in open wagons and these often become very obnoxious to smell and at many times a decided nuisance. The wagons were also ordered to be cleaned and disinfected. Our growing city has each year larger needs, and one of them is improvement in the disposal of garbage. The question has been discussed from many standpoints, but nothing definite has been decided upon.

Night-soil and cesspool contents are collected by licensed scavengers in water-tight wagon-boxes with tightly fitting lids and is taken outside of the city, where it is deposited and covered with dry manure and lime.

This place often becomes a nuisance to passers-by and the scavengers are notified to use more precautions, under penalty of forfeiture of their license.

There have been issued during the year 285 permits to abate nuisances.

The board has not learned of any infectious diseases among animals.

Our physicians generally have been very prompt in reporting communicable diseases. Blanks for this purpose are furnished by the board.

MIDDLESEX COUNTY—*Continued.*

The inspector also notifies the city superintendent of schools of all cases of communicable diseases, giving the names, street and number on regular blanks for this purpose. A total of 168 cases of communicable diseases have been reported to the board during the year, a decrease of 39 from the number reported last year. This year the prevailing epidemic has been scarlet fever, of which there were 77 cases, without a single death resulting therefrom.

They were mostly of a mild type and at no time did there seem to be any source to which to trace the contagion. A number of cases would spring up almost simultaneously in different parts of the city. A careful investigation was made, but no clearly definable source of the contagion could be found.

The inspector keeps a record of all cases of communicable diseases in a book furnished by the board.

A weekly statement of all reports of communicable diseases has been regularly transmitted to the State Board of Health, according to law.

Many large ponds (some five or six) of stagnant water have been drained and filled in the past summer. These ponds have existed for some time, and by their abatement a source of foulness and detriment to health has been removed.

During the hot weather quite a thorough inspection was made of the butcher-shops and the meat kept in the ice boxes. Many of the shops were models of neatness and cleanliness; but this could not be said of the rest, for they were far from clean. While most of the boxes were well chilled, the meat in some of them was partially tainted, showing that a poor quality of meat was bought. An inspector at the meat-cars while the meat was being delivered proved this to be a fact. The tainted meat which was discovered was condemned and the beef companies warned not to send any more such meat to our city.

One shop was found to be in an extremely filthy condition. All of the meat in the shop and ice-box (about 100 pounds) was confiscated and buried.

Such wholesome lessons will serve a useful purpose by making other butchers more careful.

Public school building No. 4, which was begun last year, is now completed and occupied as a school. This building stands as a

MIDDLESEX COUNTY—Continued.

monument in our city to the intelligence of its citizens in providing educational advantages for our young.

The board of education is justly entitled to a fair share of credit for the enthusiasm displayed in carrying the work through to completion.

The building is of brick, and contains eight large class-rooms and a dry cemented basement that may be used as a play-room during damp weather. The class-rooms are $13\frac{1}{2}$ feet by 27 feet by 23 feet. Each room will seat comfortably about 40 pupils. All of the rooms are thoroughly ventilated by means of the gravity system. Two stack heaters, one on each side of the building, draw out all the foul air from the rooms. Fresh air is continually coming in from the outside, and during cold weather passes through and is heated by four furnaces. It is therefore not necessary to open windows for fresh air even in warm weather. This fine school building means much for the comfort and health of both teachers and pupils. The city superintendent and the teachers are very vigilant in excluding children who come from families where there are contagious diseases or where any are suspected. The sanitary condition of school No. 4 is excellent. There are no foul urinals or closets. The deposit from the closets is cremated once a week. While the sanitary arrangements are not as perfect in the other three buildings, they are the best that can be obtained under existing circumstances.

Gratuitous vaccination has not been offered to the public during the past year.

There is a pest-house outside of the city near the almshouse, where cases of small-pox, typhus fever, &c., can be isolated.

There are no trades or occupations known to us that are injuring the health of operatives to any extent. There have been instances at the smelting works and the chemical works where an occasional operative is affected by the chemical used.

The smoke that comes from the cork factory located here has again been reported as a nuisance at times, especially in the morning and at noon, when the fires are started. The odor from chemical works in this vicinity is very obnoxious at times, as well as the smoke from other factories. But these things have to be endured for the present.

Dairy premises are not inspected.

MIDDLESEX COUNTY—Continued.

No special inquiry has been made by the board into the adulteration of foods.

The board intends at an early date to examine the milk-supply that comes into our city.

Kerosene oil is not tested. Two or three fires have been caused by kerosene oil, but no serious accidents to human beings have occurred.

December 23d, 1895, a new sanitary code was adopted by the board of health of this city.

Cisterns still continue to be the main supply of water for a large number of our population. But few wells exist.

The following is a short summary of the work of the board in addition to that named in the main part of the report: Inspections made, including nuisances, 417; nuisances abated, 350; permits filed to tap sewers, 106.

E. A. HULTS,
Health Inspector.

RARITAN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

A. J. Gebhart, President, New Brunswick; Luther H. Tappen, Metuchen; B. M. Kelly, Metuchen; A. Clark Hunt, M. D., Metuchen; A. C. Litterst, Secretary, Metuchen.

A horse-rendering and fertilizer factory, located near Stelton, gave rise to such foul odors that a petition was presented to this board.

After careful examination it was decided that an application be made to the Court of Chancery for an injunction to restrain the owner from continuing the nuisance.

An injunction was granted and the owner moved to another portion of the township.

Four cases of typhoid fever have been reported.

Eight cases of diphtheria were reported, and antitoxin was furnished by the township committee for use in one of the families where the disease occurred.

The houses were disinfected under the direction of the attending physician.

BOROUGH OF SOUTH AMBOY.

NAMES OF MEMBERS AND OFFICERS.

Albert Roll, President; Samuel Newton, T. Baker, J. C. Albright, M. D., A. W. Bostwick, B. Roddy; J. F. Fulton, Secretary.

MIDDLESEX COUNTY—Continued.

The public water-supply of the borough is taken from the Perth Amboy mains, but numerous surface-wells are scattered over the borough, and these are believed to be a source of danger. Thus far, however, no action has been taken to secure their abandonment as a source of water-supply. There are no sewers in South Amboy, but the attention of the mayor and council has been called to the necessity of sewerage and the matter is now being agitated by citizens.

Communicable diseases are reported by physicians, but not as promptly as the law requires. The board furnishes blanks for the use of physicians in making reports. The public is invited to attend the monthly meetings of the board, and communicate information in regard to unsanitary conditions.

SOUTH BRUNSWICK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

A. F. Stout, President, Monmouth Junction; D. G. Rowland, Dayton; Wm. P. Hagerman, Dean's; Edgar Carroll, M.D., Dayton; H. E. Hathaway, Secretary, Monmouth Junction.

MONMOUTH COUNTY.

BOROUGH OF ASBURY PARK.

NAMES OF MEMBERS AND OFFICERS.

N. E. Buchanan, President; James A. Bradley, M. L. Bamman, T. H. Beringer, D. W. Sexton, W. W. Davis, Randolph Ross; D. C. Bowen, Secretary.

House-to-house inspections are frequently performed, and a record of each premises in the borough is kept in the health office. By reference to the records the conditions affecting health on any premises in this borough can be ascertained.

These records are open for examination of the public for information pertaining to any desired premises.

The following table shows the number of dwellings and other buildings which are recorded on the sanitary records in this office:

MONMOUTH COUNTY—Continued.

Table Showing Number and Classifying the Buildings in Asbury Park.

	With Sewer Connections.	Without Sewer Connections.	Total.
Hotels and boarding-houses.....	132	...	132
Private dwellings.....	756	11	767
Dwelling and business houses combined.....	113	10	123
*Tenement houses.....	1	...	1
Tenement and business combined.....	7	...	7
Business houses.....	44	23	67
Churches.....	5	6	11
Public school buildings.....	2	...	2
Borough fire department buildings.....	1	2	3
Public assembly halls.....	2	1	3
Amusement houses.....	5	1	6
Totals.....	1068	54	1122

GARBAGE.

No change has been made since our last report in the collection and removal of garbage and rubbish. The work is performed by contract, and for the past three years supervision of the collection of these waste products has been in the hands of the police department. No provision is made in the contract as to the final disposition of garbage and rubbish after it passes outside of the borough limits.

During the past year the entire amount of garbage collected has been carted into the adjoining townships, where it was disposed of by feeding to swine.

The method of feeding in some instances, where many swine are kept, is to fence in a large space in an open field and to dump the garbage in this enclosure, where the swine devour a portion and the remainder is left to decompose, until the ground in the enclosure is so defiled and filthy as to necessitate the removal of the pen to a new part of the field. The stench which arises from these swine-yards can at times be detected for a half mile distant from the farm.

Rubbish which contains much objectionable matter, such as dead cats, rakings from vaults, articles infected with contagious diseases, etc., the indescribable conglomeration of material that usually finds its way to the rubbish barrel, has been disposed of by dumping on the borders of the headwaters of Deal Lake and by burning in open fires along one of the highways of Ocean

*In which more than four families reside.

MONMOUTH COUNTY—Continued.

township. The service during the past year has been far from a model one. The health ordinance requires that all persons employed in the collection and transportation of garbage must be provided with a permit from the health department. Numbered badges were also furnished by this department and required to be worn by all persons engaged in the collection and removal of garbage. The record shows that since the 15th day of June last to October 1st forty men and seven-teen wagons have been licensed to engage in the collection and removal of garbage.

Five of these wagons were owned by the contractor. The remain- ing twelve were owned by private individuals, who, by permission of the contractor, volunteered to collect and remove garbage for what- ever value the stuff possessed as food for swine. Many of these volunteer collectors were irregular in their time of collections, only coming when they were in need of feed for their swine. This, together with neglect and lack of judicious management on the part of the contractor, resulted in irregular service, and caused many complaints from house- holders. During the last week in July and the first three weeks in August (notwithstanding that all complaints of neglect on the part of the garbage contractor should be made at the marshal's office) forty- nine (49) citizens' complaints were received at the health office, show- ing that garbage was not regularly removed by the contractor.

The wagons owned and operated by the contractor are unsightly, offensive, and frequently found to be leaking. Long use and neglect has thoroughly saturated the soft wood from which the wagon-bodies are constructed, and no amount of washing can render them clean and free from offensive odors.

The defects in the methods pursued at present are:

1. The use of wagons constructed of absorbent material and main- tained in poor repair.
2. The lack on the part of the contractor to evenly distribute the men and teams throughout the borough to insure regular and uni- form collection on each street.
3. The present method of final disposal of Asbury Park garbage and rubbish by dumping it in adjoining sanitary districts.

To obtain uniform compliance with the ordinance requiring metallic garbage receptacles it was found necessary to institute several suits against persons who, after repeated notices, failed to supply proper

MONMOUTH COUNTY—Continued.

receptacles for the storage of garbage. These cases were among hotel and boarding-house keepers who were provided with but one or two cans, where from six to twelve were necessary to hold the amount of garbage accumulating between the times of regular collection. Experi- ence has shown that with regular service from the contractor one twenty-gallon can should be allowed for each twelve persons. When it is taken into consideration that, under the present method of collec- tion, no service is given on Sundays, it will be seen that provision must be made for the accumulation of garbage from seven meals, and the above proportion of cans to persons is none too great.

ASHES.

Clean ashes, while not in themselves a nuisance, often attract in and about the place of deposit, refuse-matter of an objectionable character, and their removal from the borough by contract, which is now being accomplished, is an improvement upon the method of dis- posal heretofore pursued, which was to use them for road-making.

PRIVY-VAULTS.

The accumulation in privy-vaults is removed by licensed scavenger and taken to the back-country, where it is converted into a ferti- lizer.

Permits for the construction of privy-vaults in the borough are no longer granted. The sewer system extends to all parts of the bor- ough and there is no longer any necessity for the construction or maintenance of this class of nuisances. During the past twelve months fifty-one privy-vaults have been condemned by the board or voluntarily removed by owners and safe plumbing conveniences sub- stituted in their place.

There are still four hundred and seventeen privy-vaults in this borough, each one more or less offensive, polluting the air and also, in some instances, the soil about them. Experience has shown that vaults which have been constructed for a long time prove upon close examination to have become leaky. A sewer connection exists on all but sixteen premises on which these four hundred and seventeen vaults are located, and an outlet for a connection with the sewers is available in each case where one has not already been secured.

MONMOUTH COUNTY—Continued.

STABLES.

It is required by ordinance that all new stable-buildings which are erected in this borough, and also in all cases where the board of health shall so require in the case of stables already erected, that the ground shall be protected from pollution by water-tight floors, so graded and drained that all excrement and refuse liquids are carried to a street sewer.

There are in all one hundred and ninety-seven stable buildings in this borough, classified as follows:

	With water-tight floors and drainage.	Without water-tight floors and drainage.	Total.
Livery and boarding stables.....	5	4	9
Private stables	59	147	186
Totals	44	151	195

PLUMBING.

One hundred and twenty-six plans and specifications for plumbing and drainage of buildings have been approved by this department during the past year, making a total of nine hundred and ten plans filed to date. A system for filing these plans has been adopted, by aid of which the plans of the plumbing and drainage of any premises which have been constructed in this borough can be referred to without loss of time. In addition to the air-pressure test required for all new plumbing systems, old drains and plumbing constructions are tested by a smoke-test applied by the use of the "Eclipse" drain-tester. This machine, which has been added to the outfit of this department during the past year, has been found to be very useful in detecting faulty workmanship in setting fixtures in new constructions, as a positive test can be applied by the aid of this apparatus after the fixtures have been set, which is not possible with the air or water-pressure tests.

The sewers of Asbury Park have continued to successfully carry off all waste-matters which they receive. There have been thirty-two connections made during the past year. The sewer system extends to all parts of the borough, and is within reach of every building. Arrangements are now being consummated for the construction of new disposal works for the sewage of Asbury Park and vicinity, which, when completed, will do away entirely with the objectionable method of discharging crude sewage into the sea.

MONMOUTH COUNTY—Continued.

WATER.

The quality of the water furnished to consumers by the borough water-works during the past year has been in every way satisfactory. The supply is wholly from artesian wells which are from 600 to 1,200 feet in depth. It is pumped from the wells and received into open tanks, where it is exposed to the air for the purpose of oxygenizing, and precipitating the iron salts which are then removed by filtration before the water is delivered into the mains.

An analysis of the water delivered to the consumers, made by Prof. T. M. Brown, shows the following results:

STATEMENT OF WATER ANALYSIS

Collected from tap in health office, Asbury Park, (Parks in 100,000), July 6th, 1895.

1895.

DATE OF Collection.	Examination.	APPEARANCE.		ODOR.		RESIDUE ON EVAPORATION.			NITROGEN.					Iron Total.	Iron, after filtering through paper, in the Laboratory.			
		Turbidity.	Sediment.	Clear.	Cold.	Hot.	Total.	Loss on Ignition.	Fixed.	ALUMINOID AMMONIA.	Free Ammonia.	As Nitrates.	As Nitrates.			Oxygen Consumed.	Calorine.	Hardness.
July 6.	9-13	Very slight or none.	Slight, faintly cloudy.	03	None.	None.	None.	6.40	.....	None.	.0002	None.	.0020	.0079	.13	4.8	.0800	None.

(Signed)

T. M. Drown,

Boston, July 15th, 1895.

MONMOUTH COUNTY—Continued.

Since the introduction of filters by the borough for the purpose of removing the iron from the water, it has been learned that equally good results could have been secured by storing the water in settling-basins, thereby saving the cost of constructing and operating filters.

Very few householders depend upon water from surface-wells. There are but twenty-one dwellings in the borough which are not supplied with water from the street mains. One of this number has a cistern-supply and the other twenty depend entirely upon water from surface-wells. The purity of the water from these wells is of doubtful character. They are all suspiciously close to privy-vaults or drains of doubtful construction, and analyses which are frequently made show each succeeding year that about twenty-five per cent. of all surface-wells examined have become polluted.

Meteorological observations have been continuously kept by this department since January, 1889. Reports are made monthly and printed in the "New Jersey Weather Bulletin."

GROUND-WATER.

Regular monthly observations are made of the rise and fall of ground-water in the soil underlying the site of the borough and the facts are recorded on charts, which are prepared annually. The accompanying diagram shows the results of these measurements for the past two years. Measurements are taken at fourteen stations evenly distributed through the borough.

MILK.

To protect the inhabitants against the use of impure milk, an ordinance was passed by the mayor and council, July 6th, 1896, providing for the appointment of a milk inspector and for the licensing of all persons engaged in the sale of milk and to regulate the sale of milk. Applications for licenses are made by the dealers on the following forms:

BOARD OF HEALTH OF THE BOROUGH OF ASBURY PARK.

Office: PARK HALL.

No

Office Hours: 1 to 2 P. M.

Application for License to Sell Milk.

The undersigned hereby applies for a license to sell milk in the borough of Asbury Park, and in accordance with an ordinance of the Mayor and Council of said borough, passed May 11, 1896, the following facts are submitted:

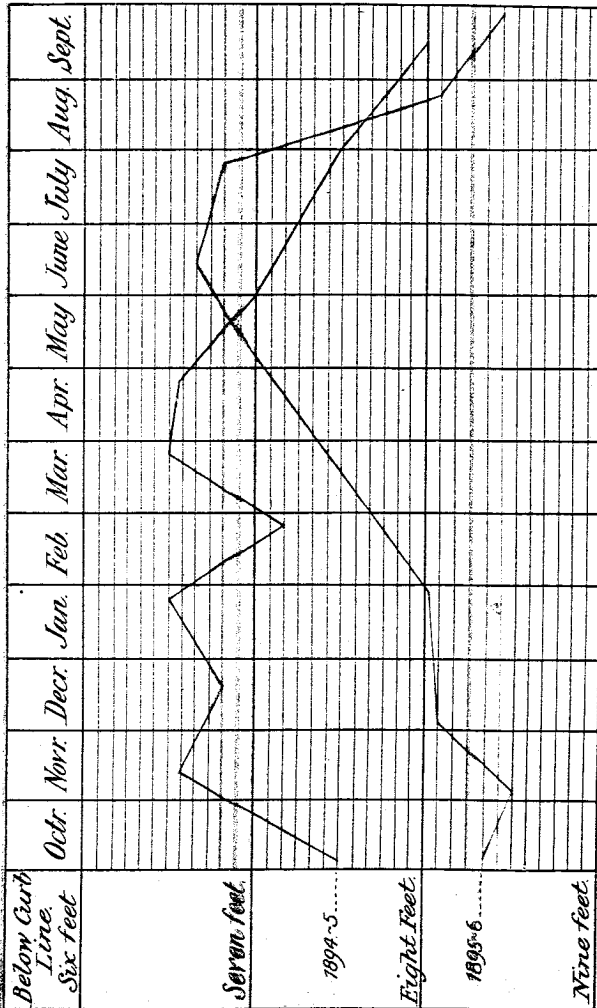


Diagram showing Ground-Water Levels in Asbury Park for the two years ending October 1, 1895, and October 1, 1896.

MONMOUTH COUNTY—Continued.

Replies to the following questions must be written in ink.

1. Is milk to be sold from depot or vehicle?
2. Location of depot.
3. License number of vehicle.
4. Number of quarts of milk sold daily.
5. Number of quarts of cream sold daily.
6. Number of quarts of skimmed milk sold daily.
7. Temperature of milk when it is sold.
8. Name of the manager of the dairy where the milk is produced.
9. Location of the dairy.

When milk is obtained from more than one source, give the name of the manager and the location of the dairy in each case.

When the milk is produced on premises owned by or under the control of the undersigned applicant, the following questions must be answered:

10. Number of cows.
11. Are all of the cows from which milk is produced in good health?
12. Are any of the cows tuberculous?
13. Have the cows been tested by the use of tuberculin?
14. Is any swill or garbage fed to the cows?
15. Where is milk stored before shipment?
16. Where is milk stored after shipment and before it is sold?
17. How and where is milk cooled?
18. Water-supply of dairy premises.
19. If from well, describe surroundings and location.
20. How are the cans, bottles and utensils washed?
21. Is the milk of any one cow sold separately?

The foregoing is a true statement.

NAME.....

PLACE OF DWELLING.....

[Applicant sign here.]

DATE.....

After a license has been taken out each dairy premises from which the dealer receives his supply is visited by an inspector of State Dairy Commissioner, Mr. G. W. McGuire, and a report showing the sanitary conditions of the dairy is received.

The following report is a sample of those received:

Copy.)

NEW JERSEY DAIRY COMMISSION.

Inspection of Dairies.

DATE, July 8th, 1896. NAME OF PLACE, Hornerstown P.O.
COUNTY, Monmouth. TOWNSHIP, Upper Freehold.

1. Name of owner or manager.
2. Number of cows. Fourteen. 3. Breed. Grade.

MONMOUTH COUNTY—Continued.

4. Condition of cows. Good.
5. Food. Pasture; no grain.
6. Condition of stable. In poor condition; cattle only in stable while being milked, turned out day and night.
7. How is manure stored? In barn-yard.
8. Condition of stable-yard. In a filthy condition.
9. Quantity of milk produced. 60 quarts.
10. Where is milk stored? In a shed along public road; shed is open, dirt floor, and adjoining a pig-pen; shed is separated from pig-pen by a slab partition.
11. How is milk cooled? On Healings & Lippincott's Star cooler.
12. Temperature of milk when sold to customers. 65° Fahr.
13. Water-supply for watering stock. Well on edge of barn-yard and public road; top of well is open, and no doubt receives drainage from both road and barn-yard.
14. Water-supply for washing cans and utensils. From pump on edge of barn-yard.
15. Location of wells. On edge of barn-yard.
16. Distance from well to stable-yard...; to cesspool...; to privy-vault, 100 ft.
17. Was sample of water taken for analysis? No. No.
18. Is there any sickness among the persons dwelling or employed on the premises? No.

Signature of Inspector, P. L. VANDEGRIFT.

A subsequent analysis of the water from the well referred to in the above report, showed it to be badly polluted.

Working under the provisions of the ordinance, the further sale of milk in Asbury Park from this dairy was prohibited. Frequent inspections of the milk depots are made by the local milk inspector, and the quality of the milk offered for sale is tested by the lactometer and samples taken for analysis.

The manner of storing the milk and the method of washing the cans and utensils are investigated, and the water-supply and drainage of the premises are inquired into.

KEROSENE OIL.

Nine samples of kerosene oil were examined with the closed tester during the past year, and the flashing-point of all of the samples was above the standard required by law. No accidents have been brought to our attention resulting from the use of kerosene and gasoline during the year.

MONMOUTH COUNTY—*Continued.*

COMMUNICABLE DISEASES.

This borough has been singularly free from preventable diseases during the past year, and with the one exception, measles, which prevailed in epidemic form in December last, there have been fewer cases than in any one year since the effort to protect the public health was begun in Asbury Park in 1880.

While measles is extremely contagious, yet its spread might and doubtless would have been restricted at the time of its outbreak in December last had this board obtained early information of the first case, so that proper isolation of the patient could have been secured, but unfortunately two cases had existed for more than a week, and the public schools had been exposed to infection before knowledge of the existence of the disease in the borough was received by the board of health. Steps were at once taken to guard against its further spread, and the following letter was addressed to the superintendent of the public schools:

OFFICE BOARD OF HEALTH }
December 19th, 1895. }

Prof. J. M. Ralston, Superintendent School District No. 90½:

DEAR SIR—Two cases of measles have appeared in Asbury Park, and we find that this disease has been prevailing in an adjoining sanitary district for the past few weeks, and that it now threatens to spread and become epidemic.

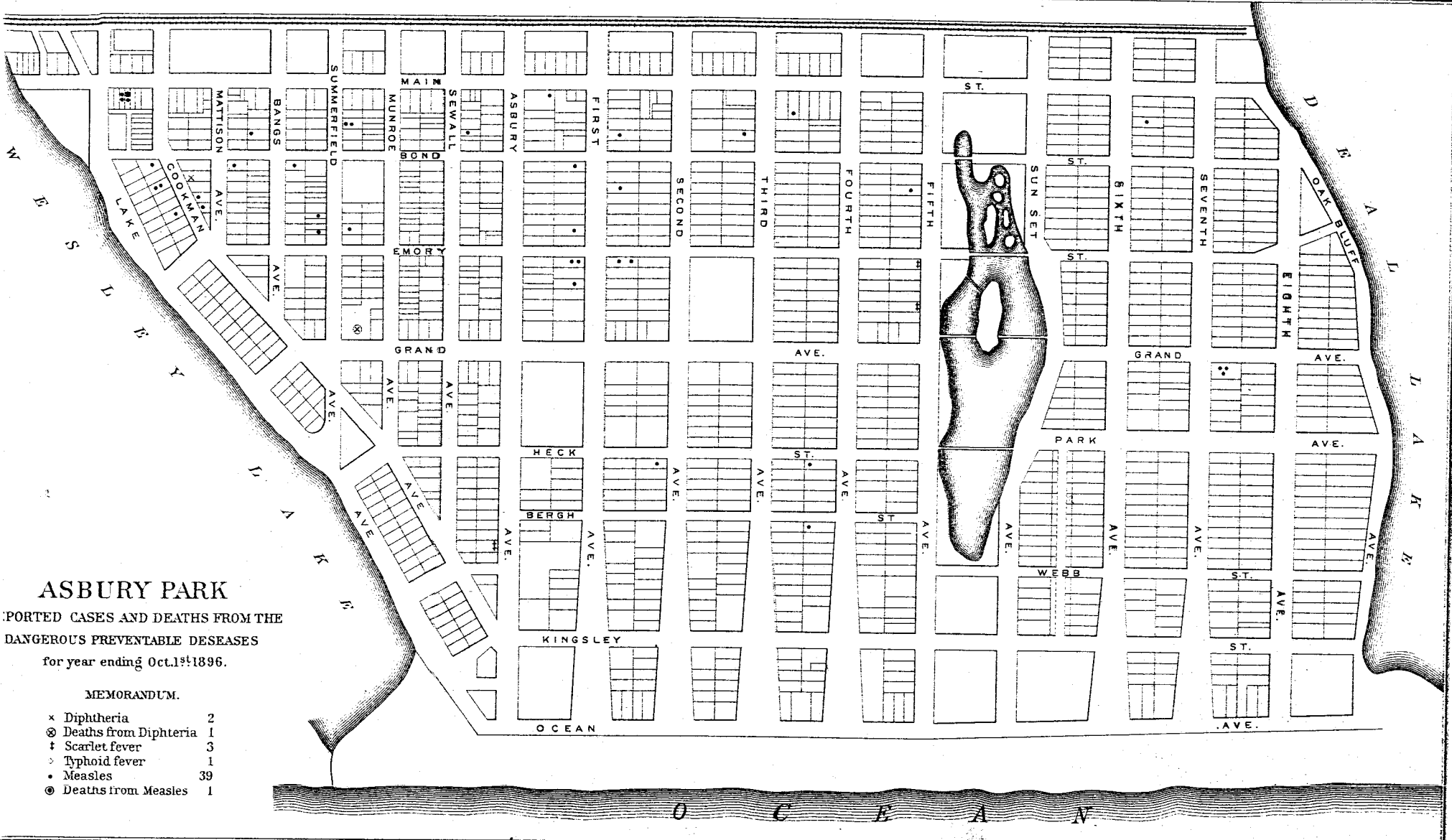
Eight years ago this disease existed here in epidemic form and was the cause of much suffering and of prolonged interference with the work of the schools. The board of health of the borough of Asbury Park desires your co-operation in preventing attendance at the public schools of any child who is affected by measles or who may dwell in a house in which any person is living who is suffering from the disease.

No person should be admitted to the schools until twenty-seven days after the eruption first appeared. In the State of New Jersey during the year ending June 30th, 1894, the deaths from measles numbered 557. This is twenty times more deaths than occurred that year from small-pox. An English authority says that measles causes five times as many deaths as small-pox. In Massachusetts for a period of twenty years, from 1874 to 1893, the deaths from measles numbered 3832. During the same period the total number of deaths in Massachusetts from small-pox was 311 (or one-twelfth).

These facts show that this disease is far from being the harmless malady which it is popularly believed to be, and they should lead the public, as well as the school authorities and the health board, to restrict the spread of the disease as far as possible. Measles is the most contagious of all of the eruptive fevers, and the only effectual method for preventing its spread is to prevent all contact with infected persons or premises.

Very respectfully,

D. C. BOWEN, Clerk.



ASBURY PARK

REPORTED CASES AND DEATHS FROM THE
DANGEROUS PREVENTABLE DISEASES

for year ending Oct. 1st 1896.

MEMORANDUM.

- × Diphtheria 2
- ⊗ Deaths from Diphtheria 1
- † Scarlet fever 3
- > Typhoid fever 1
- Measles 39
- ⊙ Deaths from Measles 1

MONMOUTH COUNTY—*Continued.*

A circular letter was also issued and a copy sent to all practicing physicians, informing them of the existence of the disease in the borough and requesting prompt reports of all cases which they might professionally attend. A notice was sent to each family in which a case occurred, advising them how they could protect the health of the other children of the community. But the infection had already been spread, and it resulted in thirty-nine reported cases and one death in this borough, and a large number of cases and several deaths occurred in the adjoining sanitary districts, in which the disease first appeared.

DIPHTHERIA.

Much benefit has been derived from the bacteriological examinations of cultures in suspected cases of diphtheria, made free of charge at the State Board of Health laboratory in Princeton. Mailing-packages for cultures are kept on deposit at this office, where they are available for the use of physicians at any time of day or night. These packages are admitted through the mails, and reports of the result of the examination are forwarded direct from the laboratory to the physician who sends the specimen.

This service not only assists physicians in ascertaining the true nature of the case in the early stages of the disease, but it is most valuable in determining by means of secondary examination when the throat is free from the Klebs-Loeffler bacillus, and when the patient can with safety to the public health be released from isolation. A study of our statistics shows that a large percentage of the cases which are reported as diphtheria prove upon examination to be pseudo-diphtheria, but with the aid of the bacteriological examinations we are enabled to detect these cases, and thereby save the annoyance which would result from establishing isolation for the patient, and also the expense attached to disinfecting the premises and paying for bedding and other articles which would perhaps have been needlessly destroyed.

But two cases of true diphtheria have occurred in this borough during the past year. One in November last in the person of a child who was stopping with its parents at a hotel.

The patient died shortly after the case was reported to the health office, and no bacteriological examination in this case was had. The origin of the case was not discovered. The second case was reported

MONMOUTH COUNTY—Continued.

on September 21st. The patient was an adult, residing on the third floor of a tenement-house on Cookman avenue. Inquiry into the origin of the case showed that the patient had moved from a dwelling in West Asbury Park, September 17th, in which several patients were under treatment for tonsillitis. She came to Asbury Park and in five days developed diphtheria. The patient was removed to the isolation hospital, and a culture which was sent to the laboratory confirmed the clinical diagnosis of diphtheria.

The occurrence of this case in the borough, together with the knowledge that, within the past few weeks, about twenty cases and four deaths had been reported in West Asbury Park and Bradley Beach, was sufficient warning to cause united action by the various local boards of health of this vicinity and the board of school trustees, to prevent the further spread of diphtheria through the public schools, which had just been opened.

To this end an invitation was extended by the Asbury Park board to the boards of health of Neptune township, Ocean Grove, Bradley Beach and Neptune City, and to the board of education of Neptune township, to meet with the borough board of health on September 23d, for the purpose of securing cordial co-operation and uniformity in the methods to be pursued in stamping out the disease.

This meeting was well attended by the several boards above-named, and the following methods were agreed upon:

1. Every physician to be urged to promptly report every case of sore throat which he may attend.

2. Each board of health to cause a specimen for bacteriological examination to be taken by a medical officer appointed by said board from every patient reported by any physician as a case of possible diphtheria, and isolation to be required in every reported case until further development shall prove that diphtheria does not exist, or until thirty days shall have passed, or until a bacteriological examination shall show that the bacilli are no longer present.

3. The joint boards of health, to provide for medical inspection of each school every school-day during the coming three weeks. Cultures to be taken by the medical inspector and forwarded to the laboratory in every case of sore throat, and the pupil to be excluded from school until a report is received from the laboratory.

MONMOUTH COUNTY—Continued.

4. Cleansing and purification of all premises where diphtheria may occur and private funerals in cases of death from this disease to be secured by the board of health in the territory where cases may appear.

The presidents of the several health boards were appointed a committee, with full power to act; to employ medical services and arrange for carrying out the daily inspection of the public schools. Plans were at once perfected and the following notice was sent to the school authorities:

ASBURY PARK, Sept. 24, 1896

Prof. J. M. Rulston, Supervising Principal Public Schools:

DEAR SIR—In accordance with the agreement reached last evening between the various local health authorities of this vicinity and the board of education of Neptune township, a physician, Dr. John Taylor, has been employed to inspect the public schools of this school district, and said board have guaranteed payment for his services. He will begin his duties to-morrow morning.

Very respectfully,

D. C. BOWEN,
Clerk.

Dr. Taylor began his duties on September 25th. His work covered a large field, there being nine school buildings in the district, comprising fifty-four class-rooms, to be visited daily. Every case of sore-throat or sickness of any character in a scholar, and which was observed by a teacher, was recorded on a blank, like the following, and the pupil was excluded from school until a report from the medical officer was received.

One of these blanks to be filled out for each pupil who may exhibit signs of illness. Leave blanks at office of Principal before one o'clock P. M.

Date.....

School.....

Class.....

Room.....

Name.....

Address { Town.....
Street.....
Number.....

Age.....

Sex.....

Number of children in family.....

Number of children attending school.....

Names.....

Classes.....

Schools.....

Sunday-school attended.....

MONMOUTH COUNTY—Continued.

REMARKS.

(State reasons for thinking pupil ill.)

.....

Teacher.

These reports were placed in the hands of the medical inspector daily, and each individual case was investigated by him and a daily report made to the health office on the following blank :

REPORT OF THE MEDICAL OFFICER

Employed in Accordance with an Order of the Joint Meeting of the Boards of Health of Asbury Park, Neptune Township, Ocean Grove, Bradley Beach, and Neptune City, held September 23d, 1896.

DATE.....

GENTLEMEN—I have this day visited the following public schools, and find the facts relating to the present outbreak of diphtheria to be as follows:

School.	Case No.	Name	Residence.	Culture Sent.
Hamilton,
Whitesville,
Prospect Ave.,
Springwood Ave.,
Asbury Park,
Ocean Grove,
Bradley Beach,
Neptune City,
Cases among persons who do not attend school,

....., M. D.

MONMOUTH COUNTY—Continued.

The following letter, addressed to Dr. Henry Mitchell, Secretary State Board of Health, will explain the methods pursued in keeping the schools free from contagion :

ASBURY PARK, N. J.,
 November 6th, 1896. }

Dr. Henry Mitchell, Secretary State Board of Health, Trenton, N. J. :

DEAR DOCTOR—In the work which is now being done in the public schools in coping with the present outbreak of diphtheria in this vicinity, the following methods are being pursued.

1. All cases of sickness or absence among scholars which are reported by teachers to the school physician are investigated, and the results of his investigations daily reported to this office. In the case of a negative report, notice is at once sent to the superintendent of schools and the scholar is again admitted to his or her class.

2. If clinical symptoms warrant the taking of a specimen for bacteriological examination, the pupil is excluded from school until a reply from the laboratory has been received. If the report shows that the case is not one of true diphtheria, notice to that effect is sent to the superintendent of schools, who gives instructions for the pupil to be re-admitted.

Notice is also sent to the local health authorities in whose district the case occurred, and further supervision over the case is suspended.

If, on the other hand, the case is one of true diphtheria, the superintendent of schools and the local health authorities are so advised, and proper isolation for the infected person and premises is secured by the health officer, and all scholars who dwell in the infected premises are excluded from school by the superintendent until a permit has been granted for their admittance by the health board.

3. The daily disinfecting and cleansing of each school building is secured by the school authorities. After school hours each day the janitors, with their assistants, proceed to disinfect the building with a solution of bichloride of mercury. In the larger building the solution is applied by the use of a garden pump, fitted with an atomizing nozzle. Each desk, chair, and every piece of furniture handled by the scholars is sprayed and, after drying, wiped with clean cloths.

Once each week the floors are thoroughly sprinkled with bichloride solution, and each day they are sprinkled with sawdust, saturated with the solution, and swept. Each door and all portions of the side-walls in the halls and classrooms, which are soiled by coming in contact with the hands or clothing of the scholars, are sprayed or wiped down with bichloride solution.

By this method each school building is daily treated, and, we believe, made the safest building in the borough for children to occupy.

Very respectfully,

D. C. BOWEN,
 Clerk.

MONMOUTH COUNTY—*Continued.*

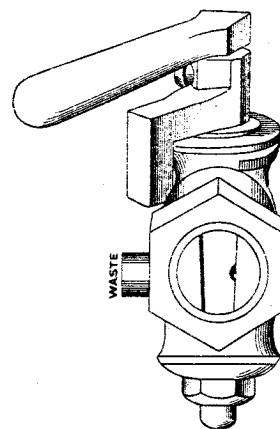
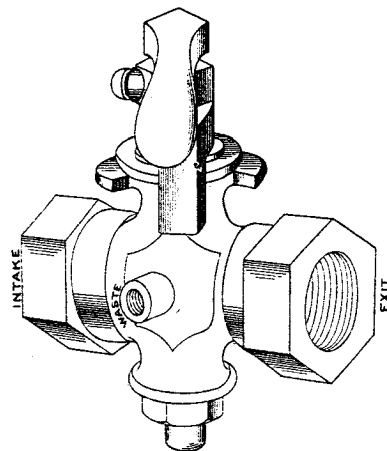
Three cases of scarlet fever have occurred during the past year. Two of these cases developed in the families of visitors stopping at hotels during the summer months.

The contagion in two of these cases was contracted elsewhere and developed in a few days after the arrival of the parties in this borough. The origin of the contagion in the third case was not learned. Only one case of typhoid fever occurred in Asbury Park during the year. This case was in the person of a lady who had been in Freehold acting in the capacity of nurse in attendance upon a case of typhoid fever, and after returning to her home in Asbury Park she developed the disease, and was removed to the Memorial Hospital in Long Branch.

The accompanying cuts show a stop and waste cock used for a hydrant valve, and which was supplied with water from the street water-mains. This hydrant was in a small door-yard in the rear of a fish-market. The ground in this yard had long been polluted by waste fluids and excremental matter from leaky drains. The valve was about three feet beneath the surface of the ground, encased in a wooden box, and covered by about eighteen inches of filthy fluid. The construction of the valve is such that when it is closed the water from the pipe on the house-side of the valve can all waste out and mingle with the polluted fluids in which the valve is placed. When the valve is opened a small quantity of the polluted water can enter the pipe and be carried to the house, so that each time water is drawn a certain amount of polluted water is discharged. By this method it is believed that typhoid fever was introduced into the family, supplied by water from this hydrant, and the disease caused one death.

Reports of communicable diseases are required by ordinance and a record of each case is kept and recorded graphically by the use of maps, upon which are shown in colors the exact location in the borough at which each case occurred. Weekly reports of all communicable disease are regularly forwarded to the State Board of Health in conformity to law.

The following table shows the number of cases of communicable diseases which have occurred in Asbury Park during the past twelve years, and also the number of persons who have died from these affections.



MONMOUTH COUNTY—Continued.

Number of cases of communicable diseases reported and the number of deaths resulting therefrom :

YEARS.	POPULATION.		NUMBER OF CASES REPORTED.							DEATHS.				
	Resident.	Non-resident.	Measles.	Scarlet Fever.	Diphtheria.	Typhoid Fever.	Consumption.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Typhoid Fever.	Consumption.	Small-pox.
1885.....	2 000	20 000	14	3	1	0	0	0	0	2	1	0	0	0
1886.....	3 000	20 000	4	2	9	0	0	0	0	0	4	0	5	0
1887.....	3 000	25 000	82	7	7	0	0	0	0	0	7	0	3	0
1888.....	3 000	25 000	0	20	2	1	0	0	0	1	1	0	4	0
1889.....	3 500	30 000	10	3	0	1	0	0	0	0	1	0	3	0
1890.....	3 800	30 000	0	16	6	0	0	0	0	1	2	0	4	0
1891.....	3 800	30 000	1	6	2	0	0	0	0	6	0	0	5	0
1892.....	3 800	30 000	36	4	7	1	0	0	0	1	3	1	4	0
1893.....	4 200	0 000	0	7	6	0	0	0	0	0	1	0	3	0
1894.....	4 200	30 000	7	7	2	4	1	8	0	0	0	1	5	1
1895.....	4 200	30 000	6	5	5	7	1	0	0	0	3	0	2	0
1896.....	.....	.....	39	3	2	1	0	0	1	0	1	0	7	0
Totals.....	.....	.....	199	83	49	15	2	8	1	5	24	2	47	1

HOSPITALS.

Through the generosity of Hon. James A. Bradley, this board has had placed at its disposal a detention hospital, thoroughly equipped for the reception of patients suffering from contagious diseases which occur in dwellings in which safe isolation for the patient cannot be secured.

Three times during the past year the value to the borough of this hospital has been demonstrated by the removal from crowded dwellings of persons suffering from dangerous communicable diseases, and who could not, with safety to the public health, have been isolated in their places of abode. This hospital is admirably situated on Asbury avenue, just outside of the borough limits. It occupies a plot of ground 150x200 feet, and is surrounded by a beautifully shaded lawn. This place is always kept in readiness for emergency cases, being each time thoroughly cleansed and disinfected after use.

MONMOUTH COUNTY—Continued.

The borough owns jointly with the township of Neptune four buildings, erected for hospital purposes, on the Sand hills, about one mile from Asbury Park. The buildings consist of nurses' quarters, kitchen and two wards. They are situated on the brow of a hill elevated about ninety feet above the sea, and overlook the coast for miles. They have been opened twice since their erection, in 1892, once for the care of small-pox cases, and they are now being used by Neptune township health authorities in caring for diphtheria patients.

VACCINATION.

This board offers free vaccination to all who may apply, at all times of the year. The re-opening of the public schools in September last suggested the necessity for a general vaccination of all unprotected persons in this school district, and this will be offered in January, 1897.

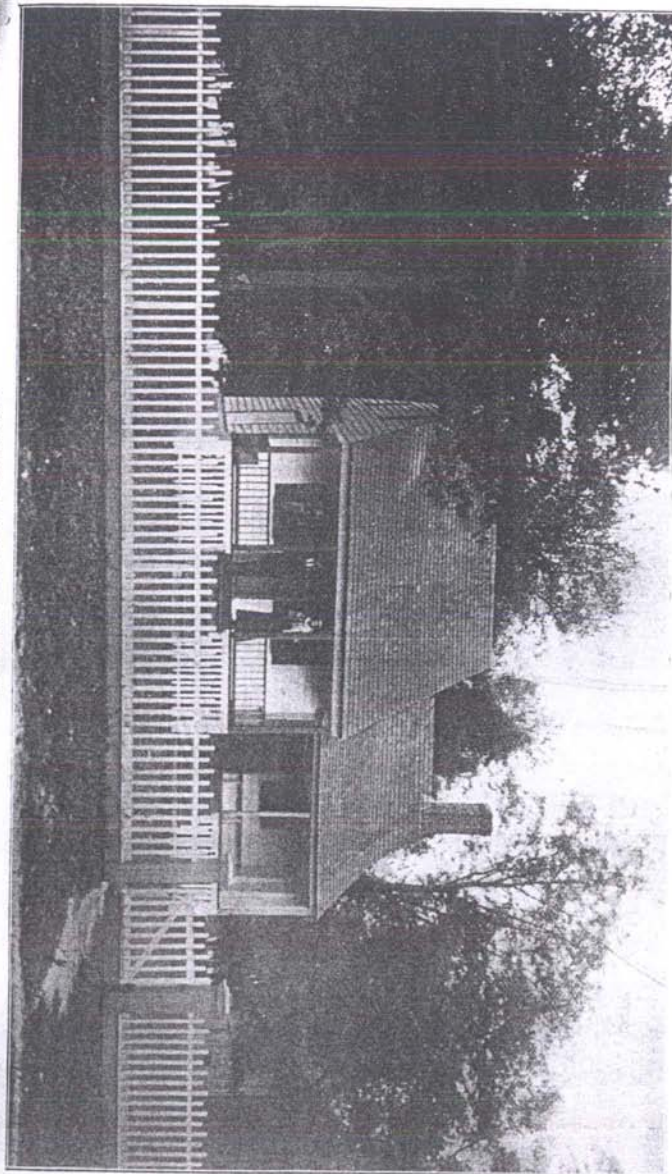
Three years ago over seven hundred free vaccinations were made by this board in consequence of an order issued by the school trustees, requiring that all pupils, before attendance upon the public schools, should be successfully vaccinated. No considerable number of vaccinations have been made in this district since the work above referred to was performed, and there must be at this time a large number of pupils in attendance at the public schools who are not protected from small-pox.

DISINFECTION.

Many articles, such as blankets and flannels, can not be effectually disinfected, without injury or total destruction, by any other means than in a steam-chamber. The laws of New Jersey require that personal property or bedding destroyed, to prevent the spread of contagious diseases, shall be paid for out of the funds of the municipality by which they are destroyed. It is therefore desirable, from an economic standpoint, that this borough be equipped with a suitable disinfecting outfit for the efficient disinfecting of infected articles without injury to the goods.

Such a plant is particularly needed in Asbury Park, where the ever-changing population of thousands of people who visit this resort from all parts of the country render us particularly liable to exposure to the contagion of communicable diseases, and the failure to thoroughly

DISINFECTION HOSPITAL, ASBURY PARK, N. J.



MAIL-BOX HOSPITAL, ASHURU PARK, N. J.



MONMOUTH COUNTY—Continued.

cleanse an infected house and its belongings is only to endanger the health and life of others and defeats the purpose of our work.

If such a plant had been established in Asbury Park four years ago enough money would have been saved to the borough in goods destroyed to more than pay for its construction.

For convenience in keeping a record of the local deaths a book with the following ruling is used, which shows, among other facts, the place of burial of each decedent :

Record of Deaths Occurring in Asbury Park for Year Ending.....189

No.	Date.		Name of Decedent.	Colo.	Sex.		Age.		Place of Death.	Resident.	Transferred.	Cause of Death.	Place of Burial.	Medical Attendant.	Undertaker.
	Mo.	Day			M.	F.	Vr.	Mo.							

MONMOUTH COUNTY—Continued.

OFFICE WORK.

Number of notices requiring improvement in stable premises.....	51
Number of notices requiring excavation of privy-vaults.....	119
Number of notices requiring compliance with garbage ordinance.....	95
Number of notices requiring abatement of defective drainage construction.....	47
Number of notices requiring abatement of nuisances other than specified.....	189
Number of notices for violation of plumbing and drainage ordinance...	25
Number of quarantine notices.....	9
Number of general communications.....	792
Total.....	1,307
Number of meetings held.....	20

The borough of Asbury Park, to maintain its place in the front rank as a health resort, should possess a furnace for the destruction by fire of garbage and all waste products. In connection with such a furnace should be established a steam disinfecting plant. It should also own a detention hospital, suitably located, to be used in the place of the one which is at present supplied through the generosity of Hon. J. A. Bradley.

D. C. BOWEN,
Secretary.

ATLANTIC TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel T. Vanderveer, President, Colts Neck; Daniel Shuts, Tinton Falls; George Milkins, Jr., Freehold; Levi Scobey, Scobeyville.

BOROUGH OF BELMAR.

NAMES OF MEMBERS AND OFFICERS.

Charles H. Thompson, M.D., President; T. P. Philbrick, Fred V. Thompson, M. D., Samuel L. Gillen, Joab Titus; Neil H. Miller, Secretary; S. C. Hoppock, Inspector.

No plumbing ordinances have been adopted by the board. Sewers have been provided, but there is no public water-supply. Garbage is removed by contract, during the summer season only. Night soil and cesspool contents are removed by licensed scavengers to points outside of the borough limits.

MONMOUTH COUNTY—Continued.

BOROUGH OF BRADLEY BEACH.

NAMES OF MEMBERS AND OFFICERS.

Elias Brower, President; Aaron Smith, C. Foster, Chas. Crawford, Robert Reynolds; Chas. Bogart, Inspector; Thomas Layton, Jr., Secretary.

Communicable diseases are promptly reported, and the board has been active in endeavoring to restrict the spread of these affections. An outbreak of diphtheria has recently received the attention of the board, and co-operation with the adjoining communities of Neptune City, Neptune township, Ocean Grove and Asbury Park was established for the purpose of defending the citizens against a continuance of this disease.

EATONTOWN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

R. L. Hopper, Eatontown; F. E. Snyder, Jr., Eatontown; G. L. Gibbs, West Long Branch; C. O. McFaddin, Oceanport; E. W. Crater, M. D., Secretary, Oceanport.

Lying adjacent to the large population of the city of Long Branch, this township has been much annoyed by the unrestricted and improper dumping of refuse materials. The board of health has recently taken action which has resulted in the use of suitable wagons for the transportation of these substances, and has designated certain localities in which dumping is permitted, and has also required that all persons who transport garbage offal or night-soil shall take out licenses for this service.

BOROUGH OF ENGLISH TOWN.

NAMES OF MEMBERS AND OFFICERS.

L. V. Dey, President; G. H. Hutchinson, M. D., Garret Forman, E. E. Christie; Charles L. Stout, Secretary.

This board has just been organized, the borough having been recently created.

TOWN OF FREEHOLD.

NAMES OF MEMBERS AND OFFICERS.

John Bawden, President; O. R. Freeman, M.D., W. S. Combs, M.D., Chas. L. Shepherd, Henry C. Thorn; J. O. Burt, Secretary.

MONMOUTH COUNTY—*Continued.*

Four cases of scarlet fever were reported during the year, one proving fatal. Only one case of diphtheria occurred. Twenty-seven complaints of unsanitary conditions on premises were received, and each case was given attention. Three meetings have been held by the board during the year.

Fifty-seven permits have been given for new sewer connections, making the total thus far issued one hundred and ninety six. The sewage disposal-beds have continued to work very satisfactorily, and no nuisance has been created by them.

FREEHOLD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

A. J. Buck, President; C. D. B. Forman, Millard F. Conover; O. R. Freeman, M.D., Inspector; Rufif V. Lawrence, Secretary; all of Freehold.

Several cases of typhoid fever occurred in the southern portion of the township during the months of August and September. Three deaths resulted.

The water-supply in the section of the township in which the disease occurred is taken from wells, and the low-ground water is believed to have caused well-pollution, and this in turn produced the usual effects where soil contamination exists.

HOLMDEL TOWNSHIP

NAMES OF MEMBERS AND OFFICERS.

J. S. Holmes, President, Holmdel; Westley Mason, Keyport; J. O. Lamberson, Hazlet; H. G. Cook, M.D., Holmdel; Aaron Longstreet, Secretary, Keyport.

Several cases of scarlet fever have occurred in the township, with one death.

HOWELL TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Benjamin M. Cooper, President, Lakewood; Charles E. Farry, Farmingdale; Robert H. Morris, Turkey; Stephen A. Disbrow, M.D., Farmingdale; James H. Butcher, Secretary, Turkey.

TOWN OF KEYPORT.

NAMES OF MEMBERS AND OFFICERS.

William Bedle, President; Timothy Mount, Dr. E. B. Reed, C. Frank Mason, Augustave Fraurer, William Con Smith; James M. Walling, Inspector.

MONMOUTH COUNTY—*Continued.*

CITY OF LONG BRANCH.

NAMES OF MEMBERS AND OFFICERS.

William J. Smythe, Jr., President; George H. Baker, M.D., Theodore Howland, Paul F. Brazz, C. V. N. Wilson, Jos. V. Jordan; Henry Gogle, Sanitary Inspector; S. F. McCloud, Plumbing Inspector; E. B. Blaisdell, Secretary.

MANALAPAN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William H. Reid, President, Tennent; D. S. Aumack, Englishtown; E. M. Reid, Smithburg; A. T. Applegate, M.D., Englishtown; S. C. Bowne, Secretary, Tennent.

BOROUGH OF MANASQUAN.

An ordinance is now under consideration by the mayor and council for the re-organization of the borough board of health.

E. P. LONGSTREET,

Secretary.

MARLBORO TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

David A. Baird, President, Marlboro; A. Hardy, Morganville; P. C. Vanderveer, Morganville; W. C. Carson, Holmdel; J. D. Ely, M.D., Secretary, Marlboro.

MIDDLETOWN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

D. W. Vannote, Bedford; George F. Bartleson, Atlantic Highlands; James Bray Jr., Lincroft; O. W. Budlong, M.D., Inspector, Bedford; George Brannin, Secretary, Atlantic Highlands.

The board has adopted ordinances which are now in press and will soon be issued. One case of scarlet fever and one of diphtheria occurred during the past year.

MILLSTONE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William Parker, Smithburg; Curtis B. Forman, Smithburg; A. L. Eldridge, Clarksburg; W. T. McClellan, M.D., Perrineville; George J. Ely, Secretary, Perrineville.

MONMOUTH COUNTY—Continued.

BOROUGH OF NORTH SPRING LAKE.

NAMES OF MEMBERS AND OFFICERS.

John Middletown, President, Spring Lake Beach; James E. Reed, Spring Lake Beach; George M. Height, Spring Lake Beach; Charles R. Brahm, Spring Lake Beach.

Night-soil is disposed of by dumping it into the ocean at low tide.

OCEAN GROVE.

NAMES OF MEMBERS AND OFFICERS.

Rev. E. H. Stokes, D.D., President, Ocean Grove; Rev. A. E. Ballard, D.D., Sea Isle City; Rev. R. Daniels, Ocean Grove; Hon. J. L. Hays, Newark, N. J.; Hon. H. W. Murphy, Freehold, N. J.; J. H. Alday, M. D., Inspector, Ocean Grove.

The sanitary inspection of premises of Ocean Grove is regularly and carefully attended to, and a record of such inspections made.

Our new electric and water plant is perfectly satisfactory in its operation, perfect and complete in its make-up, and is capable of furnishing more water than the needs of the community demand. For the past year to date there has been fifty-five connections, making a total of 1,213 connections with our water-system. The system pumped during the summer 2,000,000 gallons per twenty-four hours.

Our sewer-system is complete, and meets all the requirements made thereon. For the last year there were thirty-two new connections, making a total of 1,128 connections with the sewer-system.

The cost of our water and electric plant is \$54,000. We still continue making strenuous efforts to secure additional connections with water and sewer systems.

The plumbing involved therein we require to be of proper character.

All garbage is collected and transported by responsible parties by contract, for \$1,000, they giving bonds for a proper and faithful performance of the work.

There have been no infectious diseases among animals in the town.

As far as we know, the physicians of the town report to our board of health their cases of communicable diseases, and we endeavor to have them do so.

We keep a record of all communicable diseases, and we now are sending a weekly statement of such to the State Board of Health, as required by chapter 260, laws of 1895.

MONMOUTH COUNTY—Continued.

No public offer of gratuitous vaccination has been made by the board of health, but we stand ready to do such work without expense.

All cases of communicable and infectious diseases are placed in quarantine under strict rules.

There are no factories in the town. There are no dairies within our precincts.

There have been no accidents from the use of kerosene or gasolene.

During the last season there was a very large number of visitors, and yet the general health was very good. Towards the close of the season there were three cases of typhoid fever, and also three cases of measles, besides some other sickness incidental to warm weather. The aforesaid cases of contagious diseases were quarantined, thus preventing the spread of the disease. At present the general health of the town is good, with the exception of three cases of diphtheria, which are quarantined, and all precautionary measures adopted to confine the disease within its present locality, thus preventing its spread.

J. H. ALDAY, M.D.,
Sanitary Officer.

OCEAN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

T. R. Wooley, Long Branch; M. L. G. Irwin, Seabright; S. J. Wooley, M.D., Long Branch; Howard Brinley, Secretary, Long Branch.

TOWN OF RED BANK.

NAMES OF MEMBERS AND OFFICERS.

C. B. Warner, President; H. J. Child, J. Sheehan; J. Walsh, Inspector; S. Sabath, Secretary.

Plans are under consideration for the construction of sewers, and it seems probable that this greatly-needed improvement will be provided in the course of the coming year.

UPPER FREEHOLD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William Kirby, President, Cream Ridge; Charles C. Wyckoff, Allentown; Edward A. Hyers, Red Valley; William Quicksell, Hornorstown; F. C. Price, M.D., Secretary, Imlaystown.

MONMOUTH COUNTY—Continued.

From the very full report received from the secretary of this board we take the following statement: "Last year we reported to your board a loss of about 2,000 head of hogs from a disease which we believed to be hog cholera. The district affected covered an area of ten square miles.

"No adequate precautions were taken to prevent the return of this disease, and notwithstanding that new herds of swine were brought into this infected district, the disease has not re-appeared except in one instance, where the previous outbreak occurred very late last season. On farms adjoining this district, however, the disease developed this season, with a loss of about 150 head."

WALL TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Benjamin E. Algor, President, New Bedford; Frederick Craig, Como; W. W. Prout, M.D., Spring Lake; G. E. Rogers, Jr., Secretary, New Bedford.

MORRIS COUNTY.

TOWN OF BOONTON.

NAMES OF MEMBERS AND OFFICERS.

N. L. Briggs, President; Gibson L. Vincent, George Sanders, Henry Waer, A. E. Carpenter, M.D.; Thomas L. Hammond, Inspector; Geo. W. Burchard, Secretary.

The water-supply is now completed and is in general use.

Garbage is collected twice each week.

Communicable diseases are regularly reported and recorded. Meetings of the board are held only upon the call of the president.

BOONTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Horace Ford, John Barrett, E. H. Stickle, Jos. Stevenson, Cuthbert Wigg, M.D.; G. D. Crane, Secretary.

CHATHAM TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Chas. E. Genung, President, Chatham; Hudson Muchmore, Chatham; G. M. Swain, M.D., Chatham; G. W. Genung, Inspector, Afton; Henry Young, Secretary, Afton.

MORRIS COUNTY—Continued.

CHESTER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Abraham Tiger, Chester; W. A. Green, M.D., Chester; S. H. DeCamp, Chester; William Tiger, Ionia; H. P. Drake, Chester.

CITY OF DOVER.

NAMES OF MEMBERS AND OFFICERS.

Samuel B. Johnson, President; William H. Bayram, Albert J. Titman; James Hagan, Inspector; Joseph V. Baker, Secretary.

This city is supplied with water from springs on the mountain, but there is no system of sewers.

Plumbing is constructed under the supervision of the board of health. Communicable diseases are reported upon printed blanks furnished by the board, and a record is kept by the secretary as required by law.

HANOVER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Andrew L. Cobb, President, Parsippany; George Cook, Hanover; Livingston Petre, Hanover; E. P. Cooper, M.D., Parsippany; Joseph H. Bastedo, Boonton.

TOWN OF MORRISTOWN.

NAMES OF MEMBERS AND OFFICERS.

J. W. Rosevear, President; Charles McCallum, Isaac Arnold, William J. Kay, Thomas Martin, Secretary.

During the past year the following cases of the dangerous communicable diseases have occurred: Diphtheria, eight cases; measles, two hundred and eleven cases; scarlet fever, eighty cases.

In addition to these, other cases of measles and scarlet fever have occurred in families where no physician was employed, and from which no reports were received.

The construction of house drainage is supervised by the board.

The public water-supply of the city is satisfactory, but no sewers have been provided, and leaching cess-pools are depended upon for the disposal of waste fluids.

There has been no regular house-to-house inspection established by the board of health. The condition of one tenement-house in the city became so unhealthful that the board caused the eviction of the colored occupants, and the house will not again be used as a dwelling.

MORRIS COUNTY—Continued.

BOROUGH OF MOUNT TABOR.

NAMES OF MEMBERS AND OFFICERS.

Henry L. Coit, M.D., President; James H. Cox, Inspector; Samuel Warren, Secretary.

Garbage is systematically removed daily; waste fluids from cess-pools are removed periodically, without offense.

PASSAIC TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John Veader, Green Village; C. B. Frost, Green Village; Samuel Ortman, Sterling; F. L. Hendrickson, Secretary, New Vernon.

PEQUANNOCK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Charles I. V. Romont, M.D., President, Pompton Plains; John I. Mott, Pompton Plains; Thomas Benjamin, Lincoln Park; Oscar Vanderhoff, Butler; Albert W. Van Zann, Inspector, Pompton Plains; Robert C. Getty, Secretary, Butler.

BOROUGH OF ROCKAWAY.

NAMES OF MEMBERS AND OFFICERS.

John Harris, President; Samuel A. Crook, D. C. Berry, G. S. Dearborn, M.D., Mahlon Hoagland, Jr.; William May, Secretary.

ROCKAWAY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Joseph H. Brooks, Rockaway; C. C. DeHart, Rockaway; F. W. Flagge, M.D., Thos. Hesslin, Hibernia; William May, Secretary, Rockaway.

A moderate epidemic of measles prevailed in the township, and a number of cases of dysentery occurred.

ROXBURY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

N. H. Adsit, Succasunna; T. F. King, Ledgewood; P. H. Day, Port Morris; J. McConnell, Port Morris; F. M. Flowers, Secretary.

Several cases of measles and scarlet fever occurred in the township during the summer, but the measures adopted by the board prevented the extensive prevalence of these diseases.

MORRIS COUNTY—Continued.

WASHINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

H. W. Dufford, German Valley; J. W. Welsh, German Valley; Elias Sutton, Parkers; W. E. South, Schooleys Mountain; Jacob Hann, Stephenburg; Jacob R. Farrow, M.D., Secretary, German Valley.

Measles and whooping cough prevailed during the winter and spring.

OCEAN COUNTY.

BOROUGH OF BAY HEAD.

NAMES OF MEMBERS AND OFFICERS.

B. F. Hawley, M.D., President; C. L. Clayton, C. R. Priest; Julius Foster, Secretary.

Five cases of scarlet fever occurred during the month of September, but the action of the board prevented the spread of the disease, restricting it to the families in which it first appeared.

DOVER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

A. Ernst, John Tiltan, James I. McKeelvey, R. L. Disbrow, M.D.; Thomas B. Irons, Secretary; all of Toms River.

Sanitary inspections have been regularly performed by the board of health, and records of such inspections have been preserved.

BOROUGH OF ISLAND HEIGHTS.

NAMES OF MEMBERS AND OFFICERS.

M. F. Middleton, M.D., President; William C. McKaig, Morris Hallock, Aug. Korndeorfer, M.D., Geo. Migrantz; L. B. Parker, Inspector; William A. Parker, Secretary.

Inspection of premises is made when especially ordered by the board, and records of inspection are kept on file. Water-supply from surface-wells. Disposal of domestic fluids is accomplished by use of cesspools.

The construction of a system of sewers is under consideration, and the board of health is strongly advocating the introduction of these works. An ordinance regulating plumbing has been adopted.

OCEAN COUNTY—Continued.

Garbage is removed by contract, and the service is said to be satisfactory. Printed blanks for the use of physicians in reporting communicable diseases are furnished by the board.

A record of such is kept by the board and the facts transmitted to the State Board of Health, as required by law.

LACEY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Thomas C. Van Arsdale, President, Lanoka; B. F. Holmes, Forked River; A. G. Wilbert, Forked River; D. W. Blake, M.D., Forked River; B. F. Mathews, Forked River.

Complaint concerning refuse materials in the public street was investigated and conditions complained of were improved.

The quality of kerosene oil in use has been inquired into and the sale of oil flashing below the lawful standard has been stopped. Information having been received that the water from the well on the school premises at Forked River was unfit for drinking purposes, an investigation was made by the board and the well was filled up and a new well was driven in a suitable situation.

LAKEWOOD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

A. L. Larrabee, President; John Sherman, George Mathews, H. H. Cate, M.D.; R. B. Robbins, Secretary. All of Lakewood.

The following is a summary of an inspection made by an officer of the State Board of Health:

"During the month of June, 1896, there were a number of complaints as to the water-supply on account of the taste, which was somewhat vegetable in its nature and slightly fishy.

Professor Cornwall, of Princeton, had been engaged to examine as to the cause of this taste, and the inspection was made in his company.

The water is taken from what is known as Metedeconk creek, and a lake is formed by an artificial dam.

At the pumping station there are two Worthington pumps having a combined pumping capacity of two and a half million gallons. The average amount pumped daily is three hundred and seventy-five thousand gallons.

OCEAN COUNTY—Continued.

There are two Hyatt filters in operation. These have a filtering capacity of five hundred thousand gallons. Alum is used as a coagulant and coke and sand for filtering.

The water is pumped to a stand-pipe having a capacity of one hundred and forty-five thousand gallons. It is fifty-three feet in height and has a diameter of twenty feet. The water is pumped into the bottom of the stand-pipe and is also taken from the bottom.

The filters were put in in 1889. Since that time the same trouble as to taste has several times occurred, and more especially when the temperature of the water reaches a certain point in the spring. The filters render the water very clear, but the taste still remains.

We examined the pond and found at the upper end a great deal of vegetation. Samples were taken for analysis at Wild-hare bridge, at a point where a stream flows from Holman's cranberry bog, and also where the main stream enters the head of the lake. These were for botanical examination.

We also examined the lake in a boat, and two samples were taken on the north and south sides, where the vegetation was the thickest.

The fact that water from the cranberry bog empties into the lake, and that large numbers of persons are employed in picking the berries, and that there is apparently no provision for defecation into light receptacles, is one that demands inquiry.

The large hotels use artesian water, and not the lake water.

There are 175 houses using the lake supply.

The taste is in all probability due to vegetable matter in excess or to the presence of algæ."

The following communication from Prof. H. B. Cornwall, of Princeton University, shows the character of the water in question:

JOHN C. GREEN SCHOOL OF SCIENCE,
PRINCETON UNIVERSITY.
October 19th, 1896.

State Board of Health, Trenton, N. J.:

GENTLEMEN—According to your request, I send you the essential results in the analysis of water samples from the Lakewood water-supply taken by me last July. I add also for comparison an analysis made by Dr. W. D. Horne November, 1891.

OCEAN COUNTY—Continued.

PARTS PER 100,000.

SAMPLE.	Free Ammonia	Albuminoid Ammonia.	Chlorine in Chlorides.	Nitrogen in Nitrates.	Total Solids.
Cornwall 1—Large stream at bridge above lake,	0.006	0.009	0.45	0	4.00
Cornwall 2—North side of lake among lily pads,	0.016	0.019	0.45	0	4.30
Cornwall 3—Stream flowing from Holman's Cranberry Bogs,	0.0051	0.018	0.45	0	3.19
Cornwall 4—Flume leading to pump,	0.0018	0.0156	0.45	0	4.49
Cornwall 5—Filtered water from Pump-house,	0.0004	0.0013	0.45	0	3.40
Horne—Filtered water from pipes supplying Lakewood,	0.00049	0.0019	0.39	Traces.	4.27

Dr. Rankin, of the Biological Department at Princeton, made a microscopical examination of the samples, finding only the usual aquatic vegetation and minute forms of animal life, to be expected in the lake water—and in normal quantities. From the results of these analysis I concluded that any odor perceived at an earlier period and during warmer weather was due to algae, which might have been present then in larger quantity than usual. I could see no reason for fearing a recurrence of such conditions, and I reported that the water was in as good condition as ever, as shown by my sample 5 compared with Dr. Horne's. I expressed also the opinion that the water was and would continue to be perfectly wholesome.

Yours truly,

H. B. CORNWALL.

BOROUGH OF LAVALETTE.

No board of health has been organized in this district.
George Kerr, M.D., is the only resident physician.

LITTLE EGG HARBOR TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Joseph J. Smith, President; Charles W. Palmer, Clarence Ireland, Alfred D. Palmer; Theodore T. Price, M.D., Secretary. All of Tuckerton.

MANCHESTER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Frank Brouwer, M.D., President; C. A. Wilbur, David Webb; W. Howland, Secretary. All of Manchester.

All cases of communicable diseases have been reported and records of the same kept by the secretary.

OCEAN COUNTY—Continued.

PLUMSTEAD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Dayton Hopkins, Hornerstown; Thomas Hartshorne, New Egypt; George W. Ivins, Jr., New Egypt; C. E. Woodward, M.D., New Egypt; David W. Bussom, Secretary, New Egypt.

UNION TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Joseph A. Pharo, Barnegat; George H. Vaunote, Barnegat; John R. King, Barnegat; E. Bennet, M.D., Barnegat; E. R. Wills, Secretary, Barnegat.

PASSAIC COUNTY.

LITTLE FALLS TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Richard I. Jacobus, President; Robert A. McMinn, George McKinnon, Henry Crane, George Jackson, R. W. Furbeck; E. A. Keeler, M.D., Inspector; M. J. Synnot, Secretary. All of Little Falls.

There have been a few isolated cases of typhoid fever and diphtheria during the past year, but no epidemics. The offer of the State Board of Health to furnish reports on pathological specimens of communicable disease upon transmission of same to the Laboratory of Hygiene, at Princeton, has been taken advantage of in a few instances, with satisfactory results.

M. J. SYNNOTT, M.D.,

Secretary.

CITY OF PASSAIC.

NAMES OF MEMBERS AND OFFICERS.

Percy H. Terhune, M.D., President; Chas. E. Denholm, Patrick J. Delaney, Rev. R. M. Offord, Carl Pfeil; G. J. Van Schott, M.D., Inspector; Wm. Davidson, Plumbing Inspector; J. Payne Lowe, D.V.S., Veterinary Inspector; A. H. Smith, Secretary.

House-to-house sanitary inspection is regularly performed, and a record is kept of such inspections. During the present calendar year about 3,800 feet of sewers have been constructed in the city, and about 400 feet of storm-water drains. Total length of sewers now in use, 24.18 miles; total length of storm-water drains, 1.22 miles.

PASSAIC COUNTY—Continued.

Garbage is transported in iron carts.

One case of glanders occurred in the city during the past year. Provision has been made for isolating cases of the dangerous communicable diseases, there being one isolation hospital and four portable houses.

CITY OF PATERSON.

NAMES OF MEMBERS AND OFFICERS.

Members—Theodore Y. Kinne, M.D., President; John L. Leal, M.D., Andrew F. McBride, M.D., Thomas L. Paton, M.D., Isaac H. Voorhis, Esq., John Faust, Esq., John T. Pollitt, Esq. Officers—John L. Leal, M.D., Health Officer; James W. Smith, M.D., Assistant Health Officer; Isaac H. Voorhis, Treasurer; Hon. William I. Lewis, Counsel; John T. Pollitt, Registrar of Vital Statistics; William H. MacDonald, Plumbing Inspector; James Fitzpatrick, Sanitary Officer; James Powers McNair, Secretary.

Cases of contagious diseases reported to this board during the year beginning March 1st, 1895, and ending March 1st, 1896:

Scarlet fever, 270 cases, 15 deaths; diphtheria, 313 cases, 84 deaths; typhoid fever, 160 cases, 47 deaths; small-pox, 15 cases, 2 deaths.

Number of permits to attend school issued to children from premises where contagious diseases have existed, 231.

Number of premises where contagious diseases have existed, fumigated and disinfected, 577.

Complaints of nuisances and violations of health laws made to this board, 1,273.

All of these complaints have been investigated and proper steps taken to abate nuisances and secure obedience to health laws.

Complaints well founded and nuisances found to exist, 981.

Nuisances abated and grounds of complaint removed, 903.

Of those not abated some are laid over for more favorable weather; the remainder it has been found impossible to abate on account of legal difficulties.

Inspections of premises made, 2,117; number of notices served, 1,237; scavenger permits issued to clean and empty privy vaults, 647.

Cases tried in the recorder's court, 14; cases decided in favor of the board of health, 14.

Chapter CCVII, P. L. 1893, being a supplement to an act entitled "An act concerning contagious and infectious diseases among animals

PASSAIC COUNTY—Continued.

and to repeal certain acts relating thereto," approved April 4th, one thousand eight hundred and eighty-six, was taken advantage of by this board during the year of 1894, enforced to its full extent, and the following licenses granted under the same.

Number of licenses granted during the fiscal year, 84; total number of licenses granted, 135.

All cattle licenses previously granted by this board have by this action been canceled.

Two scavenger licenses to clean and empty the contents of privy vaults and cesspools were issued

COLLECTION AND DISPOSAL OF GARBAGE AND ASHES.

Complaints received, 17; complaints well founded, 9; garbage collected and disposed of at the works of the Paterson Sanitary Company, 3,682 tons.

PLUMBING INSPECTOR'S REPORT.

Number of permits issued.....	1,003
For new buildings.....	348
For old buildings.....	655
Number of inspections made.....	3,562
Finals.....	1,910
Number of old plumbing systems investigated.....	72
Number of old plumbing systems condemned.....	31
Numbers of sewer connections made.....	592
For new buildings.....	327
For old buildings.....	295
Number of plumbers registered.....	97

BOROUGH OF POMPTON LAKES.

NAMES OF MEMBERS AND OFFICERS.

W. S. Colfax, M.D., President; J. C. Morgan, M.D., Inspector; F. S. Wilson, Lemuel Van Ness; W. B. Longyear, Secretary.

POMPTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John F. Sisco, Butler; Gabriel Decker, Midvale; Silas Pellington, Midvale; Chas. Sigler, Wanaque; Jas V. Beam, Secretary, Wanaque.

PASSAIC COUNTY—Continued.

WEST MILFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William W. Eckhart, President, New Foundland; David G. Vanderhoff, Oak Ridge; T. P. Terhune, West Milford; Charles H. Thorn, West Milford; John R. Freeland, Upper Macopin; Joseph H. Schulster, Echo Lake; R. G. Maines, M.D., West Milford; Celestine Tintle, Secretary, Echo Lake.

SALEM COUNTY.

ALLOWAY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jos. G. Kerlin, Alloway; John D. Drummond, Alloway; Joseph Garten, Cohansay; W. L. Ewen, M.D., Alloway; J. F. Ayres, Secretary, Alloway.

LOWER ALLOWAYS CREEK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Winfield S. Carll, Canton; John Anderson, Hornersville; Keasby Smith, Hancock's Bridge; Francis B. Harris, M.D., Canton; Edward Brown, Secretary, Canton.

A few mild cases of scarlet fever have occurred.

LOWER PENN'S NECK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Frank Straughn, Pennsville; Richard Balten, Pennsville; Wm. H. James, M.D., Pennsville; David Dixon, Salem; Ephraim Fowler, Secretary, Pennsville.

MANNINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel T. Lippencott, President; Elmer H. Smith, S. P. Carpenter; S. P. Allen, Secretary. All of Salem.

OLDMANS TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John P. Richards, Pedricktown; Westley Hewitt, Pedricktown; Henry T. Johnson, M.D., Pedricktown; George Lippincott, Swedesboro; Daniel R. Morrison, Secretary, Pedricktown.

PILESGROVE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Edgar C. Moore, President, Woodstown; John G. Borton, Woodstown; Chas. Newton, M.D., Sharptown; W. C. Hinchman, Sharptown; C. H. Richman, Secretary, Woodstown.

SALEM COUNTY—Continued.

CITY OF SALEM.

NAMES OF MEMBERS AND OFFICERS.

Louis Hoelzel, President; Thomas Hughes, J. Forman Sinnickson, C. M. Sherron, M.D.; Austin T. Walton, Inspector; Clinton Bowen, Secretary.

The water-supply, which is obtained from five deep wells and also from a lake on Laurel run, has often been discolored after rains, and has in the warm weather an earthy taste. Filtration is under consideration.

On account of the objectionable odor the water from the public supply is not in general use during the summer months, and, with few exceptions, the citizens depend upon wells for the supply of water for domestic purposes during the period of greatest heat.

A small per cent. of houses near the river and in the lower parts of the city have water in the cellars during high tides and spring rains. No dwelling-houses contain more than two families. Since the last report there have been eighty cases of diphtheria and twenty-six cases scarlet fever. No provision has been made for isolating cases of these diseases.

UPPER PENNS NECK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John M. Bevis, President; Joseph E. Clark, James Hutchinson, John M. Summerill, M.D.; George W. Hewitt, Secretary. Address of all, Pennsgrove.

UPPER PITTSBORO TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Henry Coombs, Elmer; Israel Newkirk, Elmer; Welden Dubois, Daretown; George W. H. Fitch, M.D., Daretown; Joseph N. Grey, Secretary, Pittsgrove.

Two fatal cases of diphtheria occurred, but there was no extension of the disease.

One fatal case of typhoid fever also occurred.

BOROUGH OF WOODSTOWN.

C. H. Richman, Assessor of Pilesgrove township, states that no board of health has been organized in this borough, but that a board will soon be appointed.

SOMERSET COUNTY.

BEDMINSTER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

J. J. Poulson, President, Lamington; R. B. Nevins, Bedminster; Ellis Tiger, Peapack; J. B. Beekman, M.D., Pluckamin; E. F. Farrow, M.D., Inspector, Peapack; H. L. Kennedy, Secretary, Gladstone.

BRANCHBURG TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John T. Egle, President, North Branch Station; Henry S. Van Fleet, Readington; Ellsworth Brokaw, South Branch; Adonis Nelson, M.D., Neshanic Station; L. T. Schenck, Secretary, Readington.

BOROUGH OF BOUND BROOK.

NAMES OF MEMBERS AND OFFICERS.

John B. Coddington, President; W. E. Messimer, C. R. P. Fisher, M.D.; Chas. McNabb, Inspector; W. S. Negus, Secretary.

BRIDGEWATER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Wm. Hardgrove, President, Somerville; A. L. Stillwell, M.D., Somerville; Peter Gulick, Raritan; Peter H. Smith, Bound Brook; E. L. Voorhees, Secretary, Somerville.

FRANKLIN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Peter J. Statts, President, South Bound Brook; John Stothoff, New Brunswick; L. L. Suydam, Franklin Park; Sanford Snyder, Secretary, East Millstone.

HILLSBOROUGH TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Peter Huff, President, Montgomery; Frederick Wykoff, Frankfort; John French, Millstone; A. D. Baird, Frankfort; W. H. Merrill, M.D., Secretary, South Branch.

More cases of malarial fever have occurred during the past summer than in any previous year.

MONTGOMERY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Edwin S. Voorhees, President, Rocky Hill; J. H. Stout, Stoutsburg; E. C. Taggart, Griggstown; A. B. Mosher, M.D., Griggstown; John S. Hoagland, Secretary, Griggstown.

SOMERSET COUNTY—Continued.

BOROUGH OF NORTH PLAINFIELD.

NAMES OF MEMBERS AND OFFICERS.

Andrew Love, President; Frank Curtis, D. C. Adams, M.D., N. B. Smalley; Wm. N. Pangborn, Health Inspector; Rev. W. E. Honeyman, Secretary. Address of all, Plainfield.

North Plainfield has enjoyed a very healthy year, if we except an epidemic of measles, which began the middle of March and continued until the middle of May. Over 200 cases were reported to the board, and there were perhaps nearly 100 others that were not reported, owing to the fact that no physicians were employed. In a population of over 4,000 there have been but ten cases of diphtheria during the twelve months past, six of scarlet fever and four of typhoid fever. Our board has had a serious conflict with parties who persisted in sewerage into the brook that runs between the borough and Plainfield proper, and finally we were compelled to ask for an injunction from the Chancellor, which gave us relief. We have also been compelled to bring suit against several others who had violated our ordinances, and in every case the courts sustained us and enabled us to abate the nuisance. There has been a thorough house-to-house inspection during the year, and the condition of the borough is satisfactory from a sanitary point of view. Our health inspector has been very watchful and efficient, and all nuisances have been promptly abated.

W. E. HONEYMAN,
Secretary.

BOROUGH OF RARITAN.

NAMES OF MEMBERS AND OFFICERS.

George A. West, President; Rev. W. H. DeHart, J. P. Hecht, M.D., James Cooper; William Killiger, Secretary.

The following report is furnished by George W. West, President: This first full year of service since the organization of this board has been one of considerable activity. We believe we are justified in claiming that much has been accomplished toward bettering the sanitary condition of the borough.

A systematic sanitary inspection of each premise is being carried forward and a record kept of the same, noting particularly the water-supply, the drainage, the disposition of garbage and excreta and the condition of outbuildings. Many suggestions are offered, and in the

SOMERSET COUNTY—*Continued.*

worst cases requirements are made known, the carrying-out of which has greatly improved the general condition.

A few hundred feet of water mains have been laid during the year, through newly-built portions of the borough. The people are gradually coming to realize that the water from the public supply is safer than that taken from surface-wells.

Much has been done and is now under way to give the village a complete system of sewerage. Particularly, we desire to mention the construction of an outlet to the river under the water-power, which will discharge all sewage of the borough into the river and no longer pollute the water in the water-power, thus turning it into a great open cesspool.

Sewer mains are being laid under the personal supervision of a civil engineer to connect with this outlet to drain the most thickly populated portions of the town.

The Central Railroad Company had for a long time maintained on their land an old, unused reservoir filled with stagnant water, a receptacle for rubbish and filth, and constantly giving forth noxious odors. This had been a bone of contention for years. At the instigation of the board of health, assisted by the courts, the company have removed the water, thoroughly disinfected the filth in the bottom, and then filled the excavation with earth, thus completely abating this nuisance.

The new ordinance preventing the keeping of swine on the borough lots has been enforced to the letter, and the pig-sty nuisance is entirely abated.

The slaughtering of animals without a permit and without the proper arrangements and facilities for carrying on the same, has been brought to an end.

Garbage is carted from the borough, night-soil and cesspool contents are also carted away by a scavenger within certain required hours of the night and deposited on the fields of farmers.

All cases of communicable diseases have been reported to our secretary by the physicians, on the printed blanks we furnish them. A complete record of these is kept by the secretary, and a report is transmitted to the State Board of Health, as the law provides.

No provision has been made as yet for isolating cases of diphtheria, etc., except quarantining the patient at home.

SOMERSET COUNTY—*Continued.*

Nothing has yet been done toward inspecting the milk furnished our citizens. We have no dairy premises within our borough.

No accidents from the use of kerosene or gasoline have come to our notice.

The following is the report of vital statistics from June 30th, 1895, to June 30th, 1896:

Marriages, 22; births, 29; still births, 4; deaths, 35.

Contagious diseases, 63, as follows: Scarlet fever, 3; diphtheria, 3; typhoid fever, 29; measles, 31; varicella, 1; whooping-cough, 1.

Deaths from contagious diseases, 13, as follows: Typhoid fever, 5; whooping-cough, 1; consumption, 3; measles, 4.

The appropriation granted the board by the borough commissioners has been the legal rate of five cents for each of the 2,694 inhabitants, \$134.70. Of this amount the secretary received \$25, and the inspector \$25.

TOWN OF SOMERVILLE.

NAMES OF MEMBERS AND OFFICERS.

A. L. Stillwell, M.D., J. B. Betts, L. T. Reid, E. F. Brown, Geo. W. Anderson, Secretary.

SUSSEX COUNTY.

ANDOVER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Chas. W. Roof, Newton; Bartis K. Stiff, Andover; Chas. M. Howell, Andover; L. B. Straley, Andover; Green C. Cook, Andover.

An outbreak of contagious disease occurred among the cattle on a dairy farm, where 150 cows are kept. Seven of the animals died. Dr. W. Grey, veterinarian, of Newton, reported the cases to the local board of health. The premises were inspected, by order of the board of health, and found to be in a filthy condition. The action taken by the board caused temporary improvement, but complaint has recently been again made against the unsanitary condition of these premises.

SUSSEX COUNTY—Continued.

BYRAM TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

David Stone, President, Andover; George P. Hart, Stanhope; Robert Slaght, Stanhope; C. H. Davison, Stanhope; D. W. Goble, Secretary, Andover.

One case of scarlet fever and two of diphtheria occurred during the year. The board required isolation and these diseases were thereby prevented from spreading.

Physicians do not make the reports required by law as promptly as they should.

BOROUGH OF DECKERTOWN.

NAMES OF MEMBERS AND OFFICERS.

Charles E. Stickney, President; David B. Everett, Jonathan Wright, George D. Demarest, Inspector; Samuel Ruff, Secretary.

Water-works are now being constructed.

FRANKFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Linus Clark, President, Branchville; Victor Compton, Branchville; Manning F. Lantz, Augusta; E. S. Dalrymple, M.D., Branchville; George Phillips, Secretary, Branchville.

HAMPTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Robert G. Kinney, President, Newton; Elmer Case, Halsey; John W. Thompson, Blair; Frank Emmans, Secretary, Newton.

HARDYSTON TOWNSHIP.

NAMES OF OFFICERS AND MEMBERS.

W. P. Pollard, President, Franklin Furnace; J. B. Pellets, M.D., Hamburg; H. E. Rude, Hamburg; W. H. Ingersoll, Secretary.

The board inspected a nuisance caused by an offensive pond near a creamery.

The action taken resulted in an abatement of the nuisance.

LAFAYETTE TOWNSHIP.

NAMES OF OFFICERS AND MEMBERS.

Samuel Warbasse, Lafayette; John Calvin, Newton; Nelson Ackerson, Secretary, Lafayette.

SUSSEX COUNTY—Continued.

MONTAGUE TOWNSHIP.

NAMES OF OFFICERS AND MEMBERS.

Sanford Nearpass, Tri-states, N. Y.; Loren T. Cole, Montague; Eugene de Salignac, Montague; William P. Hornbeek, Secretary, Montague.

TOWN OF NEWTON.

NAMES OF MEMBERS AND OFFICERS.

Shepard Voorhees, M.D., President; Martin E. Hough, Charles S. Steel, Lewis J. Martin; George Hardin, Secretary.

The public health, on the whole, has been good the past year. Measles, in the spring months, is the only disease that has prevailed in an epidemic form. Recently the town has had an experience that it has not had for many years—a local outbreak of typhoid fever. In all, there have been ten cases, one of which has proved fatal. All the cases developed in the last three weeks of September. Eight of the ten were in five families occupying four houses in close proximity on a single street. Three of the families, comprising in all twelve persons (five of whom are now sick), drank water from the same well. Two of the others had possibly drank of this water. The eighth case is a nurse, who contracted the disease while caring for the first person that came down with the disease. The sanitary condition of all the houses, with one exception, was poor. The suspected well is steam-drilled, and it is forty-seven feet in depth. The last twenty-three feet is through rock, the first twenty-four feet through earth and cased with a six-inch iron pipe, which reaches from ten inches above the earth to the rock below. Twenty-four feet from this well, on slightly higher ground, runs a six-inch tile sink-drain from a tenement house occupied by two families. On investigation for the cause of this disease, this drain was found stopped near its outlet, and it had evidently been so for several weeks. This drainage must have found its way into the well. A sample of the water is now in the hands of an analyst for examination. The well has been abandoned for drinking and cooking purposes. There has been no known case of typhoid in any of these houses for many years.

Contaminated well-water was the very apparent cause of the other two cases not included in the above. The use of this well has also been abandoned. The patients have been isolated, the stools, bedding and dishes used disinfected in accordance with directions in circular 87 of the State Board of Health.

SUSSEX COUNTY—Continued.

Had house-to-house sanitary inspection been regularly made, the above records doubtless would not have been written. There is decidedly too much indifference manifested by the people of our town to sanitary inspection, as well as to other matters pertaining to the public health. In most town affairs there is a very commendable and progressive public spirit, but in sanitation we are lamentably behind the times.

The water plant has been extended during the year so that now nearly all streets have water-mains. This new supply has proved highly satisfactory; none of the persons who contracted typhoid fever were in the habit of using the public water-supply.

As yet we have no sewer system, but this subject is receiving some consideration at the present time.

There is poor plumbing in many houses, which should be corrected by ordinance.

SHEPARD VOORHEES,
President.

STILLWATER TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

John H. Wintermute, President, Middleville; J. F. McCloughan, M.D. Swartswood; W. E. Titman, Swartswood; E. T. Moore, Stillwater.

VERNON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

J. H. Stidworthy, President, Vernon; A. P. Shaw, Vernon; Daniel Forger-son, Stockholm; Carlos Allen, M.D., Vernon; Abraham Van Winkle, Secretary, Glenwood.

WALPACK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Philip S. Rosencrans, President, Flatbrookville; John B. Fuller, Flatbrookville; Cornelius D. Gunn, Walpack Centre; J. W. Bunnell, Secretary, Walpack Centre.

WANTAGE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Brice Roy, John Coykendall, F. V. R. McCoy, S. M. Parcell, Secretary of Deckertown.

UNION COUNTY.

CLARK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Benjamin King, Rahway; Edward Mays, Rahway; Albert Lambert, Rahway; W. E. Cladek, M.D., Rahway; F. R. Bullman, Secretary, Picton.

CRANFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jasper C. Hunt, Nathaniel R. Foster, Robert A. Hibson, Philip Jahn, Joseph Severance, J. K. McConnell, Jr., M.D.; Edward S. Crane, Secretary.

During the past year the sewer has been extended to tide water, and numerous house-connections have been made.

CITY OF ELIZABETH.

NAMES OF MEMBERS AND OFFICERS.

J. W. Whelan, President; W. A. M. Mack, M.D., N. L. Wilson, M.D., G. F. Burnet, M.D., John J. Dohahue; E. G. Putnam, Inspector; J. J. Manning, Secretary.

A new small-pox hospital has recently been constructed, and also a hospital for diphtheria and scarlet fever. New sewers have been constructed in various portions of the city and others are contemplated. The following cases of communicable diseases have been reported to this board: Diphtheria, 117; scarlet fever, 77; typhoid fever, 8; measles, 67.

BOROUGH OF FANWOOD.

NAMES OF MEMBERS AND OFFICERS.

F. W. Westcott, M.D., President; L. J. Ellis, Wm. E. Gibbs, Hy. L. Hall, Registrar of Vital Statistics; Burton P. Hall, Inspector; George F. Carter, Secretary.

The board of health of this borough was created in December, 1895, and owing to legislative changes in the laws relating to boroughs, it was re-constituted by the borough council, August 1st, 1896. The board, as newly appointed, did not meet and qualify until November 24th, 1896.

The condition of health in the borough during the year has been generally good. During the spring months there were a number of cases of measles in a light form among the children of the borough.

UNION COUNTY—Continued.

The chief aim of the board has been in the direction of securing a better disposition of the house sewage and care of the cesspools. Owing to the character of the soil, a heavy clay, there is no filtration through it, and in consequence the cesspools fill rapidly and overflow. In many cases this overflow became excessively offensive.

Under the vigorous efforts of the board a great reform was effected. The Waring system of sub-surface disposition of the overflow has been tried in several cases at the instance of the board, and it promises to work well.

The water-supply is mainly furnished by the Union Water Company. There is no sewerage system, cesspools being almost universally used.

GEORGE F. CARTER,
Secretary.

FANWOOD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William H. Terry, President, Plainfield; L. W. Miller, Scotch Plains; T. J. Nichol, Scotch Plains; John Robinson, Scotch Plains; F. W. Wescott, M.D., Secretary, Fanwood.

BOROUGH OF LINDEN.

NAMES OF MEMBERS AND OFFICERS.

Edward Guliger, President; Parmenus Rue, A. E. Knopf, Walter Lutgen, Ferdinand Blancke; Milton C. Lowden, Inspector; Oscar Gesner, Secretary.

An outbreak of measles prevailed during the spring, but otherwise the borough has been free from epidemics.

Reports of vital facts are not promptly made to this board. Physicians do not conform to the law in reporting cases of communicable diseases. The cases reported during the year are as follows:

Measles, 32; diphtheria, 4, one death; scarlet fever, 3; typhoid fever, 1.

LINDEN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

William H. Donaldson, President; Joseph Bauer, S. B. Redmond, John P. Winans, F. B. Stimson, H. Page Hough, M.D., Rahway; Milton C. Lowden, Inspector; John A. Etheridge, Secretary.

UNION COUNTY—Continued.

An outbreak of diphtheria occurred in January, but the disease was prevented from spreading by the action of the board. The disease was traced to a family which removed from Brooklyn to this place. The following is a statement of contagious diseases occurring in the township:

Measles, 37 cases, one death; diphtheria, 5 cases, one death; scarlet fever, 4 cases, one death.

NEW PROVIDENCE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

I. R. Burnett, Jr., President, New Providence; J. M. Baagley, New Providence; L. E. Bergmiller, Berkley Heights; A. M. Corey, M.D., Secretary, New Providence.

Malarial fevers have been prevalent.

CITY OF PLAINFIELD.

NAMES OF MEMBERS AND OFFICERS.

Geo. W. Rockfellow, President; Lemuel W. Serrill, Henry B. Newhall, George W. Endicott, M.D., Peter V. Weaver, Inspector; Andrew J. Gavett, Plumbing Inspector; H. O. Newman Secretary.

An outbreak of measles occurred early in the spring and two deaths resulted. No other epidemics have occurred.

Total number of deaths from preventable diseases, seven.

The regular house-to-house inspection has been continued. House connections with the new sewer system are being rapidly made. The ordinances regulating plumbing work are being enforced.

CITY OF RAHWAY.

NAMES OF MEMBERS AND OFFICERS.

C. B. Holmes, M.D., President; H. Page Hough, M.D., John M. Randolph, M.D., H. B. Rollinson, D. R. Rogers, W. J. White, Inspector; S. R. Ryno, Secretary.

During the year an outbreak of diphtheria occurred and numerous cases of typhoid fever also appeared. The board was unable to trace the origin of either of these epidemics.

BOROUGH OF ROSELLE.

NAMES OF MEMBERS AND OFFICERS.

H. C. Pierson, M.D., President; J. N. Meeker, Sanford Clark, Van. S. Roosa; John F. Crist, Inspector; Wm. P. Stevenson, Secretary.

UNION COUNTY—Continued.

The sewer system is being gradually extended to meet the requirements of the growth of the borough. House-drainage is performed under the regulations of the board. Communicable diseases are promptly reported.

SPRINGFIELD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

E. D. Williams, President; A. P. Stiles, A. P. Carter, T. W. Harris, M.D.; J. J. Hoff, Secretary; all of Springfield.

There were but four cases of contagious disease during the past year. Isolation in each of these cases prevented the spread of the affection. Printed blanks are supplied to physicians for reporting communicable diseases, and a record of all such reports is kept by the secretary.

UNION TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Wm. P. Bunnell, President, Roselle; D. C. Beach, Union; John D. Doremus, Lyons Farms; D. Hobart Sayre, Secretary.

Cases of communicable disease have been reported and a record is kept by the secretary, in accordance with the law of 1895.

Several nuisances, caused by dumping refuse materials in the township, have been abated by the board.

It is required that all dead animals shall be immediately buried and no part of the carcasses left exposed. The board placards house in which diphtheria, scarlet fever and the other dangerous communicable diseases exist.

The requests of the board are generally complied with, and it has not been necessary to resort to the law during the past year.

WARREN COUNTY.

ALLAMUCHY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

T. G. Dunlap, Allamuchy; S. H. Drake, Allamuchy; C. L. Munroe, Hackittstown; Benj. A. Hendershot, Secretary, Allamuchy.

WARREN COUNTY—Continued.

BLAIRSTOWN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Nathan Alpaugh, President; William C. Howell, Elmer Kishpaugh, Jabez J. Linabury, Secretary. All of Blairstown.

One complaint was received by the board in regard to defective drainage in Blairstown. The action of the board resulted in prompt improvement.

FRANKLIN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel H. Johnson, M.D., Asbury; John M. Hoffman, Asbury; Charles T. Heilman, Broadway; Elisha Beers, New Village; Philip Cook, Secretary, Broadway.

FRELINGHUYSEN TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Price Sticles, Johnsonburg; William Andrew Derling, Johnsonburg; George B. Armstrong, Marksboro; F. Rorback, M.D., Johnsonburg; A. L. Cook, Secretary, Marksboro.

GREENWICH TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

George Hamlin, President, Stewartville; H. H. Stone, Stewartville; A. A. Painter, Shimers; Frank W. Curtis, M.D., Stewartville; William Sherrer, Secretary, Bloomsbury.

TOWN OF HACKETTSTOWN.

NAMES OF MEMBERS AND OFFICERS.

James H. Beatty, President; James Lamblyn, John S. Cook, M.D., Alden E. Martin, M.D., A. W. Cutter, R. G. Clark, Thomas Nolan; J. Milton Everett, Inspector; O. A. Mattison, Secretary.

An additional water-supply is in course of construction.

There is no sewer system in the town.

The board holds monthly meetings during the summer.

HARDWICK TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Wm. C. Wildrick, President, Marksboro; Benjamin Linnsbury, Blairstown; David R. Newman, Blairstown; T. W. Squier, Secretary, Marksboro.

WARREN COUNTY—*Continued.*

HARMONY TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Jacob W. Cline, President, Harmony; Ralph Rush, Montana; James W. DeWitt, Harmony; James D. DeWitt, M.D., Harmony; Cornelius Pittenger, Secretary, Harmony.

HOPE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Samuel Wildrick, Marshall Gibbs, A. A. VanHorn, John O. Dill, John Miller, Secretary. Address of all, Hope.

INDEPENDENCE TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

F. W. Haggerty, M.D., President, Vienna; John N. Lindabery, Hackettstown; John D. Shoemaker, Vienna; George F. Martenis, Danville; C. H. Albertson, Secretary, Vienna.

MANSFIELD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

Fred. Dellicker, President, Rockport; B. C. Perry, Karrsville; S. H. Shields, Port Colden; James Beaty, Secretary, Stephensburg.

OXFORD TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

George Wildrick, President, Buttsville; E. J. Mackey, Belvidere; Samuel Sheridan, Oxford; David Trimmer, Oxford; L. B. Hoagland, M.D., Secretary, Oxford.

POHATCONG TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

R. T. Crouse, President, Finesville; John R. Seigle, Finesville; Wm. Butler, Shimers; Chas. H. Boyer, M.D., Reiglesville; Wm. Green, Phillipsburg; W. B. Lawback, Secretary, Finesville.

BOROUGH OF WASHINGTON.

NAMES OF MEMBERS AND OFFICERS.

T. P. McKinstry, M.D., President; J. Hornbaker; A. J. Bigler, Inspector; George Campbell, Wm. Vannata, Wm. Stites, M.D.; A. J. Craft, Secretary.

WARREN COUNTY—*Continued.*

A beginning has been made in the construction of a system of sewers, but thus far sewers have been laid in only two streets, and an extension of the system is extremely desirable.

WASHINGTON TOWNSHIP.

NAMES OF MEMBERS AND OFFICERS.

R. S. Bowers, President; Wm. Cowell, David Wise, C. B. Smith, M. D.; C. S. Dalrymple, Secretary. All of Washington.

Supplementary List of Local Boards of Health,

Including Boards from which reports were received too late for insertion in the regular list, and also including Boards from which no reports were received.

Atlantic County.

Brigantine borough.
Liuwood borough.
Somers Point borough.
South Atlantic City borough.

Bergen County.

Carlstadt borough.
Creskill borough.
Eastwood borough.
Englewood Cliffs borough.
Fairview borough.
Glen Rock borough.
Hasbrouck Heights borough.
Midland Park borough.
Midland township.
Montvale borough.
New Barbadoes township.
Old Tappan borough.
Orvil township.
Palisade township.
Ridgefield borough.
Ridgefield Park Village.
Riverside borough.
Rutherford borough.
Saddle River borough.
Schraalenburg borough.
Teaneck township.
Undercliff borough.
Union township.
Upper Saddle River borough.
Washington township.
Westwood borough.

Burlington County.

Burlington city.
Burlington township.
Cinnaminson township.
Florence township.
Lumberton township.
Mansfield township.
Moorestown borough.
Pemberton borough.
Riverside township.
Springfield township.
Willingboro township.

Camden County.

Chesthurst borough.
Collingswood borough.
Gloucester city.
Pensauken township.
Waterford township.

Cape May County.

Anglesea borough.
Avalon borough.
Cape May Point borough.
Dennis township.
Lower township.
West Cape May borough.

Cumberland County.

Fairfield township.
Leesburg borough.
Maurice River township.
South Cape May borough.

Cumberland County—Continued.
Stow Creek township.

Essex County.
Caldwell township.
Millburn township.
Nutley borough.
Vailsburg borough.

Gloucester County.
Elk township.
Logan township.
Mantua township.
Wenonah borough.

Hudson County.
Guttenberg, town of.
Harrison city.
North Bergen township.
Union township.
Weehawken township.
West Hoboken township.

Hunterdon County.
Holland township.
Lebanon township.
Readington township.
West Amwell township.

Mercer County.
East Windsor township.
Hamilton township.
Hopewell township.
Princeton borough.
Princeton township.
West Windsor township.

Middlesex County.
Helmetta borough.
Monroe township.
New Market borough.
North Brunswick township.
Piscataway township.
Sayreville borough.
Sayreville township.
Woodbridge township.

Monmouth County.
Allentown borough.
Atlantic Highlands borough.
Avon borough.
Holmdel township.
Neptune township.
Raritan township.
Shrewsbury township.
Spring Lake Beach borough.
Spring Lake borough.

Morris County.
Jefferson township.

Morris County—Continued.
Madison borough.
Matawan township.
Mendham township.
Montville township.
Morris township.
Mount Arlington borough.
Mount Olive township.
Netcong borough.
Port Oram borough.
Randolph township.

Ocean County.
Beach Haven borough.
Berkley township.
Brick township.
Eagleswood township.
Jackson township.
Lavalette borough.
Ocean township.
Point Pleasant Beach borough.
Stafford township.

Passaic County.
Acquackanonk township.
Manchester township.
Wayne township.

Salem County.
Elmer borough.
Elsinboro township.
Pennsgrove borough.
Pittsgrove township.
Quinton township.

Somerset County.
Bernards township.
Bloomington borough.
North Plainfield township.
South Bound Brook borough.
Warren township.

Sussex County.
Green township.
Lafayette township.
Sandyston township.
Sparta township.
Vernon township.

Union County.
Summit township.
Westfield township.

Warren County.
Belvidere, town of.
Knowlton township.
Lopatcong township.
Pahaquarry township.
Phillipsburg.

List of Sanitary Districts, Showing Locality and Names of Officers.

SANITARY DISTRICT.	COUNTY.	POPULATION.		NAME AND ADDRESS OF SECRETARY.	NAME AND ADDRESS OF ASSESSOR.	NAME AND ADDRESS OF REGISTRAR OF VITAL STATISTICS.
		1880.	1895.			
Absecon township.	Atlantic	501	622	Daniel Walters, Jr.	John R. Steelman, Absecon.	R. L. Nimmo.
Acquackanonk township.	Passaic	2,662	3,698	M. D. Knight, Clinton.	Richard Berry, Clifton.	E. M. Shivers.
Alexandria township.	Hunterdon	1,460	1,202	Benj. A. Hendershot, Allamuchy	John C. Davis, Little York	David C. Bowen.
Allamuchy township.	Warren	739	663	Robert L. Nimmo.	E. J. Harden, Allamuchy.	A. T. Glenn.
Allendale borough.	Bergen	1,828	689	Green C. Cook, Andover	J. F. Ayres, Alloway	Chas. M. Preston.
Allentown borough.	Monmouth	1,101	1,028	D. C. Bowen.	Green C. Cook, Andover	Whitfield Smith.
Alloway township.	Cape May	126	247	Henry S. Scull.	Levi Scooby, Scoobyville	G. S. Butler.
Angelsea borough.	Sussex	1,126	1,072	E. H. Cook.	Chalkley S. Craner.	F. B. Philby
Asbury Park borough.	Monmouth	13,065	3,761	Chalkley Haines, New Gretna.	Julius Foster.	J. M. Snyder.
Atlantic City.	Atlantic	1,606	1,715	J. R. Hall.	Frank DeCoster, Basking Ridge	J. Z. Demarest.
Atlantic Highlands borough.	Monmouth	853	863	F. F. Martinez, Jr.	Henry Williams, Bayville.	Dr. B. F. Soby.
Atlantic township.	Monmouth	19,033	19,866	H. L. Kennedy, Gladstone	John Faux.	Wm. L. Johnson.
Avon borough.	Cape May	1,749	1,715	Neil H. Miller.	Wm. Connelly.	H. M. Brinkerhoff.
Avon township.	Monmouth	3,487	4,568	Frank Greuter, Woodridge	Frank Greuter.	Geo. W. Burchard.
Bay River township.	Burlington	1,768	1,834	Frank Greuter, Woodridge	Frank Greuter.	Chas. R. Garwood.
Bay Head borough.	Ocean	786	863	Z. Demarest.	Henry Williams, Bayville.	Chas. McNabb.
Beach Haven borough.	Hudson	1,299	1,424	Wm. W. Swayze, Glen Gardner.	John Faux.	J. F. Cline.
Bedminster township.	Ocean	2,308	1,761	Wm. W. Swayze, Glen Gardner.	Wm. Connelly.	
Belleville township.	Essex	1,957	1,924	Jos. B. Carter, Delanco.	Wm. W. Swayze.	
Belmar borough.	Monmouth	1,451	1,601	Jos. B. Carter, Delanco.	Jos. B. Carter.	
Belvidere city.	Warren	7,708	8,093	J. J. Linaberry, Blairstown.	Jabez J. Linaberry.	
Bergen township.	Bergen	1,451	1,601	Wm. L. Johnson.	Samuel H. Baxter.	
Bergen Fields borough.	Bergen	7,708	8,093	Peter F. Hopper.	Peter F. Hopper.	
Berkley township.	Bergen	1,451	1,601	Geo. W. Burchard.	Geo. W. Burchard.	
Bethlehem township.	Monmouth	1,451	1,601	G. D. Crane.	G. D. Crane.	
Buena Vista township.	Atlantic	1,451	1,601	Dr. W. H. Shipps.	Dr. W. H. Shipps.	
Bethlehem township.	Burlington	1,451	1,601	Wm. Warrack, Bordentown.	Wm. Warrack, Bordentown.	
Beverly city.	Burlington	1,451	1,601	W. S. Negus.	W. S. Negus.	
Blairstown township.	Warren	1,451	1,601	W. S. Negus.	W. S. Negus.	
Bloomington borough.	Somerset	1,451	1,601	W. S. Negus.	W. S. Negus.	
Bloomfield township.	Essex	1,451	1,601	W. S. Negus.	W. S. Negus.	
Boonton town.	Bergen	1,451	1,601	W. S. Negus.	W. S. Negus.	
Boonton township.	Monmouth	1,451	1,601	W. S. Negus.	W. S. Negus.	
Bordentown city.	Burlington	1,451	1,601	W. S. Negus.	W. S. Negus.	
Bordentown township.	Burlington	1,451	1,601	W. S. Negus.	W. S. Negus.	
Bound Brook borough.	Somerset	1,451	1,601	W. S. Negus.	W. S. Negus.	
Burlington city.	Burlington	1,451	1,601	W. S. Negus.	W. S. Negus.	

List of Sanitary Districts, Showing Locality and Names of Officers—Continued.

SANTARY DISTRICT.	COUNTY.	POPULATION.		NAME AND ADDRESS OF SECRETARY.	NAME AND ADDRESS OF ASSESSOR.	NAME AND ADDRESS OF REGISTRAR OF VITAL STATISTICS.
		1890.	1895.			
Burlington township.....	Burlington	1,074	1,062	L. T. Schenck, Readington	Ellsworth Mount.	Frank L. Hewitt.
Branchburg township.....	Somerset	1,452	1,074	L. T. Schenck, Readington	L. T. Schenck	Frank L. Hewitt.
Bridle beach borough.....	Monmouth	2,118	2,118	Thomas Layton, Jr.	A. W. Downey, Burrsville.	D. J. Lawrence.
Brick township.....	Ocean	11,422	13,292	Clarence M. DuBois	C. L. Voorhees	J. J. Van Orden.
Bridgewater township.....	Cumberland	1,880	1,218	D. W. Goble, Andover.	D. W. Goble.	T. P. Varney.
Bryant township.....	Atlantic	3,633	1,658	Thomas W. Biggs.	Theo. Vincent	J. Ashion Williams.
Caldwell township.....	Essex	58,313	63,467	Eugene D. Roberts.	H. W. Young	Lafayette Miller.
Camden city.....	Camden	2,136	2,451	Lewis T. Stevens.	H. P. Drake.	Herman Foth.
Cape May city.....	Cape May	467	1,336	James R. Martland, Irvington.	C. B. Holloway.	J. V. Humphreys.
Cape May Point borough.....	Cape May	1,834	1,965	Austin Cramer, Annandale.	Timothy Morton, Parry	E. S. Cosull.
Carlstadt borough.....	Bergen	2,768	2,047	F. H. Jackson, Magnolia	F. H. Jackson.	Jean Henri Raas.
Chester township.....	Morris	1,625	1,592	H. W. Young, Afton	H. W. Young	
Chesterfield township.....	Burlington	1,253	1,298	Benjamin Rodgers, Moorestown.	Benjamin Rodgers.	
Chesterhurst borough.....	Morris	367	271	H. P. Drake, Chester.	H. P. Drake.	
Cincinnati township.....	Camden	1,422	1,202	C. B. Holloway, Chesterfield.	C. B. Holloway.	
Clark township.....	Burlington	1,717	1,202	Frank A. Brown.	Frank A. Brown.	
Clayton borough.....	Union	2,614	3,109	Samuel Ruf.	E. P. Bullman	
Cliffside Park borough.....	Gloucester	1,487	2,130	A. H. C. Phillips, M.D., Deerfield st.	A. H. C. Phillips, M.D.	
Clinton borough.....	Bergen	3,087	2,811	H. B. Jennings, M.D., Had nisd.	William Graf, Ellisburg.	
Clinton township.....	Hunterdon	1,707	1,616	Hiram D. Hopcock, Sergeantsville	Hiram D. Hopcock.	
Clinton township.....	Essex	1,707	898	Robt W. Babbington, Bridgeboro.	Robert W Babbington.	
Collingswood borough.....	Hunterdon	1,707	2,370	William C. Cattell, Wenonah.	Leming M. Rice, Jr., Dennisville.	M. G. Demarest, New Milford.
Commercial township.....	Camden	1,707	1,888	William C Cattell, Wenonah.	William C. Cattell.	
Cranbury township.....	Cumberland	2,614	3,109	Samuel Ruf.	E. P. Bullman	
Cranford township.....	Union	1,422	1,422	Frank A. Brown.	Frank A. Brown.	
Cresskill borough.....	Bergen	1,717	1,458	Edward S. Crane, Cranford.	Edward S. Crane.	
Deerfield township.....	Sussex	2,614	3,109	Samuel Ruf.	E. P. Bullman	
Delaware township.....	Camden	1,487	1,616	H. B. Jennings, M.D., Had nisd.	William Graf, Ellisburg.	
Delaware township.....	Hunterdon	3,087	2,811	Hiram D. Hopcock, Sergeantsville	Hiram D. Hopcock.	
Defran township.....	Burlington	1,707	898	Robt W. Babbington, Bridgeboro.	Robert W Babbington.	
Deford borough.....	Bergen	1,707	2,370	William C. Cattell, Wenonah.	Leming M. Rice, Jr., Dennisville.	
Dennis township.....	Cape May	1,707	1,888	William C Cattell, Wenonah.	William C. Cattell.	
Deptford township.....	Gloucester	1,707	1,888	William C Cattell, Wenonah.	William C. Cattell.	

Dover city.....	Morris	5,021	5,021	Joseph V. Baker.	Joseph V. Baker.	
Downe township.....	Ocean	2,680	2,680	Thomas B. Irons, Toms River.	Thomas B. Irons.	
Dunellen borough.....	Cumberland	1,808	1,808	Thomas B. Irons, Toms River.	Thomas B. Irons.	
Eagleswood township.....	Middlesex	1,215	1,215	G. E. Lowrie.	William A. Stites, Newport.	Charles A. Cortell.
Eastampton township.....	Ocean	589	589	Joshua M. Reeve, Smithville	Samuel P. Cranmer, West Creek.	
East Amwell township.....	Burlington	591	654	P. C. Young, M.D., Ringoes	Joseph Powell, Jr., Smithville.	
East Brunswick township.....	Hunterdon	1,375	1,273	P. C. Young, M.D., Ringoes	Levi Holcombe, Ringoes.	
East Greenwich township.....	Middlesex	4,438	4,928	Daniel Herbert, Jamesburg.	Daniel Herbert.	
East Orange township.....	Gloucester	1,259	1,383	Chalkley Haines, Mickleton.	Chalkley Haines.	
East Rutherford borough.....	Essex	13,282	17,927	Winthrop D. Mitchell, M.D.	Israel L. Dodd.	
East Windsor township.....	Bergen	2,756	2,250	Winthrop D. Mitchell, M.D.	Israel L. Dodd.	
Eastwood borough.....	Mercer	2,756	2,671	Winthrop D. Mitchell, M.D.	Israel L. Dodd.	
Eaton township.....	Bergen	2,953	3,860	E. W. Crater, M.D.	William H. Hulse, Hightstown.	George Hageleide.
Egg Harbor city.....	Monmouth	1,439	2,061	E. W. Crater, M.D.	Elwood Snyder.	J. G. H. Kaoner, Westwood.
Egg Harbor township.....	Atlantic	1,439	1,557	V. P. Hoffman.	Elwood Snyder.	V. P. Hoffman.
Elizabeth city.....	Atlantic	37,764	43,834	J. J. Manning	A. R. Vickers, Bakerville.	James J. Manning.
Elk township.....	Union	7,764	8,985	J. J. Manning	A. R. Vickers, Bakerville.	
Elmer borough.....	Gloucester	4,785	1,145	J. J. Manning	Geo. H. Hitchner	Robert Jamieson.
Englishtown borough.....	Salem	624	1,145	J. J. Manning	Geo. H. Hitchner	
Englishtown borough.....	Bergen	257	4,785	J. J. Manning	Geo. H. Hitchner	
Englewood Cliffs borough.....	Bergen	1,401	1,413	Charles L. Stout	Bismarck House.	
Evesham township.....	Burlington	3,129	3,569	James M. Matthews, Trenton Junc.	R. H. Leeds, Martham.	
Fairfield township.....	Mercer	1,688	1,802	James M. Matthews, Trenton Junc.	Lev. M. Matthews	
Fanwood borough.....	Cumberland	1,306	1,306	George F. Carter.	J. V. Mulford, Fairton	Fred. W. Schneider.
Fanwood township.....	Bergen	1,306	1,306	George F. Carter.	John Robison	Henry L. Hall.
Feldsboro borough.....	Union	1,922	1,600	F. W. Westcott, M.D.	John Robison	B. H. Jarret.
Frankford township.....	Burlington	1,459	1,763	F. W. Westcott, M.D.	John Robison	
Franklin township.....	Sussex	2,007	1,450	George Phillips, Branchville.	Geo. Phillips	
Franklin township.....	Bergen	2,021	1,825	Jno. W. Ackerman, Oakland	John W. Ackerman	
Franklin township.....	Essex	1,287	3,076	Joshua Richman, Malaga.	Henry B. Dunean, Nutley	
Franklin township.....	Gloucester	1,287	1,278	Geo. W. Snyder, Quakerstown.	Joshua C. Richman	
Franklin township.....	Hunterdon	1,283	2,464	Sanford Snyder, E. Millstone	Geo. W. Snyder	
Freehold town of.....	Somerset	1,283	1,338	Philip Cook, Broadway	Sanford Snyder	
Freehold township.....	Warren	879	3,157	J. C. Burr.	Philip Cook	
Freehold township.....	Monmouth	1,023	2,356	R. V. Lawrence	R. V. Lawrence	
Freehold township.....	Warren	1,023	864	A. L. Cook, Marksboro	A. L. Cook	
Galloway township.....	Hunterdon	2,208	1,052	Wm Hoffman	John Kale, Florence.	E. W. Bloom.
Glassboro township.....	Atlantic	2,642	2,375	Anthony Kienzie, Egg Harbor City	Geo. Phillips	Anthony Kiengle.
Glen Ridge borough.....	Gloucester	6,554	2,664	Chas. S. Heritage, M.D.	Henry B. Dunean, Nutley	
Glen Rock borough.....	Essex	3,091	1,644	H. K. Benson	Joshua C. Richman	
Gloucester city.....	Bergen	6,554	1,644	H. K. Benson	Geo. W. Snyder	
Gloucester township.....	Bergen	3,091	1,644	H. K. Benson	Sanford Snyder	
Green township.....	Camden	1,173	6,225	Wm. J. Brown.	Philp Cook	
Greenwich township.....	Camden	1,173	3,479	Wm. J. Brown.	R. V. Lawrence	
Greenwich township.....	Sussex	1,173	588	Wm. J. Brown.	A. L. Cook	
Greenwich township.....	Cumberland	1,173	1,323	Wm. J. Brown.	A. L. Cook	

List of Sanitary Districts, Showing Locality and Names of Officers--Continued.

SANITARY DISTRICT.	COUNTY.	POPULATION.		NAME AND ADDRESS OF SECRETARY.	NAME AND ADDRESS OF ASSESSOR.	NAME AND ADDRESS OF REGISTRAR OF VITAL STATISTICS.
		1890.	1895.			
Greenwich township.....	Gloucester.....	1,900	2,157	Jacob Ballenger, Paulshoro.	Jacob Ballenger.	J. M. Gamewell.
Greenwich township.....	Warren.....	825	866	Wm. Sherrer, Bloomsbury.	Wm. Sherrer.....	O. A. Mattison.
Gutenberg city.....	Hudson.....	1,947	3,626	Geo. A. De Loyes.....	Geo. A. De Loyes.....	Wm. H. Harrison.
Hacksack city.....	Warren.....	6,004	7,282	Wm. B. Jennings, M. D., Haddonfield	Wm. H. Harrison, Haddonfield	J. Louis O'Donnel.
Hackettstown.....	Camden.....	2,417	1,266	John R. Stevenson, M. D.	J. W. Cramer, Mays Landing.....	
Haddonfield borough.....	Atlantic.....	4,163	3,820	Edward North, M. D.	Samuel M. Robbins, Hamilton Sq.	
Haddon township.....	Mercer.....	3,833	4,624	Frank Emmans, Newton.....	Frank Emmans.....	
Hamilton town.....	Atlantic.....	866	4,624	John H. Bastedo, Boonton.....	John H. Bastedo.....	
Hampton township.....	Sussex.....	4,481	4,770	Wm. W. Squier, Marksboro.....	Philip S. Savercool.....	
Harrover township.....	Warren.....	593	2,551	W. H. Ingersoll.....	Horace E. Rude, Hamburg.....	
Hardwick township.....	Sussex.....	2,542	1,100	Cornelius Pittenger, Harmony	Cornelius Pittenger.....	
Hardyston township.....	Warren.....	1,152	2,989	R. N. Sheerden, Northvale.....	R. M. Sheerden.....	
Harmony township.....	Bergen.....	3,938	9,674	Eli Heritage, Richmond.....	Eli Heritage.....	
Harrison town.....	Hudson.....	1,645	842	Isaac H. Hummer, High Bridge.....	Isaac H. Hummer.....	John G. Martin.
Harrison township.....	Gloucester.....	1,936	1,032	Fred. B. Applegate.....	Isaac L. Elliott.....	Isaac L. Elliott.
Heintza borough.....	Bergen.....	2,825	2,847	W. H. Merrill, M. D., South Branch	A. D. Baird, Frankfort.....	Fred. B. Applegate.
Hightstown borough.....	Hunterdon.....	43,648	64,083	James Havron.....	Jno. Ackerman, Wyckoff.....	James Havron.
Hillsborough township.....	Somerset.....	2,373	2,377	Chas. Bridge.....	Chas. Bridge.....	
Hoboken city.....	Hudson.....	1,704	300	Aaron Longstreet, Keyport.....	Alvin A. Vanhorn, Hope.....	Wm. Paul.
Hobokus township.....	Hunterdon.....	217	1,429	John Miller, Hope.....	Walter L. Minch, Shiloh.....	Wilson D. Hunt, Harbournon.
Holland township.....	Hudson.....	3,018	3,246	N. I. Phillips.....	Wm. A. Parker.....	C. J. Rooney, Jr.
Holy Beach borough.....	Cape May.....	904	960	Wilson D. Hunt, Harbournon.....	James H. Butcher.....	A. R. Cranmer.
Holmdel township.....	Monmouth.....	1,479	3,388	James H. Butcher, Ardona.....	C. J. Rooney, Jr.....	
Hope township.....	Warren.....	1,832	246	C. H. Albertson, Vienna.....	C. H. Albertson.....	
Hopewell borough.....	Mercer.....	1,743	1,650	Wm. Laird.....	W. S. Hendrickson, Jackson's Mill.	
Hopewell township.....	Cumberland.....	4,338	246	Wm. A. Parker.....	Chas. Chamberlain, Woodport.....	
Howell township.....	Mercer.....	3,018	182,713	D. W. Benjamin.....		
Hudson county.....	Hudson.....	904	1,690			
Independence township.....	Essex.....	1,717				
Irvington village.....	Ocean.....	1,650				
Island Heights borough.....	Ocean.....	1,650				
Jackson township.....	Hudson.....	163,033				
Jersey City.....	Hudson.....	1,611				
Jefferson township.....	Morris.....	1,611				

LOCAL BOARDS OF HEALTH.		1900.	1905.	NAME AND ADDRESS OF REGISTRAR OF VITAL STATISTICS.
Junction borough.....	Hunterdon.....	7,064	9,751	M. R. Albright.....
Kearney township.....	Hudson.....	10,487	10,487	James M. Matthews.....
Keypoint town.....	Monmouth.....	3,386	3,386	William C. Smith.....
Kingwood township.....	Hunterdon.....	1,424	1,376	Samuel J. Snyder, Locktown.....
Knowlton township.....	Warren.....	1,411	1,294	Samuel J. Snyder, Locktown.....
Lacey township.....	Ocean.....	711	769	B. F. Matthews, Forked River.....
Lafayette township.....	Sussex.....	742	703	Nelson Ackerson, La Fayette.....
Lakewood township.....	Ocean.....	4,142	2,201	R. B. Robbins, Lakewood.....
Lambertville city.....	Hunterdon.....	3,865	4,620	Wm. Wayne Robinson.....
Lanedis township.....	Cumberland.....	1,729	4,960	Eben H. Foote, South Vineland.....
Lavallette borough.....	Ocean.....	1,729	1,729	George Kerr, M. D.....
Lawrence township.....	Cumberland.....	1,448	1,705	Chas. C. Foster, Cedarville.....
Lawrence township.....	Mercer.....	2,337	1,794	Chas. C. Foster, Cedarville.....
Lebanon township.....	Hunterdon.....			H. M. Thompson.....
Lebanon township.....	Bergen.....			Oscar Gesner.....
Leonia borough.....	Union.....			J. A. Ehrhidge.....
Linden borough.....	Union.....			J. A. Ehrhidge.....
Linwood borough.....	Atlantic.....			J. A. Ehrhidge.....
Little Egg Harbor township.....	Ocean.....	1,890	1,821	Theo. T. Price, M. D., Tuckerton.....
Little Falls township.....	Passaic.....		2,410	D. H. Brown, Tuckerton.....
Little Ferry township.....	Bergen.....	1,197	1,113	M. T. Synnot, M. D., Little Falls.....
Livingstone township.....	Essex.....		1,311	W. J. D. Berdan, Paterson.....
Lodi borough.....	Bergen.....		1,408	S. P. Allen.....
Lodi township.....	Bergen.....		638	Thos. A. Keeler, Columbus.....
Logan township.....	Gloucester.....	1,523	7,333	James Beatty, Stephentown.....
Long Branch Com.....	Warren.....	1,738	1,800	J. S. Paucost, Piquan Grove.....
Lopatcong township.....	Salem.....	1,368	1,953	W. D. Berdan, Paterson.....
Lower Alloways Creek township.....	Salem.....	1,798	1,798	S. P. Allen.....
Lower Penns Neck township.....	Cape May.....		3,250	C. E. Cook.....
Lumberton township.....	Burlington.....		1,657	D. H. Brown, Brownstown.....
Madison township.....	Morris.....	1,520	1,944	S. C. Bowler, Tement.....
Madison township.....	Middlesex.....	2,002	1,427	Edw. P. Longstreet.....
Manasquan borough.....	Monmouth.....	1,057	1,470	W. Howland, Manchester.....
Manchester township.....	Ocean.....	2,976	4,693	S. P. Allen, Salem.....
Manchester township.....	Salem.....	1,971	1,613	James Beatty, Stephentown.....
Mansfield township.....	Burlington.....	1,992	2,082	J. S. Paucost, Piquan Grove.....
Manua township.....	Gloucester.....	1,791	1,851	J. D. Ely, M. D., Marlboro.....
Marlboro township.....	Monmouth.....	3,183	2,874	Chas. A. Geran.....
Matawan township.....	Monmouth.....	2,279	2,116	Henry Reeves, Leesburg.....
Maurice River township.....	Cumberland.....		283	F. T. May.....
Maywood borough.....	Bergen.....	1,864	1,989	Wm. M. Potts, Medford.....
Medford township.....	Burlington.....	1,266	1,462	Wm. B. Bowman.....
Mendham township.....	Morris.....	1,225	1,339	Wm. H. Lewis.....
Merchantville borough.....	Camden.....		2,500	Stillwell H. Townsend, Burlington.....
Middle township.....	Cape May.....		2,368	

List of Sanitary Districts, Showing Locality and Names of Officers—Continued.

SANITARY DISTRICT.	COUNTY.	POPULATION.		NAME AND ADDRESS OF SECRETARY.	NAME AND ADDRESS OF ASSESSOR.	NAME AND ADDRESS OF REGISTRAR OF VITAL STATISTICS.
		1890.	1895.			
Middletown township.....	Monmouth	6,320	6,320	George Brannin, Atlantic Highlands	George Brannin.....	Thos. Holt.
Midland Park borough.....	Bergen	1,254	1,254	Nicholas G. Hopper, Ridgewood.	Nicholas G. Hopper, Ridgewood.	
Millburn township.....	Essex	2,437	2,437	Geo. J. Ely, Fernineville	Geo. J. Ely.....	L. H. Hogate.
Millville city.....	Monmouth	1,752	1,723	Wm. P. Hornbeck, Montague.	Clayton B. Tice, Williamstown.	Marshall O. Leighton.
Monroe township.....	Cumberland	10,002	10,468	Richard P. Francis, M.D.	Wm. P. Hornbeck.....	Edward Brown.
Monticello township.....	Gloucester	3,040	2,942	John S. Hoagland, Griggstown.	Jno. S. Hoagland.....	
Montclair town.....	Sussex	797	858	Thomas Martin.....	Jno. W. Vanduyne, Pine Brook	
Montvale borough.....	Essex	8,666	8,666	W. P. Lippincott, Hartford.	C. M. Phillips.....	Thos. Martin.
Moorestown borough.....	Bergen	1,655	1,655	Samuel Warren.....	Wm. P. Lippincott.....	Cyrus F. Cook.
Morristown city.....	Morris	10,156	10,290	Jno. T. Irving, Elwood	W. W. Phillips, Elwood	
Morris township.....	Morris	2,525	2,525	D. D. Chandler.....	Samuel A. Cliver, Elwood	
Mount Arlington borough.....	Burlington	348	348	A. Van Nest Baldwin, M.D.	Benj. Romaine.....	Frank King.
Mount Olive township.....	Burlington	1,669	1,669	Benj. Romaine, Wrightstown.	Dr. A. M. Cory.....	Louis J. Wendell.
Mount Tabor borough.....	Morris	1,848	1,848	Dr. A. M. Cory, New Providence	George Hardin.....	John L. Jaques.
Mullica township.....	Atlantic	697	825	M. H. Girvin, Mt. Holly.	George Hardin.....	
Naperville township.....	Monmouth	877	877	Rev. W. E. Honeyman.	John A. Wines, Milltown	Rev. W. E. Honeyman.
Netcong borough.....	Morris	181,830	215,806	Charles R. Brain.....	J. H. Cooley, M.D., Plainfield	
Newark city.....	Essex	18,603	19,910	J. H. Alday, M.D.	J. H. Cooley, M.D., Plainfield	
New Barbadoes township.....	Bergen	1,962	1,896	H. A. Brinley, Long Branch.	J. A. Brinley.....	E. A. Burgees.
New Brunswick city.....	Middlesex	839	934			
New Hanover township.....	Burlington	3,003	3,426			
New Market borough.....	Burlington	5,376	6,760			
New Providence township.....	Middlesex	5,715	8,427			
Newton township.....	Sussex	1,238	1,394			
Northampton township.....	Burlington	269	269			
North Bergen township.....	Hudson	452	921			
North Brunswick township.....	Middlesex	452	526			
North Plainfield township.....	Middlesex	452	526			
North Plainfield township.....	Somerset	452	526			
North Springfield township.....	Somerset	452	526			
North Spring Lake borough.....	Monmouth	452	526			
Nutting borough.....	Essex	452	526			
Ocean City borough.....	Cape May	452	526			
Ocean Grove Association.....	Monmouth	452	526			
Ocean township.....	Ocean	452	526			
Ocean township.....	Monmouth	452	526			
Oldmans.....	Salem	1,432	1,425	Daniel R. Morrison.....	Levi C. Justice, Pedricktown.....	Garet F. Harring, River Vale. Alpheus Struble.
Old Tappan borough.....	Bergen	18,844	22,792	Wm. Schluer.....	Jas. A. Osborne, Hohokus.	
Orvil township.....	Essex	4,002	3,436	L. B. Hoagland, M.D., Oxford	David Trimmer, Oxford.	
Oxford township.....	Warren	291	304	Palisade township.....	Fletcher Fuller, Calno.	
Pahaquarry township.....	Bergen	2,810	2,810	W. D. Woodley.....	Wm Ely, New Bridge.	
Palisade township.....	Burlington	13,694	13,694	F. Leo Hendrickson.....	F. Blackburn.....	W. D. Woodley. Cornelius Van der Ploog.
Palmira township.....	Bergen	1,821	97,844	James P. McNeil.....	H. E. Horner, Merchantville	John T. Pollitt. Barclay Hampton.
Park Ridge borough.....	Passaic	76,347	816	Frankin Keeler.....	Robert C. Getty.....	Geo. S. Kille
Passaic city.....	Passaic	13,028	13,028	Robert C. Getty, Butler.	Robert C. Getty.....	Wm. King, Jr. Frank Kneidler.
Passaic township.....	Monmouth	1,497	1,497	Geo. E. Mills.....	C. H. Richman, Woodstown	Charles E. Kelly, New Market.
Patterson city.....	Passaic	2,862	13,030	Frank Kneidler.....	Lewis Whitaker, Centertown	H. O. Newman Samuel Bartlett.
Pemberton borough.....	Burlington	9,512	9,081		Rutledge T. Crouse, Finesville.	
Pemberton township.....	Burlington	8,644	1,779		Daniel W. Busson.....	D. C. Law.
Pennsauken township.....	Camden	2,163	2,045		J. V. Beam, Wanaque.	H. W. Lumsden. M. W. Hubbard.
Pennsgrove borough.....	Salem	923	923		Jno. F. Anderson, Jr.	S. Rusing Ryno.
Pequanock township.....	Morris	1,907	1,907		Frank Brown, Mine Hill	
Perth Amboy city.....	Warren	7,106	7,945		Chas. Alpaugh	Saml. Sabath. Saml. E. Stohr.
Pilesgrove township.....	Salem	11,367	3,669		Benjamin M. Kelly, Metuchen	
Piscataway township.....	Middlesex	1,483	3,924		Asbury F. Beadle	
Plainfield city.....	Union	1,327	3,914		Elijah Lowe, Barley Sheaf	
Pleasantville borough.....	Atlantic	3,768	2,776		Henry Benecke	Jos. A. Vrohel, River Edge.
Pohatcong township.....	Warren	2,813	4,081		Thos. Terhune, Hohokus.	Edward H. Pancoast. Wm. May.
Point Pleasant Beach borough.....	Ocean	1,841	1,841			
Pompton Lakes borough.....	Passaic	1,841	1,841			
Pompton township.....	Passaic	1,841	1,841			
Port Oram borough.....	Morris	1,841	1,841			
Princeton borough.....	Mercer	1,841	1,841			
Princeton township.....	Mercer	1,841	1,841			
Quinton township.....	Salem	1,841	1,841			
Rahway city.....	Union	1,841	1,841			
Randolph township.....	Morris	1,841	1,841			
Raritan borough.....	Morris	1,841	1,841			
Raritan township.....	Somerset	1,841	1,841			
Raritan township.....	Hunterdon	1,841	1,841			
Raritan township.....	Middlesex	1,841	1,841			
Reading township.....	Monmouth	1,841	1,841			
Reading township.....	Monmouth	1,841	1,841			
Red Bank town.....	Monmouth	1,841	1,841			
Ridgefield Park borough.....	Bergen	1,841	1,841			
Ridgefield Park village.....	Bergen	1,841	1,841			
Ridgewood township.....	Bergen	1,841	1,841			
Ridgewood village.....	Bergen	1,841	1,841			
Riverside borough.....	Bergen	1,841	1,841			
Riverside township.....	Bergen	1,841	1,841			
Riverton borough.....	Burlington	1,841	1,841			
Rockaway borough.....	Monmouth	1,841	1,841			

List of Sanitary Districts, Showing Locality and Names of Officers—Continued.

SANITARY DISTRICT.	COUNTY.	POPULATION.		NAME AND ADDRESS OF SECRETARY.	NAME AND ADDRESS OF ASSESSOR.	NAME AND ADDRESS OF REGISTRAR OR VITAL STATISTICIAN.
		1890.	1895.			
Rockaway township.....	Monmouth.....		4,461	Wm. May.....	Wm. May.....	Wm. May.....
Koeselle borough.....	Union.....		1,867	Wm. P. Stevenson.....	Wm. P. Stevenson.....	G. A. Rawlins.....
Koxbury township.....	Morris.....		2,189	F. M. Flowers, Landing.....	F. M. Flowers.....	Chas. Van Winkle.....
Rutherford borough.....	Bergen.....		2,283			T. Nelson Woodruff.....
Saddle River township.....	Bergen.....		2,197	Peter J. Smith.....	Peter J. Smith, Rochelle Park.....	Clinton Bowen.....
Salem city.....	Sussex.....		6,516	Clinton Bowen.....	Clinton Bowen.....	Lefferts Smith, South River.....
Sandyston township.....	Middlesex.....		1,084			Chas. G. Hoff.....
Sayreville borough.....	Middlesex.....		8,609			U. H. Huntley.....
Schraalenburg borough.....	Bergen.....		572	J. D. Norcross.....	J. D. Norcross.....	W. R. Fox.....
Sea Isle City borough.....	Cape May.....		766	Winfield S. Haines, Tabernacle.....	Winfield S. Haines.....	J. F. Fulton.....
Shamong township.....	Burlington.....		968	George W. Anderson.....	George W. Anderson.....	Chas. Hart.....
Shrewsbury township.....	Monmouth.....		3,649			
Somersville town.....	Somerset.....		4,514			
Somers Point borough.....	Atlantic.....		2,089	Granville S. Woolman, Vincentown.....	Granville S. Woolman.....	
Southampton township.....	Burlington.....		4,830	J. F. Fulton.....	J. F. Fulton.....	
South Atlantic City borough.....	Middlesex.....		2,403	H. E. Hathaway.....	H. E. Hathaway.....	
South Bound Brook township.....	Middlesex.....		791	S. F. Stanger, M. D., Harrisonville.....	S. F. Stanger, M. D., Harrisonville.....	
South Brunswick township.....	Cumberland.....		4,970	J. F. Osborne, Hilton.....	J. F. Osborne, Hilton.....	
South Cape May borough.....	Essex.....					Dr. Wm. J. Chandler.....
South Harrison township.....	Gloucester.....					
South Orange township.....	Essex.....		1,724			
Sparta township.....	Sussex.....		1,670	J. J. Hoff.....	J. J. Hoff.....	
Springfield township.....	Burlington.....		569			
Spring Lake Beach borough.....	Monmouth.....					
Spring Lake borough.....	Monmouth.....					
Stafford township.....	Ocean.....		1,095	E. T. Moore, Stillwater.....	E. T. Moore, Stillwater.....	
Stillwater township.....	Sussex.....		1,255	D. Austermulh.....	D. Austermulh.....	
Stockton town.....	Camden.....		6,446			
Stow Creek township.....	Cumberland.....		966			
Summit township.....	Union.....		3,602			
Tenack township.....	Bergen.....		811	J. W. B. Lansing, M. D.....	J. W. B. Lansing, M. D.....	
Tewksbury township.....	Hunterdon.....		2,034	A. G. Banghart, Glen Gardner.....	A. G. Banghart, Glen Gardner.....	
Trenton city.....	Mercer.....		57,458	William Cloke.....	William Cloke.....	C. Edward Murray.....
Undercliff borough.....	Bergen.....		1,072			E. Grant White, Fort Lee.....
Union township.....	Bergen.....		1,862			
Union, town of.....	Hudson.....	13,336	5,005			
Union township.....	Hudson.....	2,197	1,073	Morris Stockton, Pattenburg.....	Morris Stockton.....	
Union township.....	Hunterdon.....	1,184	1,055	E. R. Wills, Barnegat.....	E. R. Wills.....	
Union township.....	Ocean.....	1,083	3,412	H. B. Whitehorse, M. D., Verona.....	H. B. Whitehorse, M. D., Verona.....	
Union township.....	Union.....	2,846	2,247	F. C. Price, Imlaystown.....	F. C. Price, Imlaystown.....	
Upper Freehold township.....	Monmouth.....	2,229	803	George W. Hewitt, Penn's Grove.....	George W. Hewitt, Penn's Grove.....	
Upper Penn's Neck township.....	Salen.....	1,823	321			
Upper Pittsgrove township.....	Salen.....					
Upper Saddle River borough.....	Bergen.....					
Upper township.....	Cape May.....					
Vailsburg borough.....	Essex.....	1,756	1,683	Abram Van Winkle, Glenwood.....	Abram Van Winkle.....	
Vernon township.....	Sussex.....		1,887	H. B. Whitehorse, M. D., Verona.....	H. B. Whitehorse, M. D., Verona.....	
Verona township.....	Essex.....	3,822	1,951	John S. Halsey, M. D.....	John S. Halsey, M. D.....	
Vineyard borough.....	Cumberland.....		1,126	James Breneman, New Bedford.....	James Breneman, New Bedford.....	
Wall township.....	Monmouth.....		3,863	G. E. Rogers.....	G. E. Rogers.....	
Walpack township.....	Monmouth.....		2,362	Joseph W. Bunnell.....	Joseph W. Bunnell.....	
Wantage township.....	Sussex.....		1,086	S. M. Purcell.....	S. M. Purcell.....	
Warren township.....	Somerset.....	1,046	1,658	Peter Newmiller, Wareenville.....	Peter Newmiller, Wareenville.....	
Washington borough.....	Warren.....		3,538	A. J. Craft.....	A. J. Craft.....	
Washington township.....	Bergen.....		1,269	W. W. Banta, Hillsdale.....	W. W. Banta, Hillsdale.....	
Washington township.....	Burlington.....	661	310	A. E. Coster, Green Bank.....	A. E. Coster, Green Bank.....	
Washington township.....	Gloucester.....	1,165	1,206	C. E. Phillips, M. V., Hurfville.....	C. E. Phillips, M. V., Hurfville.....	
Washington township.....	Mercer.....	1,126	1,142	J. P. Hutchinson, Windsor.....	J. P. Hutchinson, Windsor.....	
Washington township.....	Morris.....	2,367	2,278	J. R. Farrow, M. D., Ger. Valley.....	J. R. Farrow, M. D., Ger. Valley.....	
Washington township.....	Warren.....		1,287	C. S. Dalrymple, Washington.....	C. S. Dalrymple, Washington.....	
Waterford township.....	Camden.....	2,421	2,789			
Wayne township.....	Passaic.....	2,004	2,099			
Weehawken township.....	Hudson.....	1,943	2,677			
Wenonah township.....	Gloucester.....	668	473	J. Barclay Hilliard, Rancocas.....	J. Barclay Hilliard.....	
Westampton borough.....	Burlington.....	866	593			
West Amwell borough.....	Hunterdon.....		896			
West Cape May borough.....	Cape May.....		1,588	Mark Clement, Woodbury.....	Mark Clement.....	
West Deptford township.....	Gloucester.....		2,739			
Westfield township.....	Union.....		3,753			
West Hoboken township.....	Hudson.....	11,665	18,296			
West Milford township.....	Passaic.....	2,486	2,169	Frank C. O'Connor.....	Frank C. O'Connor.....	
West Orange township.....	Essex.....	4,358	5,854			
West Orange township.....	Mercer.....	1,329	1,244			
West Windsor township.....	Bergen.....	646	675	Wm. H. Campbell, Scullville.....	Wm. H. Campbell, Scullville.....	
Westwood borough.....	Atlantic.....	538		J. F. Brooks.....	J. F. Brooks.....	
Weymouth township.....	Mercer.....		109	Wm. R. Prentiss, Wildwood.....	Wm. R. Prentiss, Wildwood.....	
Wilbur borough.....	Cape May.....		739			
Wilwood borough.....	Burlington.....		2,034	Michael G. Burdiss, Wilton.....	Michael G. Burdiss.....	
Winlow township.....	Camden.....	4,665	5,802			
Woodbridge township.....	Middlesex.....	3,911	3,863	T. E. Parker, M. D.....	T. E. Parker, M. D.....	
Woodbury city.....	Gloucester.....	421	421			
Woodcliff borough.....	Bergen.....	327	387			
Woodland township.....	Burlington.....		526	Wm. H. White.....	Wm. H. White.....	
Wood Ridge borough.....	Bergen.....		1,470			
Woodstown borough.....	Salen.....		2,224	B. F. Buzby, M. D., Swedesboro.....	B. F. Buzby, M. D., Swedesboro.....	
Woolwich township.....	Gloucester.....	2,035				

John J. Hopper, Saddle River.
William Billington.
William Mac George, Jr.
John J. Polmann, Passaic.
A. J. Craft.
Jessie W. English.
William G. Blattner, Cape May.
I. O. J. Bate.
Wm. H. Campbell.
J. F. Brooks.
Wm. K. Prentiss.
D. T. Mathers.
G. M. Ackerman.
W. H. White.

List of Coroners.

Atlantic County—George Senft, Wm. McLaughlin, Elisha S. Ingersoll.
Bergen County—Wm. F. Ricardo, Jacob M. DeBaun, Cornelius Collins.
Burlington County—Augustus B. Groebler, Frank G. Stroud, Lemuel Fisher.
Camden County—A. H. Lippincott, Frank O. Stern, Edgar H. Landis.
Cape May County—John S. Douglas, Wilson A. Lake, Daniel C. Heritage.
Cumberland County—John S. Halsey, Stetson L. Bacon, Paul J. Davis.
Essex County—Benj. M. Skinner, Albert J. Hollis, Chas. H. Terrill.
Gloucester County—Thomas E. Parker, Louis N. Shreve, Thomas J. Gaskill.
Hudson County—Diedrick Oldenberg, James A. Exton, Cornelius Greenleaf.
Hunterdon County—Thomas S. Callan, Alfred B. Nash, Wm. R. Little.
Mercer County—Wm. Glenn, Wm. M. Diebrow, Chas. H. Walker.
Middlesex County—H. Martyn Brace, Chas. R. Moke, Edward E. Haines.
Monmouth County—William T. Hopper, Henry Herbert, Theo. M. Anderson.
Morris County—George W. Wilkinson, Cornelius B. Gage, Chas. DeV.
Romondt.
Ocean County—Edward J. Wirth, Alfred Palmer, George Nunemaker.
Passaic County—Chas. B. Hindee, Abraham Vermeulen, Charles W. Booth.
Salem County—Wm. H. Carpenter, Thomas J. Torton, John G. Campbell.
Somerset County—Adonis Nelson, Abram B. Mosher, Aaron L. Stillwell.
Sussex County—John Moore, James N. Miller, Sidney B. Straley.
Union County—Henry C. Pierson, Stephen B. Keefe, Robert R. Sinclair.
Warren County—Joseph D. Vann, Michael Kenney, Joseph Hilbert.

Epidemic Outbreaks.

BY A. CLARK HUNT, M.D., STATE SANITARY INSPECTOR.

As the law passed in 1887, establishing a State Board of Health, requires the State Board of Health to "make sanitary investigations and inquiries in respect of the people, the causes of disease, and especially of epidemics," it has been the custom, whenever it came to the knowledge of the board that contagious disease existed in a given locality, to make an investigation for the purpose of ascertaining the cause of the outbreak, and to aid local authorities in any way possible in limiting the spread of the disease.

The new system of reporting cases of communicable diseases to this board, under the provisions of Chapter 260 of the Laws of 1895, has aided somewhat in gaining an early knowledge of localities where there were outbreaks, but numerous localities do not comply with the law, and, aside from the reports from cities, we still fail to receive notification from many places.

In nearly every instance where visits have been made, the names of all patients attacked, the location of houses, dates of attack and sanitary condition of dwellings have been noted, but in the reports which follow these data have been omitted, and only those facts which may be of general public interest are mentioned.

During the year attention has been called to outbreaks of communicable diseases in the following places :

Hightstown, Mercer county.
Basking Ridge, Somerset county.
Rahway, Union county.
Bound Brook, Somerset county.
Masonville, Burlington county.
Elizabeth, Union county.
Berlin, Camden county.
High Bridge, Hunterdon county.
West Orange, Essex county.
Woodbridge, Middlesex county.
Newton, Sussex county.

BOROUGH OF HIGHTSTOWN.

A telegraphic communication was received January 8th, 1896, requesting that an officer of the State Board of Health should come to Hightstown to advise with the inspector of the local board as to an outbreak of diphtheria.

Up to the date of visit nine cases had been reported, and in each instance the patient was recovering.

The first case gave a history of having been away from the town, and the other cases could be traced to exposure to the infection, either directly or indirectly.

The local board of health had taken active measures to limit the extension of the disease, and no new cases had been reported for several days.

The most interesting fact presented in this outbreak was that four of the cases occurred in the families where the women took in washing from various households. It was therefore necessary to stop the clothing coming to infected houses, and where clothing had already been exposed to infection to see to it that proper precautions were taken. As no case appeared in families sending clothing to infected houses the precautions taken were apparently effective.

As the danger of the extension of an epidemic, where cases occur in the families where washing is done is so imminent, it would seem a wise precaution for the attending physician on the date of his first visit to obtain a list of families sending clothing to the infected house, and at once notify the local board of health, so that there may be no delay.

BASKING RIDGE.

Visited February 15th, 1896, on account of an outbreak of typhoid fever.

Basking Ridge is located among the hills in Somerset county, and has more than a local reputation for healthfulness, and therefore an outbreak of this character seemed to warrant careful investigation.

At the time of inspection nine cases had been reported and two deaths had resulted.

There was some doubt expressed as to whether the disease was typhoid fever, but we were informed by one of the physicians who had examined a majority of the cases, that he was positive as to the diagnosis and that there could be no doubt.

Of the nine cases reported, four occurred at the Washington Hotel.

The first case in the hotel and the first of the series of cases, was a Miss A, who, two weeks previously, had visited Newark.

The three remaining cases at the hotel were directly exposed to the first case, and assisted in nursing.

Three of the cases reported in the village had visited the patients in the hotel.

As the hotel seemed to be the starting-point from which the disease spread, a careful examination was made of the premises, and the well from which drinking-water was obtained received especial attention.

The well is located in a recess of the house and is along the driveway leading to the barn. Its depth is forty feet.

As the persons attacked had used the water, an analysis was made and the chemist's report led to the abandonment of this water supply.

A drain on the premises which had become stopped was relaid.

Aside from these points noticed, there was nothing that attracted especial attention.

The milk supply was obtained from cows on the premises.

The proprietor of the hotel seemed anxious to assist in every way possible and the local board took an active oversight of details.

On account of the sloping nature of the ground, and the nearness of wells and outbuildings, there is danger of contamination of water in this section, and every individual property-owner should take precautions to prevent it.

RAHWAY.

An outbreak of typhoid fever was reported and a visit was made May 1st, 1896.

Since February 11th to the present time thirty-seven cases have been reported and three deaths have occurred from the disease.

These cases were located in different parts of the town and there were no local conditions on premises to account for the disease.

The milk-supply was obtained from different dealers and no history of a series of cases supplied by one milkman was brought out.

In all but one or two instances the patients drank city water, or a combination of city and well-water.

We were informed that the disease first appeared after a freshet in the Rahway river early in February and that a number of cases were reported after a second freshet, about the middle of March.

The water-supply for the city is obtained from the Rahway river, and inquiry was made to ascertain whether there had been cases of typhoid fever at Cranford, Milburn, South Orange or Orange, as these places are located on the river or its branches, and considerable sewage finds its way into the stream.

We were informed that no cases had been reported.

In the report of this board for 1893 will be found a report of an examination of the Rahway river. At that time an inspector of this board made a careful inspection of the stream, noting all direct contaminations.

On account of the outbreak in Rahway it seemed wise to verify the former report and this was done.

At Cranford, where there are many house-drains and sewers emptying into the river, it was found that eight additional connections had been made. A new sewer system has been completed, but as yet no connections have been made to it.

In time, all the drains now discharging into the river at this point will empty into the sewers, and thus a great part of the contamination will be obviated.

From South Orange to the Valley road twenty-nine closets and house-drains are so located as to be possible sources of contamination, and in the village of South Orange at least eight drains and outbuildings are so located on a branch as to cause contamination.

In other respects, the report of 1893 was verified. Although at the point of intake the water appears to be very clear, with such evidence of contamination it would seem necessary that im-

mediate action be taken to purify it before offering it to consumers.

As we had a fair reason to account for the existence of the fever in Rahway as a result of contamination of the public water-supply, attention was directed to the matter, and the mayor in his message urged the adoption of some method of filtration, and plans have been submitted to the common council for improving the present supply.

BOUND BROOK.

An investigation of an outbreak of diphtheria in South Bound Brook was requested, and a visit was made June 22d, 1896.

South Bound Brook is governed by a commission, and is located opposite Bound Brook, on the south side of the Raritan river, and is in Franklin township, Somerset county.

The board of health of Bound Brook feared that the disease might extend to their borough, as there was no special health organization in South Bound Brook.

But two cases were reported. One case was that of a child of an ice dealer, and the second the child of a milk dealer. Both cases resulted fatally. The cases were in the families of two brothers.

No public funerals had been permitted.

As one of the cases was in the family of a milk dealer, special inquiry was made to ascertain whether proper precautions were being taken.

The milk which was distributed to consumers was obtained from a farm located some distance from the village, and the father of the child which was taken ill, as soon as he was informed that the disease was diphtheria, employed a man to deliver the milk, and, therefore, there was no risk of conveying the disease to his patrons.

In both instances the houses had been disinfected under the supervision of the attending physicians.

As there was no health organization in this sanitary district an effort was made to secure the appointment of a local board of health.

In many of the smaller incorporated boroughs and villages in the State, there is a tendency on the part of officials to rely upon

the township authorities to execute the health laws, and we, therefore, have some difficulty in impressing the fact that the law is mandatory and states that there shall be a local board of health in all cities, boroughs, and other forms of local municipal government.

Efforts are made each year to secure organization where it does not exist, and we are able to report that the number of places unequipped to meet emergencies arising from outbreaks of communicable diseases is steadily lessening.

MOUNT LAUREL TOWNSHIP, BURLINGTON COUNTY.

A report was received from the secretary of the local board of health, stating that several cases of typhoid fever had occurred at a small village called Masonville, and requesting an inspection by a representative of the State Board of Health.

The visit was made July 23d, 1896. Masonville is a small hamlet located two miles from Hartford, and having a population of about two hundred persons.

Two years ago there were nine cases of typhoid fever reported in this locality, and last year four cases.

But two cases have been reported this year.

One of these cases occurred in a house situated on the south side of the railroad.

Two years ago a case of typhoid occurred in the same house, and the dejections of the patient were buried 125 feet from the well.

Examination of the premises showed that the pump, which was located in the kitchen, had leading from it an open-box drain which receives house-drainage, and there is every opportunity for sewage to back into the well. This danger is increased, as the drain discharges but thirty feet away.

The second case was that of a young man who worked in the village store, which is located on the north side of the railroad.

The condition of the well and its surroundings on these premises was as unsanitary as can be imagined.

It is located in a small building attached to the barn, and a mass of semi-liquid manure is within ten feet of it. On the other side is an open ditch, starting from the well, which receives house-drainage, and this was very filthy. Within seventy-five feet of

this well and in the rear of the barn a house is located in which there were three cases of typhoid fever two years ago, and the discharges of the patients were buried near the line-fence.

Under the circumstances, a chemical examination of water taken from the wells was suggested, and the result showed ample evidence of contamination.

The board of health was instructed to require that drinking-water taken from surface-wells should be boiled before use, and to order the closing of suspected wells.

No further cases have been reported from this locality.

ELIZABETH.

As several cases of typhoid fever were reported from this city, occurring within a short space of time, a visit was made by an inspector of this board on August 19th, 1896.

Twelve cases had been reported up to this date, and efforts had been made by the local authorities to ascertain the cause of the outbreak.

In several cases the patients were found to have used the water from old wells, which had in many instances been abandoned for a long time.

The cause assigned for using the well-water was that the city water had such a strong vegetable taste as to be unpalatable.

The city water is obtained from the Elizabeth river in part, and also from the wells at Netherwood.

At certain seasons of the year, especially in warm weather, the water acquires a taste on account of the large quantity of vegetable matter which finds its way into the stream.

The board of health of the city took active measures to prohibit the further use of polluted wells, and at the same time there was a decided improvement in the character of the city water, so that there was no extension of the epidemic.

The public water-supply of the city would be greatly improved if the artesian water could replace the supply taken from the river.

An inspection of this stream, several years ago, revealed numerous direct and indirect contaminations, which could only be

avoided by regular patrol and the application of legal methods where required.

We understand an effort is being made to supplement the artesian supply, and trust that in the near future decided improvement may result.

WATERFORD TOWNSHIP, CAMDEN COUNTY.

Cases of diphtheria were reported from Berlin, which is located in Waterford township, and a visit was made August 25th, 1896.

Five cases of the disease had appeared in a hotel and there was fear expressed that the disease might extend, as the local board of health was somewhat tardy in quarantining the premises.

At the time of visit bacteriological examination had been made, and the diagnosis of diphtheria confirmed.

The local board of health had met and ordered a quarantine of the premises, and was preparing to secure proper disinfection when the patients were convalescent.

As a result of the action taken, no cases have since been reported from this locality.

HIGH BRIDGE, HUNTERDON COUNTY.

As several cases of typhoid fever had occurred in High Bridge the local board of health asked for advice and assistance, and the locality was visited September 7th, 1896.

The area of the village is about one square mile, and the character of the country is very hilly, the village itself being almost surrounded by elevated lands.

A branch of the Central Railroad of New Jersey starts from this point, and, as it leaves High Bridge, passes along a side hill. Above this railroad and on a street (Church street) running parallel with it are located a number of houses, the rear yards of which terminate at the railroad cut.

Eleven cases of typhoid fever were reported and the premises were examined.

In all but three instances the houses where the disease appeared were located on the northwest side of the branch railroad, and the three which were not thus located were on the southeast and but a short distance away.

There is no public water-supply, and the milk-supply was obtained from eight different dealers.

In only one of the houses where there were cases of typhoid was there any provision made for the care of waste liquids.

Wells are dug at varying depths of from 20 to 40 feet. There was every chance for pollution of wells by surface drainage on several of the premises examined.

One of the persons attacked did not use water from his well, but obtained his supply from a neighbor. He was taken with the disease at about the same time as this neighbor was, and no other cases occurred in his own family.

In no instance was a water-closet on any of the premises examined located over 100 feet away from the well, and in some cases they were but 40 feet apart, although it must be stated that the water-closet was always on a somewhat lower level than the well.

As there had been cases of typhoid within a few years on the same street, and the disease seemed to be localized, an examination of the suspected wells was ordered. The local board was requested to urge the inhabitants to use boiled water for a short time, and the number of cases was thereby limited.

In all such localities a public water-supply would lessen the tendency to such outbreaks, and this was recommended.

The location is such that water can be obtained with but comparatively small expense, and the question should receive earnest attention.

WEST ORANGE TOWNSHIP, ESSEX COUNTY.

Cases of scarlet fever were reported from this district, and a visit was made September 23d, 1896.

We were informed by the health officer that six cases of scarlet fever had occurred in five houses in West Orange, and that four cases were reported outside.

The chief interest attached to this outbreak was in the fact that one milkman supplied all the cases in West Orange with milk.

As there is a custom of collecting milk tickets from houses where contagious diseases may exist and selling them to other patrons, the health officer of the district ordered the milkman to

destroy the tickets taken from infected houses and to thoroughly cleanse the bottles.

As some of the children attended one school, the disease may have been transmitted by direct exposure. We were informed that the Washington school had been disinfected, and the houses where the disease existed promptly quarantined.

Referring again to the handling of milk tickets, we would draw attention to the common custom of putting the tickets into the bottles, which is done by many persons. These tickets are taken by the milkman, placed in a package, and sold to the next customer. There is no cleansing of the tickets, and, of necessity, with frequent handling they become soiled, and might easily become the transmitters of disease.

If some plan of giving tickets which should be destroyed after being once used were adopted, the risk of transmitting disease in such a manner would be dispelled.

NEWTON, SUSSEX COUNTY.

Ten cases of typhoid fever were reported from this district, and it was visited October 5th, 1896.

One death occurred from the disease.

It was ascertained that eight of the cases were in four houses, all in close proximity and located on Mill street. Five of the patients used water from the same well, and two other cases are supposed to have used it.

One of the patients may have contracted the disease from nursing a typhoid case.

An examination of the premises was made, and the conditions were very unsanitary.

The house-drain from one of the houses had become stopped and plugged from end to end with sewage. This drain is but twenty-four feet from a driven-well, from which probably seven of those attacked obtained water for drinking purposes.

An analysis of the water from this well was ordered.

In a house, across the street from the one above mentioned, where two persons were ill, it was noted that the wash and waste-water had been emptied into a wooden hopper, which carried the liquids to a blind drain in the street, and that the foul liquids had flowed back under the house.

As Newton has a public water supply, it is interesting to state that not in a single instance did a person attacked with the disease use the town supply.

It is hoped that all of those now depending on wells will soon avail themselves of the city water and abandon wells, which, of necessity, are constantly exposed to contamination.

The chances of contamination are very great, as no sewers are provided and the soil must in time become saturated with filth.

WOODBIDGE, MIDDLESEX COUNTY.

Thirteen cases of diphtheria were reported and a visit was made October 12th, 1896.

Twelve of the cases were in Second street. Six of these were in one house, four in another, and two in a third.

The remaining case occurred in a house located near the clay banks outside of the town. No deaths are reported.

The origin of the disease has not been traced, but as the elder persons in the families where the disease appeared are accustomed to travel about, and as the families are so closely located, the transmission of the disease is readily explained.

The local conditions are far from sanitary.

As the ground is flat there is a chance for foul liquids to find their way into wells and there is need of constant house-to-house inspection to secure cleanliness of surroundings. The local board of health placed a strict quarantine over the houses and no extension of the disease is reported. As soon as practicable, the infected houses will be thoroughly disinfected.

Inquiries Concerning Charitable and Penal Institutions.

BY A. CLARK HUNT, M.D.

During the past year attention has been called to several of the public institutions, and inspections have been made for the purpose of ascertaining existing conditions and to aid, if possible, in correcting defects.

As there is a detailed description of each institution on file in the office of the State Board of Health we only refer, in the following reports, to recent observations.

PISCATAWAY TOWNSHIP ALMSHOUSE MIDDLESEX COUNTY.

Visited January 13th and March 30th.

A communication was received from the chairman of the township committee requesting a representative of the State Board of Health to meet with their committee and aid them in making some changes in the buildings, so that better accommodations might be provided for the inmates.

The almshouse is located about two miles from Stelton and on the road leading from Stelton to New Market.

The building in use was originally an old farm-house.

The water-supply is from a driven-well, sixty-two feet in depth, and water is only furnished to the kitchen.

There is no bath-room for inmates and it is, therefore, almost impossible to secure bodily cleanliness.

There are always in the institution those who are suffering from chronic diseases, but there is no provision for hospital accommodations.

The rooms are small and badly lighted.

The average number of inmates is eight.

The building committee decided to increase the size of the building, and at the meeting plans were submitted for tearing down the old extension and rebuilding.

The following suggestions were made:

1. That each room should receive as much light as possible.
2. That transoms should be placed over the doors of the separate rooms.
3. That doors and windows should be placed opposite so as to secure cross-ventilation.
4. That hospital accommodations should be provided.
5. That bathing facilities be provided.

These suggestions were considered by the committee and the new building has been erected.

The report from the superintendent is to the effect that the changes made give satisfaction and lessen, in a marked degree, the work of securing cleanliness of inmates and their surroundings.

It was impossible to make all the improvements on account of limited appropriation of money, but what has been done is in the right direction.

The committee in charge plan to complete the work when sufficient funds are placed at their disposal.

MIDDLESEX COUNTY JAIL.

Visited May 22d.

This institution is located at New Brunswick. The water-supply is the same as that which is furnished to the city.

Each corridor is furnished with bath-room and water-closet, but the inmates make use of galvanized buckets in the cells.

The number of inmates at the time of inspection was twenty-five.

The bath and toilet-room in the men's part has been somewhat improved by increasing the light, and a new closet fixture has replaced one which was much out of repair.

The woman's part is well lighted, and is used at times for minors, as there is no provision made for their separate confinement, as required by law.

We found the cells on the men's side overcrowded, and not in as cleanly a condition as is desirable.

This portion of the jail should be remodeled and small cells, constructed of steel, should replace the large ones now in use. Under the present conditions there is a tendency to put too many prisoners in each cell, and, as the ventilation is unsatisfactory, the air at times becomes very foul.

HUDSON COUNTY JAIL.

Visited June 3d, 1896.

This institution is located in Jersey City.

The water-supply is the same as that of the city, but we were informed that since water had been obtained from the Pequannock water-shed a decided improvement is noticed.

There have been no changes made in the buildings.

The number of inmates at the time of visit was 180.

Buckets are used by prisoners in the cells.

There is no compulsory bathing, and prisoners do not bathe with any regularity.

We would call attention to the plumbing in the institution, as the conditions are such as to require a thorough overhauling. The rims of the bath-tubs are broken and some of the closet fixtures are out of repair.

The pressure on the the top floor is not sufficient to adequately flush the closets, and a better flushing system should be put in use.

The number of inmates is less than at any previous visit, and corridors and cells were in a cleanly condition.

ESSEX COUNTY JAIL.

Located in Newark.

Visited June 21st, 1896.

As this institution has been fully described in former reports, we would call attention to the improvements which have been made within a short time.

Until very recently the portion of the jail assigned to the female prisoners was badly lighted and the ventilation was unsatisfactory.

The old portion has been entirely removed and a new building erected.

This wing is lighted through a skylight. The construction of the cells is modern, and ample provision is made for light and ventilation.

A closet fixture and hand-basin are placed in each cell, and there is a ventilator opening into a foul-air shaft.

At the time of inspection there were twenty-four female prisoners, but the air in the corridors gave no indication of overcrowding.

There have been no changes made in the part of the jail where the male prisoners are confined, excepting some improvements in bathing facilities.

There were 145 male prisoners.

A new kitchen and laundry have been completed, and these are filled with modern appliances.

The jail was in a cleanly condition throughout, and the systematic attention paid to all details of order and cleanliness is noticeable.

BELLEVILLE TOWNSHIP ALMSHOUSE, ESSEX COUNTY.

Visited June 22d, 1896.

This almshouse is located about a mile back of Belleville.

The water-supply is obtained from a well 30 feet in depth, located near the building.

There is a cellar under the whole building, and this is used for storage of vegetables and fuel.

There is no plumbing in the building and there is no provision for bathing.

The number of inmates is four. The building is in charge of one of the inmates and there is evidence of careful housekeeping.

The floors, walls and rooms were cleanly and the institution is in better condition from a sanitary standpoint than it has been in the past.

It would be a decided improvement to introduce water and furnish proper bathing facilities.

CAMDEN COUNTY JAIL.

Visited August 31st, 1896.

This institution is located at Camden. Although within a few years a new jail has been built, the portion set apart for female prisoners was incomplete and unsatisfactory.

Very recently a change has been made and entirely new quarters provided for female prisoners and minors.

We noticed a decided improvement in the ventilation of cells in this new part, as the tops of the cells are left open so that the air can pass freely through the grating and thus a constant circulation is secured. Each cell is provided with a flush-closet.

The light is especially good, and in all parts there was evidence of careful supervision.

In the men's part there were but fifty prisoners, and the cells were cleanly.

The use of canvas hammocks, instead of mattresses, is a good plan and assists materially in keeping the cells free from vermin.

The only feature noticed which needs change is the location of the bath-rooms. These are in dark corners where, as there is no sunlight or circulation of air, it becomes difficult to overcome the tendency to foul odors. An additional pipe for the extraction of foul air has been placed over the tiers of cells in the men's part.

Heretofore, in the winter season, when the jail is overcrowded, it has been difficult to secure sufficient ventilation, but the additional foul-air duct is said to have made a noticeable change for the better.

PERTH AMBOY CITY LOCK-UP.

Visited October 2d, 1896.

Our attention was called, by the local board of health of the city of Perth Amboy, to the condition of the lock-up which is used by the police department for detaining prisoners.

The building in question is located next to and is attached to the City Hall.

It is one story in height and is built of brick.

There are five cells in the building and a five-foot corridor.

The only method of obtaining light is by a single small window.

In each cell there is a closet fixture, which consists of a straight pipe connected directly with the sewer without trap of any kind.

To flush these closets water from a bucket must be used, and at times they become very foul.

Heating is effected by a stove, and in the winter, when there were over thirty prisoners in this small space, with the door and window closed, the air became so foul as to be unbearable.

The cells had all been whitewashed and cleaned when the inspection was made, so that no objection could be made as to cleanliness.

Under the circumstances it seemed advisable to confer with the building committee of the city council, with a view of securing some improvements.

If the city could afford to build a new lock-up at the present time it would be the wiser plan, but we were informed that this could not be done for some time to come. It was suggested that the lock-up should be ventilated, and that closet fixtures, with proper flushing attachments, be supplied.

We are informed that this has been ordered and that changes will be made at once.

REPORT OF AN INSPECTION OF THE STATE REFORM SCHOOL, JAMES-
BURG, N. J.

To the State Board of Health:

At the request of Mr. Ira Otterson, superintendent of the Reform School for Boys, a visit was made to this institution October 10th.

The request was made on account of the occurrence of several cases of typhoid fever, and for the purpose of determining, if possible, the cause, or to make suggestions as to any defects noticeable.

The number of cases reported is four, as follows:

1. Robert Parent, who was attacked in June, 1896, and died.
2. Charles Johnson, colored, attacked September 15th, 1896.
3. One of the teachers.

These cases were from separate houses, and no one of them gave a history of being away within one month of the date of attack.

4. One case is reported as occurring last year.

The description of the institution will be found on file in the office of the State Board of Health.

The number of inmates at present is 375, and of officers and help, 48.

The investigation at this time was directed to three points, as follows:

1. Milk-supply.
2. Drainage.
3. Water-supply.

1. The milk-supply is obtained from cattle owned by the State and kept on the farm, and the water used for washing the cans is the same as that provided for the institution.

2. From each of the buildings a drain is carried to one of the sewers, which empty into open ditches in the fields back of the buildings.

One of the lines of the sewer crosses the water-pipes in its course.

The sewage from the buildings north of the main building is carried in a northeasterly direction toward an orchard, and flows over the surface of the ground.

3. Water-supply.

There are two sources from which water is obtained for use in the institution. One is known as the "old supply," and the other as the "new supply."

The old supply is obtained from a line of drainage tile along the slope of a hill, southwest of the barn, and intercepting the water from springy spots on the hillside. The pipes are about three feet in depth, with open joints.

The land along this line is of a swampy character, and there is a strong probability that surface impurities reach these pipes.

The pipe-line carrying the water is carried to a well, from which the water is pumped to a standpipe.

This water-pipe crosses the line of one of the sewers.

The new supply is taken at a point at least one mile from the institution, and is obtained from springs along the hillside.

Formerly the water ran along the side of a public road before reaching the pump-house, but now a pipe has been laid across the meadows, so that no water from the road can mingle with the brook water. An examination of this stream shows that it ran along the hillside, and that the brush has recently been trimmed to give more exposure to sunlight. We also found that the brook bed had been cleaned.

There was no evidence of contamination, and there are no

houses near enough to cause any suspicion of soil-pollution in this locality.

The water from the 12-foot well in the pump-house is pumped by an electric engine to the stand-pipe on the grounds of the institution, and the pipe-line runs parallel with the "old supply" pipe when it reaches the grounds of the institution, and a pipe is carried to the well, so that water may be pumped either direct or that the two supplies may be pumped from the well.

This pipe-line from the new supply also runs either over or under one of the sewers.

A. CLARK HUNT, M.D.,
Sanitary Inspector.

October 10th, 1896.

The following communication was sent to the superintendent of the school:

OFFICE OF
THE BOARD OF HEALTH OF THE STATE OF NEW JERSEY.
TRENTON, October 14th, 1896. }

Mr. Ira Otterson, Superintendent State Reform School, Jamesburg, N. J.:

DEAR SIR—An inspection of the water-supply of the Jamesburg Reform School was made October 10th, 1896, by officers of this board, and the report shows that the original supply is drawn from a line of porous tile-pipes which extend along a low-lying portion of the grounds, having a vineyard and strawberry bed upon one side and a swampy locality upon the other side. This line of porous collecting pipes is said to be four inches in diameter and it is about four hundred feet in length, and it is laid between two and three feet beneath the ground surface, thus constituting a subsurface drain for a large area of the school premises.

This collecting pipe is in effect a shallow, elongated surface well, having all of the objections, risks and dangers which door-yard wells are well known to possess, and when we consider that thousands of gallons of water have for years been pumped from this source it becomes evident that contamination of the supply might occur. A line of sewer crosses the water-pipe near the buildings, but in this locality the water-pipe is said to be made of glazed tiles and to have cemented joints. However, it is altogether improbable that the joints of either the sewer-pipe or water-pipe are actually tight, and pollution of the supply at this point is possible. The well near the pond, through which the water from the pipe-line flows, is used by the inmates of the institution at pleasure, and pollution at this point is also possible.

A new source of supply, a small brook about three-quarters of a mile from the institution, has, within a few years, been utilized for increasing the original supply, but the new supply is scanty.

In view of the foregoing facts we believe that the original water-supply of the institution should be entirely abandoned, and we recommend that a competent engineer or an officer of the geological survey shall be secured to investigate all of the available sources of supply and advise a source from which a pure and plentiful supply of water may be obtained.

Very respectfully,

HENRY MITCHELL, Secretary.

Water=Supplies and Sewerage.

WATER-PURIFICATION IN NEW JERSEY.*

BY M. N. BAKER, C.E., OF UPPER MONTCLAIR, N. J.

(Associate Editor "Engineering News," New York.)

It is the duty of municipal authorities to provide the citizens whose representatives they are with an ample supply of water, free from all substances which may be injurious to health, pleasant to sight and taste, and suitable for domestic and the most important industrial purposes. The ideal supply would be naturally pure, but it is often impossible to secure such water at a cost thought to be within the municipal purse, or cities have sat idly by with folded hands and silent tongues when once pure supplies have been made foul. So true is this that of 3,000 public water-supplies in the United States to-day scores, if not hundreds, are so badly polluted with sewage as to be a constant menace to health, if not already a continual source of disease. Strange to say, contamination often results from the action of those who use the water. This is a fact that seems almost incomprehensible, for while imagination can picture a community mean enough to pour its sewage into its neighbor's water-supply, it would seem that the law of self-preservation would keep men and women from drinking their own sewage. But self-preservation and a respect for the rights and health of others is not strong enough in some localities of this land to prevent the wholesale pollution of public water-supplies, and among the worst sinners in this respect are certain of our New Jersey towns and cities.

*Originally printed in the proceedings of the New Jersey Sanitary Association for 1895, under the title "Purification of Water-Supplies by Filtration." Revised to date by the author in October, 1896.

Where sewage-polluted water must be used, means should be adopted for its purification. Other impurities or objectionable qualities which it is sometimes desired to remove or prevent are hardness, iron, suspended earthy matters, vegetable stains and bad tastes and odors.

Simple filtration will first be considered. The term as now used is a broad one, but it originally signified a mere straining process. It has been practiced on public water-supplies, both here and abroad, for over sixty years, and for forty years has been compulsory on that portion of the water-supply of London which is drawn from the river Thames.

The early water filters, in fact all efficient ones on a large scale until within the past ten years, were artificial beds of sand, resting on gravel and stone to facilitate the collection of the filtrate in conduits below. The water passed downwards through the sand at a slow rate, thus requiring large areas of filter-beds. To clean the bed the soiled upper layer was scraped up, removed, washed and replaced. To obtain a more rapid rate of filtration from a given area, and for greater ease in washing, the modern commercial or mechanical filter was developed in the United States early in the eighties, and has been improved upon from time to time since. Without attempting to trace the various stages through which the mechanical filter has passed, it may be said that it aims to purify large volumes of water with a small body of filtering material, relying upon frequent washings to keep the material clean. Washing is accomplished by a simple reversal of the current, sometimes accompanied by agitating the sand with revolving arms. The wash-water carries out the impurities lodged in the filtering material. Many of these filters work under pressure, the water often passing through them on its way to the reservoir, stand-pipe or distributing system. Gravity filters are also largely used, in which case the filter-tanks are open at the top and may be built of wood instead of metal. Gravity filters often but not always require an extra pumping plant. On most waters some chemical, generally alum in minute quantities, is used to coagulate the matter to be removed and throw it down on the bed. The coagulant also forms a film on the surface of the filters which aids in retaining the impurities.

Mechanical filters are now used on over one hundred American water-supplies, against perhaps ten filter-bed plants worthy the name. Many factors have contributed to the greater use of mechanical than slow sand filters in this country. Chief of these is the commercial aspect of mechanical filtration and a former entire misconception of the principles of and the results which may be accomplished with filter-beds. Mechanical filters have been vigorously pushed by sales-agents wherever bad water has been reported. Filter-beds stand or fall on their own merits, as they are not patented and no one is financially interested in securing their adoption. The misconceptions regarding filter-beds have come to light with the recognition of the germ theory of disease and improved methods and interpretation of the bacterial examinations of water. For years water contained disease and other germs, and filter-beds removed many of them without anyone knowing it.

It was first supposed that the chemical impurities in water were in some way the source of danger, and the aim was to remove these. Later, it was learned that bacteria were the real danger, and finally it was discovered that the process which removed organic impurities in chemical form also took out bacteria. When mechanical filtration began to come forward its promoters took up and urged the old belief, then still largely prevalent, that sand filtration was a simple straining process. This belief they perpetuated as long and completely as possible, and for years encountered scarcely any opposition. It is now recognized as an oxidizing process, depending for its success upon the work done by the bacteria of nitrification. Most of the plants built by the mechanical filter companies have been designed to remove suspended matter and color where these were so marked as to render the water almost intolerable. These ends many of the mechanical filters have accomplished most admirably. Meanwhile most communities have remained satisfied with water that looks well, without regard to the dangerous impurities it may contain, or have secured new supplies from more favorable sources. With the modern advances in sanitary science attention has recently been turned to the importance of removing sewage impurities from polluted waters, if the latter must be used, and of late filter-beds and mechanical filters have been con-

structed with this end in view. For the detailed results obtained by mechanical filters we had, until 1896, practically no figures regarding the removal of organic impurities, including bacteria, save those furnished by the parties who make and sell the filters, or are in some way financially interested in their use. Some extended impartial experiments were made at Providence in 1893-4, by Mr. E. B. Weston, Member American Society of Civil Engineers. Mr. Weston's report was printed in 1896 as an appendix to the report of the Rhode Island State Board of Health, and was abstracted and criticised at length in "Engineering News," of April 16, 1896. Its conclusions were that for the local conditions at Providence rapid mechanical filtration would be preferable to slow sand filtration, but neither system has yet been adopted. Extensive and careful tests of mechanical filters were completed in August, 1896, at Louisville, Ky., with Mr. George W. Fuller as chemist and bacteriologist to study them for the water company, and if these results are published they will doubtless throw much light on the subject. I have a growing belief that good bacteriological results are possible with mechanical filtration, and I am certain that suspended matter, vegetable stains and iron can be removed by this means. The Massachusetts experiments demonstrate beyond a doubt the high bacterial efficiency of properly constructed and operated filter beds. The diminution in the typhoid death rate at Lawrence, Mass., since the city water filtration plant was put in operation, shows practically what real filter-beds will do. So does the experience with unfiltered and filtered river water at Hamburg and Altona, respectively, during the last cholera epidemic. Other European examples could be cited, and some recent American practice, aside from that of Lawrence, is gradually confirming for this country what is well established abroad. Filter-beds will also remove color and suspended matter, as well as sewage impurities, and, if supplemented by aeration, will also take out iron.

Notwithstanding the vileness of some of our New Jersey water-supplies there is not in operation within the State a single city filter plant of any kind designed wholly to remove organic impurities, unless it be the mechanical filter plant at Bordentown described below.

There were at the beginning of 1896 seven mechanical filter plants in the State. Three of these were put in to remove suspended matter and color from surface water—Lakewood, Long Branch and Somerville; three are designed to remove iron from artesian or deep-well water—Asbury Park, Atlantic Highlands and Keyport. The seventh, the Bordentown plant, might never have been installed had the water been pleasant to the senses, but it is said that it was put in to remove albuminoid ammonia.

In May, 1896, a slow sand filtration plant, the first of its kind in this State, was put in operation at Lambertville, N. J.

In December, 1895, I visited all of the mechanical filter plants, except that at Lakewood. By correspondence at and since that time, I have secured additional information regarding these water filtration plants in New Jersey, which is set forth in the following pages.

Before taking up these plants brief descriptions will be given of some other attempts at water purification in New Jersey.

INFILTRATION BASINS FORMERLY USED AT NEWARK.

The most notable of the early attempts at water purification in New Jersey was at Newark, in connection with the new Belleville works built in 1867. Here two infiltration basins were built* close by the Passaic river with the idea of securing a purified supply from that stream. The basins were each 140x340 feet, giving a combined area of 47,600 square feet. They were excavated through alluvial soil, sand and gravel to a depth of nine feet below low water in the river, and had vertical walls of stone masonry laid in cement.

In January, 1870, the quantity pumped from the basins was about 600,000 gallons a day, but in September of the same year, when the consumption reached about 2,000,000 gallons, water had to be drawn from the river.

With an increasing consumption the infiltration basins yielded a diminishing proportion of the supply, making the city more and more dependent on the Passaic river, a condition which Newark did not relish even then, for in 1879, and again in 1880, it drove a number of wells near the pumping-station. The yield

* "Engineering News," May 7th, 1881.

of these wells, it is said, was sufficient to dilute by one-half the river water, but this was only for a time, and the city was glad enough to secure a pure gravity supply from the Pequannock river in 1892. In the fall of 1896, the city having nearly reached the limit of the supply then available to it from the Pequannock (the East Jersey Water Company having a right to 22,500,000 out of 50,000,000 gallons contracted for until 1900), experiments were instituted to determine what amount of water could still be secured from the old infiltration basins and the driven wells, for temporary use.

AERATION BY THE HACKENSACK WATER COMPANY.

A deficit of oxygen often occurs in surface-waters, especially when stored in reservoirs, which gives rise to unpleasant tastes and odors through the development of algae or other minute forms of vegetable life. Such a condition was experienced at Hoboken, N. J., in June and July, 1894. It was remedied by making up the deficiency in oxygen by pumping air under a pressure of 100 pounds or more into the long force main leading to the works.* Later it was deemed advisable to supply compressed air to the water in the reservoir. The work was done by Mr. Charles B. Brush, M. Am. Soc. C. E., Engineer of the Hackensack Water Company, under patents then owned by Prof. Albert R. Leeds, of the Stevens Institute of Technology, and now controlled by the New York Filter Manufacturing Co.†

Reference to aeration, as formerly practiced at Long Branch in connection with mechanical filtration, is made further on. Other references to its use in the same connection are made under Asbury Park and Keyport.

* See Trans. Am. Soc. C. E., Vol. XV., pp. 129 to 141, February, 1885.

† Since the above paragraph was put in type, Mr. Brush has informed me in a letter dated January 9th, 1897 that aeration has been practiced continuously from about April 15th to November 15th of each year since 1881, there seeming to be no advantage in aerating the water the balance of the year. There has been no alga growth since aeration was begun.

Most of the aeration has been done in the two reservoirs, the air compressor being located at one reservoir and air forced to the other through about one mile of 8-inch pipe. A 3-inch wrought-iron pipe extends around each reservoir, from which 2-inch branches, about 190 feet apart, run down the slopes, turn at right angles, and extend for six feet along the reservoir bottoms, these sections of pipe being perforated. The amount of air delivered by each pipe is regulated by a valve on the reservoir embankment.

Mr. Brush has found that with a reservoir holding 4,000,000 cubic feet (45,000,000 gallons) of water, through which 1,300,000 cubic feet are passing daily, it is desirable to force free air into the reservoir to the extent of 1,000,000 cubic feet per day; that is, the free air should be about 17 per cent. of the capacity of the reservoir. He has also found that it is not desirable, when aerating the water in the mains, to use free air in greater quantities than 5 per cent. of the volume of the water.

THE HYATT AND NEW YORK MECHANICAL FILTERS AT THE SOMERVILLE AND RARITAN WATER-WORKS.

The first mechanical filter plant built to purify a public water-supply in New Jersey was put in operation at Raritan in 1882, by the Somerville Water Company, which built works at that time to supply Somerville and Raritan. This was a small Hyatt filter, built in the early days of the development of the process, and must have been one of the first city plants erected anywhere. In July, 1885, this filter, which had not given the best satisfaction, either through deficient capacity or otherwise, was replaced by four filtering-tanks of an improved pattern, known as the Hyatt manifold. The combined capacity of these filters was 500,000 gallons a day. The Hyatt patents, with those of several other companies, were transferred a few years ago to the New York Filter Company. This company added a filter of another type, called the New York, in June, 1894, and again in August, 1895, each addition having a capacity of 500,000 gallons, making the present daily capacity of the plant 1,500,000 gallons.

The combined population of Somerville and Raritan in 1890 was 6,417, of which Somerville had 3,861, and Raritan 2,556.

The water-supply is taken directly from the Raritan river, through a twenty-inch intake to the middle of the stream. A pumping capacity of 2,000,000 gallons is available. The water is pumped directly to a 25x140-foot stand-pipe, with an open top, from which it flows through the filters and on to the consumers. The present stand-pipe was built in 1895, replacing one 10x140 feet. The new structure has a funnel-shaped bottom to facilitate cleaning, and the attendants at the pumping-station state that it is flushed out about once a week. It would appear from this that a considerable amount of settlement takes place in the stand-pipe, lessening to some extent the work of the filters.

Filtration is employed to remove matters in suspension, the river carrying "a large amount of red mud when it is swollen," according to the volume on "water-supply," published in 1895 by the New Jersey Geological Survey, from which has been abstracted much of the information in this paper regarding the streams of New Jersey. The same report states that this mud unfits the water for public use without "settlement, and possibly

filtration," but that "otherwise it does not seem to be a bad water, judging from the results of our chemical analyses." Above the source of supply the river has a drainage area of 468 square miles, and at this point the Geological Survey estimates the "dry season flow" as 42,330,000 gallons a day. The central portion of the drainage area is highly cultivated and large areas are almost completely deforested. The flow of the river fluctuates greatly and is subject to very heavy floods. This is largely due to the lack of ground storage in the drainage area, and of course to deforesting also, the whole watershed having but 13 per cent. of forest.

The filters are located, practically, in a separate building, but within a few feet of the pumping station, and connected with it. An ell forms a house for the pumping engineer, the whole structure being of brick.

As all the filters now built by the New York Filter Company are of the same type as the new ones at Raritan, the old Hyatt filters here and at other points in New Jersey will be described only in a general way. These filters work under a pressure, the filtering material being placed in a vertical iron or steel tank, the water passing downward through the filter and cleaning being effected by reversing the flow, the wash-water carrying away the impurities lodged in the filter. In the Hyatt filters built in 1885 at Raritan, the filtering material was lifted bodily by the water through four tubes to an open, upper compartment, finally passing back to its original-resting place by gravity, the dirty water being drawn off at the top. In the late filters of this type the material is confined in a water-tight tank and sectional washing is employed, that is, only a part of the filtering material is washed at a time.

The New York filter, as used in the additions to the filtering plants at Raritan and at Long Branch, is a horizontal cylindrical tank, with the proper inlet, outlet and wash-water pipes. The filtering material is supported on concrete, embedded in which are so-called cone valves, through which the filtered water passes to the collecting-pipes. The filtration is downward through sand and fire-coke, and washing is effected by reversing the flow. The cone valves, as now made, might be described as a cross between a hemisphere and a cone in shape. They are made of perforated

copper and are filled with gravel to prevent the sand from entering them. All the operations of the filter are governed by the turning of a few valves.

The guaranteed daily rate of filtration is 1,500,000 gallons. As nearly as can be learned, the average daily amount filtered last year was, approximately, 800,000 gallons, and the maximum 1,000,000 gallons. With a full stand-pipe the filters work under a head of from sixty to sixty-five pounds. When the filters are clean, the loss of head on account of resistance caused by the filtering material as the water passes through it is given as about one pound. The small filters are six and one-half feet in diameter and thirteen feet high, the open compartment occupying nearly half the space. The large filters are eight feet in diameter and twenty feet long. About once a year the sand and coke are removed from the tanks in order that the interiors may be painted. A small amount of material wastes with each washing, and some new sand and coke is added yearly if required.

The filters are washed from one to five times a day, varying with the condition of the river water. Unfiltered water is used of necessity, owing to the fact that instead of pumping through the filters to the stand-pipe the reverse practice is followed. The percentage of all water pumped used in washing the filters could not be obtained. Two of the old filters are washed at a time, requiring about forty-five minutes; it takes about twenty-five minutes each to wash the new filters, so that the time required to wash all the filters is two and one-third hours.

Alum is used whenever a chemical is employed. It is bought from the Nichols Chemical Company, 47 Cedar street, New York city, at \$6 per barrel of 300 to 400 pounds, f. o. b. at Raritan. The water company has to pay for hauling the alum to the pumping station, but the distance is short. Alum is used only when the river is bad. None was being used when I visited the plant, and it was said that probably none would be used until spring. As to the amount of alum, when used, to each gallon of water filtered, no definite information could be obtained, further than that when employed, as little as one-tenth grain per gallon had been used. An indefinite statement was made to the effect that the alum used in a day's run cost about \$1. The 500,000-gallon filters built in 1885, cost about \$8,000; the 500,000-gallon

tank added in 1894, cost \$4,000, and the addition of the same size in 1895, cost \$3,600. These figures include nothing for the cost of the filter-house or room, and what they include in the way of piping not otherwise necessary, I did not learn.

The filters are attended by the pumping engineer, Mr. Edwin S. Slack, and his son, Mr. George C. Slack, assistant engineer. Most of the information given above was obtained by me from the latter at the filtering plant on December 6th, 1895. I am also indebted to Mr. Hugh K. Gaston, treasurer of the Somerville Water Company, for information furnished and courtesies extended. Those who wish to visit the plant can reach it by the Central Railroad of New Jersey, stopping at either Raritan or Somerville. A stage runs from Somerville and Raritan, passing within a short distance of the plant.

The only analyses of the Raritan river water, before and after filtration, of which the writer knows, are those published in the catalogue of the New York Filter Company, as of the date of August 15th, 1892. The analyst is not stated. The figures are as follows:

PARTS PER 100,000.

	<i>Before Filtration.</i>	<i>After Filtration.</i>
Color.....	Dark Brown	Faint
Taste.....	Earthy	Pleasant
Smell.....	Earthy	None
Albuminoid ammonia.....	0.049	0.015
Free ammonia.....	0.013	0.052
Required oxygen.....	0.655	0.095
Nitrites.....	0.0025	—
Nitrates.....	0.175	None
Chlorine.....	0.25	0.125
Total hardness.....	7.25	7.25
Permanent hardness.....	3.75	6.75
Temporary hardness.....	3.50	0.50
Total solids.....	26.72	15.98
Mineral matter.....	21.84	12.72
Organic and volatile matter.....	4.78	3.26

As this plant was put in to remove matters in suspension its efficiency should be judged by its removal of total solids. These were reduced from 26.72 to 15.98 parts per 100,000, a reduction of 10.74 parts in 26.72, or about forty-two per cent. The color is reported as having been changed from dark brown

to faint. The reduction of organic matter, as indicated by the albuminoid ammonia, was nearly seventy per cent.

THE HYATT AND NEW YORK MECHANICAL FILTERS AT LONG BRANCH.

After the Somerville plant of 1885, three years elapsed before mechanical filtration was again put in use in New Jersey. The Long Branch Water Supply Co. built this second plant, using Hyatt filters, and putting them in operation in June, 1888. It consisted of eight tanks, each ten feet in diameter and ten feet high, having a rated capacity of 2,000,000 gallons a day. During the first half of 1894 there were added two horizontal filters, eight feet in diameter and twenty feet long, built by the New York Filter Co. These filters have a capacity of 500,000 gallons each, making a total capacity for the plant of 3,000,000 gallons a day.

Filtration was adopted at Long Branch "to remove marked brown stain and a small amount of sediment," says Mr. Whitney Conant, secretary of the Long Branch Water Supply Co. The water supply is drawn from Whale Pond Brook, which is described in Vol. III. of the State Geological Survey as follows:

"The stream drains 5.1 square miles, giving an average flow of 5,300,000 gallons and a minimum of 855,000 gallons daily. The maximum available with storage will be 2,910,000 gallons daily. There is already some storage in use."

Long Branch is a well-known summer resort on the Atlantic Ocean. It had a population of 3,833 in 1880 and 7,231 in 1890. Water-works were built in 1877. In 1882 and 1889, respectively, the works supplying Monmouth Beach and Seabright were consolidated with the Long Branch plant. At present the company's mains extend north to the Highlands of Navesink, supplying a large number of summer cottages in the season. Water is pumped to an 18x80-foot open stand-pipe, having a capacity of about 150,000 gallons. Filtration was started in 1888, as stated above.

The filters are located in an addition to the pump-house, and about fifty feet from the pumps. Their guaranteed capacity is 3,000,000 gallons a day. The maximum amount of water pumped during the last calendar year was 2,500,000 gallons and the minimum 1,100,000, or a total of about 420,000,000 for the whole

year. On August 24, 1895, there were pumped 2,823,000 gallons. This was after a long dry spell and was on a warm day, the thermometer registering 86° F. at noon, against 76° on the 23d and 68° on the 22d of the same month.

The average working head on the filters is about forty pounds and the loss of head in the filters ranges from five to ten pounds.

During fires the water is still pumped through the filters. About two years ago the filters were shut down about an hour during a fire which caused much alarm. This instance was given at the pumping station as an exceptional one. Sand and coke, about five feet in depth, is used for filtering material, the latter being taken from the beach at Long Branch. The same sand is used for building purposes, but for the filters the coarser particles are screened out. The filtering material has never been entirely renewed, but about three inches in depth is added each year to replace waste. The old filter tanks have been emptied twice to repair the movable arms described later. The combined filtering area is about 1,100 feet, assuming the available width of the horizontal filters to be their diameter.

Unfiltered water is generally used for washing the filters, although filtered can be employed. About five per cent. of the total pumpage is required for washing the filters. It is stated that fifteen minutes suffice to wash each filter tank and that the filters are washed once in twenty-four hours, unless the condition of the water and the small loss of head shows this to be unnecessary. The filters had not been washed on the day of my visit.

To wash the old filters six valves must be manipulated, three at the top and three at the bottom, and in addition a lever must be shifted from time to time to move a radial arm.

This arm has a sharp edge to facilitate turning, and through its perforations a spray of water is sent into the filtering material to aid the cleansing process. In the new filters it is necessary to turn only three valves in washing. Sectional washing is practiced and at the close wash-water is passed through all the sections to even up the bed.

Potash alum is used as a coagulant, being furnished under contract by Lennig & Co., of Philadelphia. No other chemical has been used. The total alum consumption in the year 1895 was 21,830 pounds, the maximum being one grain per gallon, while

at times none was added to the water. At the time of my visit but little alum was being used, and it was stated that this would be discontinued when the weather became colder.

The filters cost \$28,000 and the building in which they are housed, \$3,000. The expense for repairs in 1895 was \$208. The firemen attached to the pumping station wash the filters. Chemical analyses to show the results of filtration were made in 1892 of water collected July 8th, by Prof. Albert R. Leeds, of Hoboken, and biological examinations in 1889 by Dr. Charles V. Chapin, of Providence, R. I.

The results of the chemical analysis, as given in the catalogue of the New York Filter Co., were as follows:

PARTS PER 100,000.

	Before Filtration.	After Filtration.
Color.....	Dark yellow	None
Taste.....	Very peaty	None
Smell.....	Peaty	None
Free ammonia.....	0.132	0.0035
Albuminoid ammonia.....	0.0445	0.0095
Oxygen required to oxidize organic matters.....	1.232	0.1735
Nitrites.....	0.0025	0.0015
Nitrates.....	0.087	0.087
Chlorine.....	0.35	0.35
Total hardness.....	2.25	2.25
Permanent hardness.....	—	1.00
Temporary hardness.....	2.25	1.24
Total solids.....	9.52	7.14
Mineral matters.....	5.28	5.40
Organic and volatile matters.....	4.24	1.74

The albuminoid ammonia shows a reduction of about eighty per cent. and the total solids about twenty-five per cent. All the color, taste and odor is shown as removed. Prof. Leeds states that the amount of alum used at the time was 0.65 grains per gallon.

In the catalogue mentioned above three bacteriological tests by Dr. Chapin are given. These show an average of 268 bacteria per cubic cm. in the unfiltered and three in the filtered, a reduction of 98.2 per cent.

The special difficulty encountered in operating this plant is given by Mr. Conant in the following language:

"Irregularity in the use of water. During some parts of hot days in midsummer, the consumption exceeds the proper rate at which the filters should be operated: that is, at a greater rate than 3,000,000 gallons per day."

It is said that there is no complaint against the coagulant. Most of the above information was furnished by W. Whitney Conant, secretary of the Long Branch Water-Supply Co. The balance was obtained by the writer on visiting the plant December 5th, 1895, where he was kindly received by Mr. Joseph Lake, engineer of the pumping-station.

There was originally used in connection with this plant a vertical aerating pipe, sixteen inches in diameter and one hundred feet long, sunk in the ground. The pipe was plugged with cement at the bottom and divided by a vertical partition into two halves. Water was passed down one compartment, sucking air up through the other, and then went to the pumps.*

This has been abandoned, Mr. Lake states, for three or four years. Water is now taken from the "lake" directly to the receiving well. Mr. Lake said that the consumption finally exceeded the capacity of the aerating apparatus.

THE HYATT MECHANICAL FILTERS AT LAKEWOOD

Next in order of erection is the Hyatt plant at Lakewood, N. J. This place is a winter resort in the pines of New Jersey. Its population is not given separately in the census returns, but has been estimated recently at 1,000 by one person and 2,000 by another. A public water-supply was introduced by the Lakewood Water-Supply Co. in 1886 and the filters were put in operation in December, 1889. The reason given by the company for adopting filtration is "to purify and change color of water." Water is pumped from the South branch of the Metedeconk river. According to the report on water-supply of the New Jersey Geological Survey, this stream has its watershed wholly on tertiary sand and gravel. A narrow strip of swamp-land borders on the stream through a portion of its length, but how much of this is on the drainage area above the water-works intake, is not stated. The aggregate of swamps, however, is said to be small.

*Aeration and filtration at Long Branch, as practiced then, was described in "Engineering News" for October 13th, 1888, from which some of this information has been taken.

The minimum daily flow of the stream at Lakewood is given in the above named report as 4,120,000 gallons; the average as 25,500,000, and its supplying capacity, with storage, as 14,000,000 gallons. Water is pumped through the filters to a 150,000 gallon stand-pipe, which is not roofed over. Mr. Vermeule, in the above named report, gives the average daily consumption as 280,000 gallons, but the company reports it as "say 250,000 gallons, estimated." The filters are in the pumping-station.

The pressure under which the filters operate is also given approximately as forty-eight pounds. The filtering material is sand and coke, five feet deep, in two tanks, with a combined filtering area given as 580 feet.

The latter seems excessive for two Hyatt filters. The filtering material has been entirely renewed but once. Washing is done daily with unfiltered water.

Sulphate of alumina is used as a coagulant. It is bought from the Martin Kalbfleisch Chemical Co., of New York, at 1.6 cents per lb., not including freight.

Regarding the average quantity used, the report at hand says, "291 lbs. in pumping 3,780,000 gallons of water." This would be at the rate of about 0.54 grains per gallon, allowing 0.4 cents per lb., or \$8 per ton for freight and cartage, making the coagulant cost two cents per lb. delivered. The cost would be about \$15.40 per 1,000,000 gallons for chemicals alone, or 1.54 cents per 1,000 gallons. Assuming a consumption of 100 gallons per day per capita as an average, or 36,500 gallons a year, the cost would be about 55 cents per capita per year. Practically the same coagulant has been used from the start.

The cost of filters and building is given as about \$5,000. No special difficulties are reported in operating the plant, nor any complaints regarding the use of chemicals. The above information regarding the filter plant was given by Mr. Isaac A. Van Hise, president of the Lakewood Water Co.

THE NATIONAL MECHANICAL FILTERS AT BORDENTOWN.

Bordentown followed close upon Lakewood in the adoption of mechanical filtration, having put a small National plant in operation in September, 1890. Bordentown is on the Delaware river, not far below Trenton. It had a population of 4,258 in

1880, which diminished slightly to 4,232 in 1890. Water-works were built in 1856 by the Bordentown Reservoir and Water Co.

The water-supply is now taken from Crosswicks creek and the Delaware river. It is pumped through the filters to a reservoir with about 500,000 gallons capacity. The creek drains 139.2 square miles, lying almost wholly in the marl regions of the State. Regarding the general character of the drainage area the State Report on Water Supply, already cited, speaks as follows:

"The highly agricultural character of this watershed is not favorable to its purity for water-supply purposes, nevertheless the chemical analyses which we give in a later chapter do not indicate any serious natural impurities. The water is used for the supply of Bordentown, and has not given entire satisfaction, but this is believed to be due to unwholesome marshes on the lower portion of the stream, and to local sewage contamination."

The total supplying capacity of the stream at its mouth is given in the report as 23,600,000 gallons a day. The analyses mentioned above were made by Prof. Alfred Chester, from a sample collected at Crosswicks, in July, 1894, and Prof. H. B. Cornwall, in May, 1892. The former was taken directly from the stream and, it must be understood, was not at the intake of the water-works. It showed 10.4 parts per 100,000 of solids, of which 6.04 was volatile organic matter; 0.08 of chlorine; 4.10 hardness, and an acid reaction. The nitrogens were not given. The sample analyzed by Prof. Cornwall was taken from a city hydrant, after the filters were added to the works. Presumably it was filtered water, so it will not be given here.

The reason given by the company for adopting filtration is "to get rid of an excessive amount of albuminoid ammonia." This, the company says, it has "succeeded in doing."

In connection with this information, and before giving the further matter reported by the company, the writer may state the results of his visit to the plant on December 6th, 1895, when he was shown about by Mr. J. H. Longstreet, president. Water from the creek is drawn from a point very near its outlet into the river. The effect of the tide in the river is felt in the creek. Mr. Longstreet thinks the water in the creek is less polluted than that in the river. This is the only filtration-plant on the Delaware river in New Jersey. In the spring and fall vegetable

matter gives the creek-water a bad taste, and alum is used. In the winter, and sometimes in the summer, no alum is used. The local board of health objects to the use of water which requires filtration, and Mr. C. C. Vermeule has made a report for the board, recently, in which he recommends the construction of infiltration galleries up the creek. The company sank an artesian well 250 feet to rock in 1895, but got no satisfactory results and does not expect to make further attempts in this line. A rival company was recently organized to supply artesian water, but aside from sinking a test well Mr. Longstreet thought it had done nothing.

The filtered water is pumped through the mains and the surplus goes to the reservoir. The reservoir is cleaned yearly, but there has been less matter to remove since the filters were put in. Filtration is not suspended in case of fire.

The first shells for the tanks have been replaced. They are guaranteed to withstand a pressure of 200 pounds. One of them cracked, but the cause could not be given.

Returning now to the information given by Mr. J. B. Woodward, secretary of the water company, on one of the blank forms used by the writer in collecting information on mechanical filtration for use in "Engineering News," it may first be stated that sand, about six feet in depth, is used as a filtering material. This has been partially renewed once since first put in service, but in November, 1895, coke was being got ready to take the place of a portion of the sand.

Both unfiltered and filtered water is used in washing, but the relative amounts of each and the percentage of wash-water to all water pumped is not given. It is said that the filters are washed from one to three times a day.

Alum is used when a coagulant is employed. It is bought from the Kalbfleisch Chemical Company, of New York, at two cents per pound, f. o. b. in Bordentown. No other chemical has been employed. The total cost of alum for the fiscal year prior to the report was \$205.45. It is stated that for the past five years the total yearly cost of alum has not exceeded \$150. The amount used per gallon is not given by Mr. Woodward, but he gives the water consumption at from 250,000 to 500,000 a day.

Mr. Vermeule, in his report on the water-supply of New Jersey, so many times mentioned, estimates the water consumption as 250,000 gallons a day. At 350,000 gallons a day the yearly amount would be 127,750,000 gallons. If this and the figures for total alum consumption are right then the average use of alum would be less than 0.6 grains per gallon, including all water pumped when no alum is employed. For alum alone, on the above basis, the cost would be 6.26 cents per capita per year where the average use and waste of water was 100 gallons per capita.

The cost of the filtering plant, including building, which forms a part of the pumping station, was \$7,000. No complaints against the use of alum have been received.

Analyses of the water before and after filtration are quoted from the above-mentioned catalogue, as follows:

PARTS PER 100,000.		
	<i>Before Filtration.</i>	<i>After Filtration.</i>
Color.....	Yellow, turbid	None
Taste.....	Flat, muddy	None
Smell.....	Flat, muddy	None
Free ammonia.....	0.005	0.0015
Albuminoid ammonia.....	0.021	0.005
Oxygen required to oxidize organic matter.....	0.114	0.045
Nitrites.....	—	—
Nitrates.....	—	—
Chlorine.....	1.125	1.075
Temporary hardness.....	1.500	1.500
Total solids.....	15.400	13.600
Mineral matter.....	12.600	11.400
Organic and volatile matter.....	2.800	1.600

This was Delaware river water, collected on November 6th, 1891. Color, taste and odor are reported as all removed; albuminoid ammonia as reduced about 75, and total solids, 12 per cent.

THE CONTINENTAL MECHANICAL FILTERS AT ATLANTIC HIGHLANDS.

The three remaining towns where mechanical filters are in use adopted filtration to remove iron compounds from artesian-well water. Two of these places, Atlantic Highlands and Asbury Park, have filters made by the Continental Filter Company, of 44 Wall street, New York city. The following general description of the Continental filter has been written from notes taken

at the office of the company from its president, Mr. Charles H. Ludington, Jr., and engineer, Mr. David Williamson:

Double filtration is employed, water passing through two filter tanks in succession. The first tank contains a bed of fairly coarse, sharp sand, and the second a bed of specially prepared fine material, each bed being about three and one-half feet thick. Downward filtration is employed. The company recommends pressure filters, but is willing to erect gravity plants. Those at Asbury Park and Atlantic Highlands, the only municipal plants yet built, are pressure filters. No chemicals are employed at either of the two plants under consideration. The company claims that it can handle most water without a coagulant. Washing is effected by reversing the current, compressed air also being admitted to the filter at the same time. A 10,000,000-gallon plant, Mr. Williamson stated, would not require more than 150 cubic feet of air per minute. About thirty minutes are required for washing two tanks with a capacity of 1,000,000 gallons a day. The loss of pressure caused by the passage of water through the filters is given as from a slight amount when the beds are clean to not over five pounds after becoming clogged, providing the filters are properly operated.

The largest of the two Continental filter plants is at Asbury Park, but the first to be put in operation was at Atlantic Highlands.

Atlantic Highlands is a coast town near Asbury Park and Long Branch, which had a population of 945 in 1890. The town built water-works in 1883, pumping a supply from artesian wells direct to the consumers, the surplus going to a covered stand-pipe with a small elevated tank on top of it, for high service. The stand-pipe has a capacity of about 178,000 gallons and the tank of about 20,000 gallons.*

The following information regarding the water-works system and the filters was obtained by the writer from Mr. W. W. Roberts, engineer of the pumping-station, during a visit to the works December 4th, 1895:

Eight wells are now in use, four having been added since the plant was started. The first well sunk was 460 feet in depth, but the others range from 108 to 112 feet deep. All the wells

* An illustrated description of these tanks was given in "Engineering News" for September 7th, 1890.

were four and one-half inches in diameter, cased down to strainers each three and one-half inches in diameter and forty feet long. The original wells are connected with a ten-inch siphon collecting-pipe, emptying into a receiving well. The later wells are connected with an eight-inch pipe, which joins the siphon near the receiving well. The siphon leg is six inches in diameter and twenty feet long. The receiving well is twenty feet in diameter and twenty-two feet deep, and has in its bottom a small well or sump eight feet in diameter and four feet deep, into which the siphon-leg extends. The big well is lined with a brick wall in cement and covered with iron or steel beams and brick arches. The bottom of the well is in its natural condition, as excavated, and being in sand a considerable amount of water comes into it. During construction a pulsometer pump was used to keep the excavation dry, the estimated pumpage at times being 350 gallons per minute. In the summer the infiltration is less than during the remainder of the year, falling off with the lowering of the ground-water level. The available storage capacity of the well is given as 32,000 gallons.

The filter plant was put in operation in October, 1893. It has a daily capacity of 500,000 gallons, and is located in a one-story extension to the pumping station. The filters generally work under a pressure of 122 lbs., with a loss of head of 8 lbs. With full tanks the working head is 131 lbs. Each filter is six feet in diameter and eleven feet long. The filtering material in the first tank is crushed quartz, and in the second is animal charcoal. About eight bags of sand and five of charcoal have been used to replace material lost by washing. The filters are washed once in twenty-four hours when worked to their full capacity. At the time of my visit the pumps were being run only about four hours a day, and each tank was washed every other day, equivalent to washing once in forty-eight hours. In washing both filters nine valves and two levers must be manipulated, but this permits the washing of each filter in halves if desired. Unfiltered water is used in washing, and about one hour is required for the process. Some care is necessary to prevent the wasting of the animal charcoal in the wash-water, but it appears that this is not a matter of much difficulty.

Mr. Roberts thinks the use of air in washing is advantageous. He states that the filters were used about a month without the air, and that on resuming its use the wash-water had a very bad odor. The compressor has a 12x12-inch air and 8x12-inch steam end, a large volume under a low pressure being required.

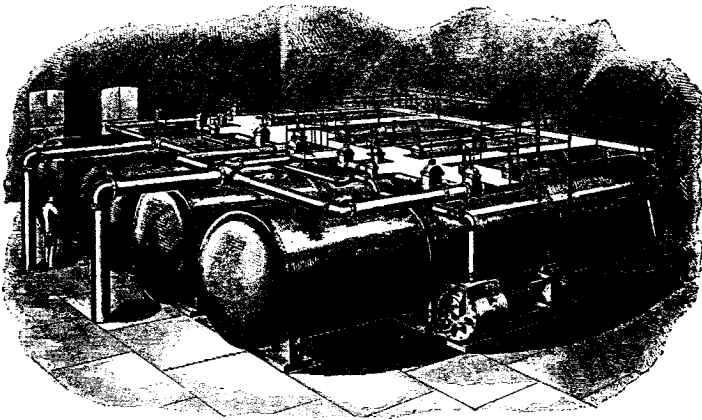
No chemicals are used, no extra labor is employed to operate the filters, and there was no expense for repairs last year. The cost of the filter plant and foundations was \$4,850, of which \$400 was for the air compressor.

It seems probable that the artesian well-water is much diluted by the infiltration of the receiving-well through a considerable part of the year, thus rendering less difficult the task of filtration. In summer, when the ground-water level is low, and thus the infiltration less, it is harder to remove the iron from the water than at other times. I have not yet learned the character of the iron compound at Atlantic Highlands, but am told that it exists in a different form than at Asbury Park or Keyport.

THE CONTINENTAL MECHANICAL FILTERS AT ASBURY PARK.

The second Continental filter was put in operation at Asbury Park on January 11th, 1895. It has a capacity of 2,000,000 gallons, and is of great interest, owing to the careful studies of its operations which have been made, and the fact that the use of Pohle air lift-pumps to increase the flow from the artesian wells thoroughly aerates the water before filtration and greatly aids in removing the iron, although I do not understand that this was taken into account when filtration was adopted.

Asbury Park is a well-known sea-side resort not far from New York. Its population is not separately given by the United States census, but it was estimated as 3,500 in 1890. The summer population is, of course, larger. The water-works were built by the borough, and were put in operation in June, 1886. The supply has always been from artesian wells, but a number of different wells and combinations of wells have been tried to secure the necessary quantity desired and quality of water. The first five or six wells were 425 feet deep, and now yield so little water that they are not drawn upon. Next, seven wells were sunk to a depth of 600 feet, these having a 4½-inch casing. Later, two much deeper wells were put down, one 1,021 feet deep, with a



VIEW OF FILTER PLANT AT ASBURY PARK, N. J.

casing six inches in internal diameter, and the other 1,132 feet deep, with a ten-inch casing. These wells are known, respectively, as the 1,000 and 1,100-foot wells.

The 400-foot wells flowed slightly at the surface, but so many were put down that they interfered with each other. Some of the 600-foot wells gave a fair flow, and others did but poorly. The 1,100-foot well gave a flow of about 175, and the 1,000-foot of about 125 gallons per minute at the surface, or a total of 430,000 gallons a day. These wells discharge a less amount at the level of the receiving tanks.

The 400 and 600-foot wells yield water containing some iron, and the deeper ones are so impregnated with it as to render their use impracticable without removing the iron. The 1,000-foot well was sunk in 1893, and the 1,100-foot in 1894. An attempt was made to use the water from the deep wells, notwithstanding the iron, and then to use these and 600-foot wells together, but so much trouble arose that finally the deep wells were drawn upon only when the 600-foot wells were insufficient. Iron was deposited in the mains, and when these deposits were stirred up by fluctuations in the current the concentrated iron solution drawn from house faucets seemed to the consumers unbearable. It was thought that vigorous flushings of the mains would prevent, or at least alleviate, the trouble, and at periods the water-works force actually worked night and day in response to the complaints that came from every mouth.

Investigations for a new supply from some other source were instituted, having in mind not only better but more water. Men with mechanical filters to sell declared that the iron could be removed by their methods. Dr. Thomas M. Drown, now president of Lehigh University, was called upon by a joint committee of Asbury Park and Ocean Grove to give an opinion on the matter. He stated in a most interesting report* his belief that aeration followed by filtration would effect the desired result. Mr. Parker N. Black studied the possible sources of supply—surface and artesian. He found no available surface-supply, and suggested sinking still deeper wells. One was extended to 1,300 feet, but an accident prevented conclusive results. Finally, Mr. Black recommended trying the air lift-pump, and this gave so good re-

sults that it was adopted for use on the seven 600-foot and the two deep wells. Bids for mechanical filters were invited, and a contract finally awarded to the Continental Filter Company.

The air lift-pump has been applied to all the 600-foot and to the deep wells, three-quarter inch air-pipe being used in the 600-foot, and one inch in the deep wells, the pipe extending down 200 feet in each well. The yield from the two deep wells, with the use of air, is said to be 1,000,000 gallons, or about two and one-half times as great as the natural flow. In December, 1895, it was said that the 600-foot wells are not used except for washing the filters, the water not containing so much iron as to prevent such a use.

The 1,100-foot well discharges into a wooden tank through a wooden trough perhaps fifty feet in length, and the 1,000-foot well directly through an iron pipe, but also at the top of the tank. From this tank the water passes through a short flume to a tank at a lower level, thus receiving further exposure to the air. These tanks are each about sixteen feet in diameter and six feet deep. These tanks were put in as temporary affairs, pending the construction of a receiving reservoir. A tank of similar size receives the yield of the 600-foot wells. The water from the deep wells is said to contain sulphuretted hydrogen gas, so that aeration is desirable to remove this.

The compressor for the air lift-pumps is duplex, 16 x 22 inches. It is run at 100 pounds when starting the well, and at a minimum pressure of 87 pounds thereafter. Steam for the compressor is furnished by a 100 H. P. boiler, made by the Abendroth & Root Manufacturing Company, New York city.

As the water discharges from the deep wells, it looks clear, but in the first tank it was brownish, and in the second had taken on a reddish brown color, while on the flume between the two tanks there was a deposit resembling mineral paint.

The air is kept on the wells until 11 P. M., from which time until morning all pumping ceases, except that the main pumps are started up a few times to prevent the overflow of the tanks from the natural flow of the well.

Direct pumping is employed, the surplus above consumption going to a 12x125 feet stand-pipe, not roofed over, giving a capacity of about 106,000 gallons. The stand-pipe is generally

* See "Engineering News," Jan. 10th, 1895.

kept full, it being the aim to do so continually. There are two 750,000-gallon Gaskell pumps.

The filters are located in a temporary wooden addition to the pumping-station, and are arranged as shown in the accompanying view. The average working head of the filters is $54\frac{1}{2}$ lbs., and their resistance is given as from 3 to 5 lbs. The filtering material in the first of each pair of filters is quartz or sand, and in the second it is animal charcoal. From January to December, 1895, it had not been necessary to renew any of the filtering material. The depth of material is about 4 feet. Each tank is 6 feet in diameter and 23 feet long, made from $\frac{3}{4}$ -inch steel plates, double riveted.

Regarding frequency of washing, it was stated at the pumping-station that this was being done once in twenty-four hours in December, but in the summer once in twelve hours had been the rule. Air is used with the reverse current in washing, the attendant stating that, so far as he had observed, the only advantage of the air is to lessen the time of washing. The air compressor is 18x24 inches, low pressure. Water from the 600-foot well is used for washing. This is employed in its unfiltered state for the first tank, but this tank, being cleaned, filtered water from it, after wasting for a while, is employed for washing the animal charcoal in the second tank.

The writer visited the filter plant on December 5th, 1895, and saw it in full operation. On inquiring how much water was required for washing, he was informed that the amount was 30,000 gallons an hour; but further inquiry showed this to be the estimate of the makers. The writer was also told that three hours was taken to wash both sets of filters, one and a half hours for each, when done in the daytime, and four at night, owing to the greater leisure.

My observations during washing showed that a total of about one and a quarter hours was consumed in washing one set of filters, but the pumpage at that time was said to be as low as 250,000 to 275,000 gallons a day. About forty-five minutes were taken in washing the first filter of the set. At first the wash-water was highly colored with iron, and after that it graded down until it finally ran pretty clear. When this result was reached the current was turned back to the normal, and the filtrate was

first wasted a few minutes, then turned into the second filter. The wash-water from this tank was first cloudy, with scarcely any reddish, but perhaps a light amber or straw-colored tinge. The quantity of water actually used in washing, according to the pump register, was 17,368 gallons for the sand and 11,176 for the charcoal filter, making a total of 28,544 gallons. This would indicate about ten per cent. of the total pumpage used for washing, but doubtless with higher rates of consumption the percentages would not increase proportionately. As the water was pumped from the 600-foot well and wasted, the stand-pipe pressure being off the filters, the lift is very small, probably seldom more than 10 feet.

The pumpage from March to October, 1895, both the total and average daily for each month, and the level at which water was maintained in the stand-pipe (full height, 125 feet), was as follows:

	Pumpage in Gallons—		Ht. Water in Stand-pipe, ft.
	Total.	Av. Daily.	
March.....	12,589,000	406,000	90
April.....	12,337,000	408,000	87½
May.....	10,081,000	306,000	87½
June.....	19,367,000*	616,000	105
July.....	21,332,000	688,000	95
August.....	29,529,000	953,000	92½
September.....	17,164,000	572,000	92½
October.....	12,273,000	396,000	87½

The consumption indicated above includes the water pumped from the 600-foot wells for washing the filters.

The cost of the filters and foundations was \$20,000. This does not include the temporary wooden building, which is to be replaced by a one-story brick structure, about 45 feet square, at an estimated cost of \$1,500.

The writer is indebted to Mr. George H. Coffin, superintendent of the water-works, for courtesies shown him while at Asbury Park, and to Mr. E. H. Howland, engineer of the pumping-station, for information there obtained.

Just what the Asbury Park plant is capable of doing, the relative value of the sand and animal charcoal filters, and the part played by the air in removing the iron, is set forth in the following report by Dr. T. M. Drown, president of Lehigh University,

*Including amounts used in experiments.

who made an exhaustive series of experiments to determine these points in 1895:

To the Water Commissioners of Asbury Park, N. J.:

GENTLEMEN—In accordance with your request I have made a thorough investigation of the character of all the wells which furnish your water supply at Asbury Park, in order to determine the best method of securing from them a water practically free from iron, and satisfactory for all domestic uses.

In my report of November 23d, 1893, to the joint commission on water-supply of Asbury Park and Ocean Grove, I expressed the opinion that the water of the deep wells, which you had not been able to use on account of the large amount of iron they contained, could be treated by aeration and filtration, and perfectly satisfactory water-supply obtained from them.

My recent investigation confirms this opinion, the water now being supplied to consumers from deep wells containing, on an average, less than 0.0200 parts of iron per 100,000.

For three weeks, from May 17th to June 7th, my assistant, Mr. Robert Spurr Weston, has made, under my direction, at the pumping-station in Asbury Park, a very large number of examinations of the waters of all the wells, and of the water after it has passed the filters. These examinations were made under all possible conditions, and at all hours of the day and night to determine definitely a mode of procedure which would ensure uniformly good water at all times.

In the water, as it comes from the wells, the iron is mainly in the form of sulphate of the protoxide. The water has also a somewhat disagreeable odor from gaseous carburetted hydrogens dissolved in it. On exposure to the air this gas escapes in a comparatively short time and the iron becomes oxidized, forming first a scum on the surface which resembles oil in appearance and finally settles out as a rusty precipitate of hydrated sesquioxide of iron. Under ordinary conditions of exposure to the air the complete conversion of the iron to the insoluble form of sesquioxide may require several days, but when the water, fully charged with air, as is the case when it is raised from the well by the Poble air lift-pump, is forced through a bed of sand, the friction of the water hastens the oxidation, and the greater part of the iron remains behind in the sand as solid hydrated sesquioxide.

Unless, however, the water contains sufficient air in solution before it enters the filter to oxidize the iron completely, some of the iron will pass through unchanged. The filter itself has no power to remove iron until it has separated out in the solid form as sesquioxide.

The present practice at Asbury Park is entirely satisfactory; namely, raising the water from the two wells—1,040 and 1,100 feet deep—by the air-lift, allowing the water to run into a large tank, with overflow into a second tank, from which it is forced into the filters at the rate of about a million gallons daily. The filters are cleaned by reversed current with water from the 600-foot wells every twelve hours (this was in the summer when pumpage was high—Ed.), and the red hydrated sesquioxide of iron washed out. A simple calculation from the amounts of iron in the well-water and in the filtered water shows that about 117 pounds of metallic iron are removed daily from 1,000,000 gallons of water.

In the Continental filter, at use in your works, there are two cylinders; the first contains sand, the second bone charcoal, and the water is forced through both cylinders before it passes to the mains. A long series of experiments show that nearly all the iron is removed in the first or sand filter, and that very little remains to be done by the second or bone charcoal filter. In some experiments it was found that iron was actually added to the water by the bone charcoal filter. This was, however, due to the fact that the filter had not been thoroughly cleaned. In actual working, at present, the bone charcoal filter removes only an insignificant amount of iron, since the first, or sand filter, removes 98 per cent. of all the iron in the water.

I give below some of the results of the analyses made of the original well-waters and filtered water during the period—May 17th to June 7th—by Mr. Weston at the pumping station at Asbury Park:

TABLE I.—Determination of Metallic Iron in Artesian Wells at Asbury Park, May 18th to 21st, 1895:

	PARTS PER 100,000.					
	No. 1.	No. 2.	No. 3.	Depth of wells in feet.		Auxiliary.
	1,040	1,100	1,000	Nos. 1 & 2.	No. A. P.	
May 18,	2.300	2.600	2.600	600	400	600
	2.125	3.300	3.400	0.157		
	1.600	3.200				
	1.330	1.310	1.520	0.137		
	1.500	1.900				
May 20,	1.260	1.950	1.550	0.175	0.009	0.157
	1.130	1.800	1.272	0.180		
	1.400	1.820	1.570	0.180		
	1.400	1.900				
	1.400	1.540				
	1.440	1.900				
May 21,	1.130	1.400		0.155		
	1.190	1.360		0.165		
	1.230	1.320		0.240		
	1.070	1.320		0.205		
	1.110	1.340		0.227		
	1.170	1.460		0.125		
	1.130	1.370		0.150		
	1.000	1.460				
	1.070	1.350				

From the foregoing table it will be noticed that the amount in wells Nos. 1 and 2 decreased on continuous use until the third day, when it became reasonably constant. The average of nine determinations on May 21st, is, for well No. 1, 1.125, and for well No. 2, 1.1378 parts per 100,000, equivalent to 0.66 and 0.80 grains per gallon, respectively. Well No. 2, which is not in use at present, would probably contain, on continuous pumping, about the same amount of iron as well No. 1.

The 600-foot wells contain very much less iron in solution, the average of the above thirteen determinations being 0.1791 parts per 100,000. This amount,

however, unfits water for general domestic use. Although this water does not taste of iron, as is the case with the water of the deep wells, yet the iron separates out in the course of time, forming a reddish coating on the vessels containing it. Its use is not to be recommended unless it is previously aerated and passed through the filter.

The 400-foot wells are entirely satisfactory, but unfortunately the amount of water obtainable at this level is insufficient for the supply of the borough.

Following, I give a summary of some of the determinations of iron in the filtered water during the period from May 18th to June 7th.

TABLE II.—Determinations of Metallic Iron in original and filtered water when using the 600-foot wells exclusively, from May 21st to May 28th, 1895.
Rate about 150 gallons a minute.

Date.	PARTS PER 100,000.		
	Iron in well water.	Iron after passing Sand Filter.	Iron after passing Both Filters.
May 21st.....	.155	.016	.045
	.165	.011	.038
	.240	.045	.072
	.205	.019	.052
	.227	.012	.041
	.125	.022	.067
May 22d.....	.190	.009	.033
		.017	
		.012	
		.019	
		.026	
		.020	
		.025	
May 23d.....		.025	
		.023	
		.026	
		.023	
		.037	
		.034	
May 24th.....		.023	
		.015	
		.022	
		.023	
May 28th.....		.025	
		.020	

It is not to be inferred from this table of results, that the increase of iron on passing the bone charcoal is a necessary condition of operation of the filter. The bone charcoal in this case had probably become charged some weeks previously with iron from the water of the deep wells, which had not been properly aerated, and gave up this iron to the purer water subsequently passing through it.

The fact is an interesting one, and serves to emphasize the necessity of thorough aeration of the water before it is allowed to enter the filters.

An average of the results in the preceding table, shows that the 87.9 per cent. of the iron was removed by the sand filter. In this series of experiments, the water was pumped directly from the wells. In a subsequent series of experiments with the 600-foot wells, the water was aerated by the air-lift, and the percentage of removal of iron by the sand alone was 92.7 per cent., and by both filters, 95 per cent.

Table 3, following, gives the results of treating wells No. 1 and 2 by the sand filter only. The water had stood in tanks for some time, and some of the iron had already settled out.

TABLE III.—Determinations of Metallic Iron in water of deep wells, filtered through sand only. Rate about two hundred gallons per minute.

Date.	PARTS PER 100,000.	
	Iron in deep wells.	Iron after passing Sand Filter.
May 28th, 9 A. M. to 11 P. M.	1.095	.025
		.027
		.023
		.027
		.029
		.041
		.045
		.043
		.042
		.040
		.039
		.042
		.038
	1.000	.025
		.024
		.024
		.027
		.029
		.030
		.031
		.033
		.034

The average amount of iron removed in this case was 96.9 per cent. In the next table, the result of treating the water of both deep wells by both filters is given.

TABLE IV.—Determinations of Metallic Iron on filtering water of both deep wells through both filters. Rate, 200 gallons a minute.

Date.	Iron in well waters.	PARTS PER 100,000.	
		—Iron after passing—	
		Sand Filter.	Both Filters.
May 29th, 4 to 9 P. M.....	0.945	.075	.011
		.057	.009
		.053	Trace.
		.042	.019
		.042	.021
		.042	.019
		.062	.019
		.036	.039
		.033	.030
		.034	.027
		.015	.000
		.018	.016
May 30th, 4 to 10 P. M.....	0.810	.023	.018
		.035	.022
		.033	.026
		.037	.032
		.032	.024
		.036	.024

In the interval between 9.30 P. M., May 29th, and 1 P. M., May 30th, the filters were thoroughly washed with water from the 600-foot wells and the filtering of the deep well-water resumed at 4 P. M., May 30th.

The amount of iron in the water treated is seen to be much less than in the original well-water; this is owing to the settling out of some of the iron on oxidation in the collecting tanks.

Averaging all the results in Table IV. we find the removal of iron by the sand filter to be 95.54 per cent., and by both filters 98 per cent.

In the series on the deep wells, the results of which are given in Tables III. and IV., the water was taken from the open collecting tanks supplied by the natural flow of these wells. It had stood sufficiently long in the tanks to become thoroughly saturated with air before it was pumped into the filter. In the experiments which follow, the water was raised from the wells by the air-lift and was thoroughly aerated when it flowed into the tanks. This quick aeration is necessary when the pumps are working at full speed, owing to the small size of the aerating tanks.

The following table gives the results of experiments on the deep wells, when the water was raised by the air-lift and filtered at different rates:

TABLE V.—Determinations of Metallic Iron in filtered waters of deep wells through both filters at different rates.

Date.	Rate Per Minute. Gallons.	PARTS PER 100,000.	
		—Iron Remaining After Passing—	Both Filters.
		Sand Filter.	Both Filters.
May 30, 9 to 11 A.M.....	200	.038	.034
		.035	.024
		.039	.033
		.021	.018
		.017	.015
		.024	.006
		.033	.008
		.038	.022
		.038	.017
		.032	.024
		.033	.015
		.027	.010
June 1, 9 A.M. to 9:30 P.M.....	415	.031	.019
		.025	.028
		.023	.011
		.031	.019
		.030	.015
		.022	.011
		.026	.010
		.024	.033
		.029	.023
		.018	.015
		.013	.020
		.018	.070
June 3, 12:15 P.M. to 9 P.M.....	700	.016	.020
		.017	.013
		.018	.013
June 4, 11:00 to 12:20 A.M.....	—	.018	.018
		.023	.014
		.020	.026

During this time, May 30th to June 4th, the filters were run night and day, with an intermission of about an hour or an hour and a half every twelve hours, for washing out the iron oxide which had collected in the filters in this time.

The average removal of iron for the six days, assuming that the water from wells Nos. 1 and 2 was used in equal proportions, and that its average contents of iron, as it flowed into the tanks, was 1.1319 parts per 100,000, was for the sand filter 97.70 per cent., and for both filters 98.23 per cent., or only 0.53 per cent. additional removal by the charcoal filter. If we take the last two days only, when the pumps were working at their maximum rate, the removal of iron by the sand filter was 98.30 per cent., and by both filters, 98.51 per cent., or only 0.21 per cent. additional removed by the charcoal filter.

The quality of the water now supplied to consumers in Asbury Park is in every respect satisfactory for drinking and general domestic use, and the continued favorable action of the filter in removing the iron from the aerated water is confidently to be expected.

(Signed) THOMAS M. DROWN.

THE WARREN MECHANICAL FILTERS AT KEYPORT.

The problem of removing iron from artesian water has been approached at Keyport in a different manner than at Asbury Park and Atlantic Highlands, although mechanical filtration is common to all three plants. At Atlantic Highlands we have seen that reliance is placed wholly upon filtration, while at Asbury Park the water is aerated, though I do not understand that the builders of the filters deem this necessary. No chemicals are used either at Asbury Park or Atlantic Highlands. At Keyport filtration is preceded by a combined chemical treatment and aeration, effected in a settling tank, lime being the chemical employed. Before describing the process employed it will be well to give some information regarding the locality and the source of water-supply.

Keyport is a town on Raritan bay, which in 1890 had a population of 3,411. Water-works were put in operation by the town in August, 1893. The supply is drawn from six artesian wells, located on the shore of the bay, at about high-water mark and 150 feet apart. The wells are from 235 to 240 feet deep, with casings $4\frac{1}{2}$ inches inside diameter. The original combined capacity of the wells is stated as about sixty gallons per minute.

Each well is connected by a $4\frac{1}{2}$ -inch pipe, with an 8-inch suction main. A 700,000-gallon Worthington pump forces water through a 12-inch main about one mile long to a 20 x 125 feet stand-pipe, having an open top and a capacity of about 300,000 gallons. The consumption is small. In December, 1895, when I visited the plant, the pumps were being run only a few hours every other day.

The purification plant was not put in until 1895, having been started in September of that year. Previous to its introduction much trouble was caused by iron in the water. This would settle in the mains and at times would be very pronounced in the water drawn from certain taps, while others in near-by houses would be free from it. The iron is in the form of bicarbonate. As the water comes from the wells it is said to be perfectly clear, with a slight taste of iron.

The filters are of the Warren type, made by the Cumberland Manufacturing Company, of Boston. They have a guaranteed

capacity of 500,000 gallons a day and operate by gravity. There are two open, wooden tanks, each $10\frac{1}{2}$ feet in diameter and eight feet deep, having twenty-six inches of filtering material consisting of coarse sand and fine gravel. The filters are washed twice a day, when in use. This is effected by reversing the current and by using the revolving arms with their rake-like teeth, shown by the accompanying illustration. These arms are rotated by power and gradually sink into the sand as they revolve. They are designed to loosen the sand and gravel, which becomes packed, and thus to lessen the work of the wash-water and the quantity required. Filtered water is used in washing.

Lime and aeration is employed in connection with a settling tank, the details of this part of the plant and process being described below. About four pounds of lime are used to each 12,000 gallons of water filtered, or 330 lbs. per 1,000,000 gallons. The lime is bought from Tomkins Bros., 74 Passaic street, Newark, for about \$1.00 per bbl., f. o. b. at Newark. Freight is about ten cents per barrel, and haulage is very light, as the haul is short.

The cost of the filters, settling basin, extra pump and air compressor was \$3,700; of the 22x25-foot brick addition to the pumping-station, \$771; and of extras, about \$330; making a total cost of about \$4,700.

Various analyses of the amount of iron in the water before filtration place it at from 0.5 to 3.2 parts per 100,000. Analyses of the water before and after filtration, made just after starting the plant, have been sent me by Mr. W. B. Nye, manager of the Cumberland Manufacturing Company, as follows:

	PARTS PER 100,000.	
	Before Filtration.	After Filtration.
Total solids.....	17.2800	9.7500
Organic and volatile.....	22.2500	2.5500
Chlorine.....	0.7080	0.708
Free ammonia.....	0.0052	0.0013
Albuminoid ammonia.....	0.0050	0.0027
Iron (Fe.).....	2.0400	0.0500
Sulphuric Acid.....	1.7000	0.8500

These figures show 97 $\frac{1}{2}$ per cent. of iron removed. The other ingredients are unimportant, unless it be the sulphuric acid, which was reduced 50 per cent. The total solids were reduced

about 43 per cent., and the "organic and volatile" matter 88 per cent.

Mr. Nye kindly sent me a detailed description of the accessories to the filter proper, which I cannot do better than to give in his own language, as follows :

The filters run but a few hours a day, owing to the small requirements of the town, and as the supply of water seems to be somewhat limited, we are on the point of making one or two slight alterations to facilitate washing, as there is hardly water enough for one filter to wash the other in the usual manner. By means of a by-pass, we tap the suction-pipe from the wells before reaching the pump, and with a 6x8½x8-inch Worthington tank-pump, pump the water, together with considerable air, to the settling basin, which forms a part of the filter plant. The end of the settling basin next the pump is partitioned off, and the water from the pump enters a portion of the settling basin 3 feet x 2 feet 10 inches, having a hopper-shaped bottom. From this it passes over a partition and down a passageway 2 feet 10 inches x 1 foot, and thence through a propeller into a third section of the tank 2 feet 7 inches x 2 feet 10 inches, from which it passes over a partition into the settling basin. Here it drifts along, passing down one side of a long centre partition, as shown on the drawing, and up the other side, where it enters a pipe leading to the filters. Above the settling basin is placed a cylindrical tank 3 feet in diameter and 4 feet deep, in which the solution of lime is prepared. In the cover of this tank is placed a hopper made from a galvanized iron pail, with holes punched in the bottom, and in this hopper is placed fresh lime, broken up into small fragments. The water-supply pipe is branched above the lime tank, and a portion of it is delivered over this hopper full of lime by means of finely perforated pipes, so that there is a constant spray of water upon the lime, which thereby insures a continuous slacking, the water and the lime passing down through the hopper and into the large tank, where it meets a further supply of water, and by the constant rotation of a paddle having wooden blades so arranged as to keep up a constant upward circulation, a milk of lime of the proper consistency is made, which passes off through an overflow pipe by which the milk of lime is delivered into the hopper through which the water enters the settling basin. By delivering the lime in this manner it is sure to meet every portion of the incoming water, and such lime as is not at once reacted upon by the water, remains in the hopper and is constantly agitated, so that all the lime is eventually brought into solution. The water and the lime then continues its course, as previously described, and on its entrance into the third section through the propeller, meets a supply of air furnished by a 7x7-inch Clayton low-duty air compressor.

It is evident that by the addition of the lime to the water, the iron which has existed in the shape of a bicarbonate is converted into a carbonate, which by the further aeration is converted into a sesquioxide, which combining with the water forms into a ferric hydrate, while any excess of lime that may exist is also oxidized, and thus prevented from separating out later, as it would on exposure to the carbonic acid in the air. The course of the oxidation can be plainly seen, as the water entering the basin is clear ; after receiving the lime

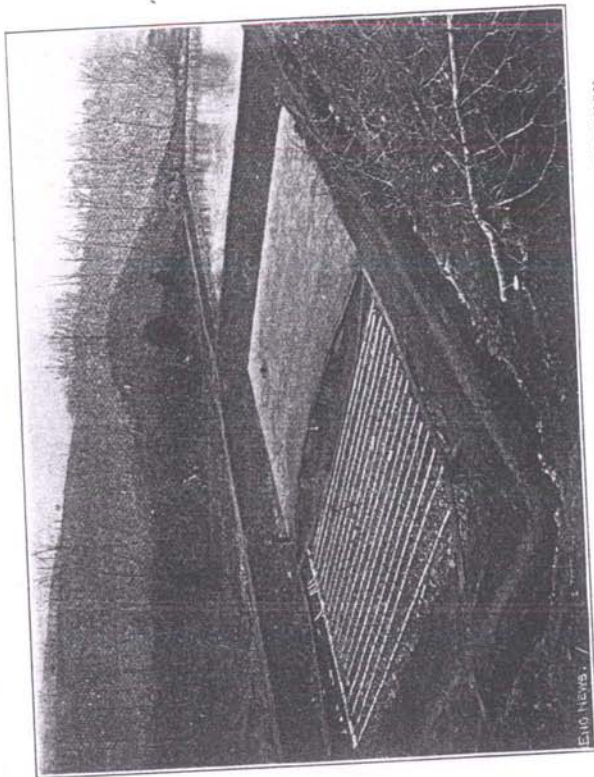
it turns green, and after aeration passes from green through yellow into red, due to the presence of hydrate in the water. Much of this hydrate and the lime settles to the bottom of the settling basin during the progress of the water from the point of delivery to the filters, and the minute portions of hydrated iron are caught in the filters, from which the water issues bright, clear, sparkling, free from iron and much softer than before treatment. I enclose copy of analysis of the water both before and after treatment, from which you can see the results obtained. When the plant was first placed in operation, the water for the lime apparatus was supplied by one of our well-known alum pumps, but we found the rate of pumping to be so uniform that a propeller was unnecessary, and the supply of water once regulated by the valves will take care of itself, and by placing from seven to eight pounds of lime in the hopper per hour, perfect results are obtained.

The power for cleaning the filters, operating the lime agitator and the air compressor, is furnished by an 8 H. P. vertical engine made by the Lawrence Machine Company of Lawrence, Mass., builders of the well-known centrifugal pump which bears their name.

The arrangement of the plant is not exactly as we would have it, as we originally constructed it with a centrifugal pump coupled direct to the engine; but this did not prove successful, owing to the amount of air in the suction pipe from the wells, and we accordingly removed it and substituted the Worthington tank-pump already named, placing an independent engine on the original foundation of the pump and engine.

SLOW SAND FILTRATION AT LAMBERTVILLE N. J.

The first and, as yet, the only water-works in New Jersey to adopt slow sand filtration, or the ordinary system of filtration through sand filter-beds, is Lambertville, N. J. In 1895, a report recommending this system of water purification was made to the Lambertville Water Company by Mr. Jos. B. Rider of South Norwalk, Conn. The report was accompanied by plans for the beds. This work was finally carried out, with Mr. Churchill Hungerford, New York city, as engineer. Mr. Hungerford made new plans for the work, differing from those submitted by Mr. Rider in a number of important details, but retaining some of the same features (for a description of the plant see another page). I cannot do better than to present Mr. Hungerford's description of this plant, condensed somewhat from the shape in which it appeared in "Engineering News" for July 2d, 1896. The accompanying illustration, as well as those relating to the Asbury Park and Keyport plants, was taken from "Engineering News." Mr. Hungerford describes the Lambertville filter-beds as follows:



THE FILTER BEDS AT LAMBERTVILLE, N. J., DURING CONSTRUCTION.

Eng'g News.

The water-supply of Lambertville is impounded in two reservoirs made by building dams across a small stream at points about 2,000 ft. apart. The reservoirs are very shallow. The bottom consists of a light, clayey soil, which makes the water very muddy when agitated by wind or currents. In addition to this, large numbers of carp, which infest the reservoir, probably increase the turbidity. The clay in suspension is so finely divided that a week's sedimentation has very little effect upon it. As there is very little inflow to the reservoirs during the months of July, August and September, the water becomes stagnant and highly charged with organic matter, giving rise to a very strong "fishy" taste and odor. It was with the intention of removing these objectionable features that the filter-beds were constructed.

The beds are situated on a small plateau immediately below the lower or distributing reservoir and occupy two rectangular basins, each of which is 130 ft. long, 92 ft. wide and 9 ft. deep.

A puddle trench, 4 ft. wide, excavated to the underlying rock, runs through the middle of all embankments. This varies in depth from 4 to 18 ft. A single row of 2-in. hemlock sheet-piling was set to prevent craw-fish from penetrating the banks. After the basins were finished, a layer of sand, 1 in. thick, was placed on the natural clay bottom. Paving with rough stone followed this, and sand was sifted into the interstices, thus insuring the filtered water against coming in contact with the clay. This pavement formed a foundation for the underdraining system which consists of:

(1) A 12-inch conduit, running the entire length of each basin, composed of vitrified pipe with a 4-inch tee every two feet. This conduit connects with a 12-inch cast-iron pipe leading to the receiving-chamber, where it terminates in a gate or valve. The 12-inch joints in the vitrified pipe are calked with jute.

(2) A series of lines of 4-inch vitrified pipe, run at right angles from the main conduit to the opposite side of the basin. These lines are 2 feet apart, plugged at the end and laid with open joints. They are not laid level, the ends opposite the conduit being slightly higher. The intervening space between the lines was filled with riprap to the top of the pipes. Gravel would have done equally as well, but as all sand and gravel had to be hauled three miles, besides paying thirty-two cents toll for each two-horse load, it was found more expedient to use random stone.

Two layers of gravel, the lower layer coarse and the upper fine, were placed over the pipe. They had the same rate of grade as the pipe; the gravel was washed before placing. The only sand that could be obtained contained a large amount of loam and had to be thoroughly washed before being used. Great care was exercised during this operation, as it was found that too much washing was worse than too little, on account of the finer particles being carried away with the loam, leaving the residue too coarse. Besides containing loam, the sand was not sharp, and about 20% of it consisted of rounded nodules of slate, which could not be removed by washing. The sand was found to contain 33% of voids.

The filter-beds proper, or sand-layers, average 2½ feet in thickness, being thickest at the corner nearest to the receiving-well, each bed measuring 60x100 feet on the surface. The sand was placed while wet, so that there would be less settlement when covered with water. To insure a perfect contact with the banks, sand was beaten into the slopes as high as the surface of the sand bed.

The slopes were ripped to within 1½ feet of the top of the embankment, to prevent the unfiltered water, which stands on the surface of the sand to a depth of 3 feet, from washing the slopes. The flow-line in the filter is 10 feet lower than that in the reservoir, but two butterfly valves, operated by floats, regulate the inflow. These floats are in the receiving-chamber, and are operated by the filtered water. As the sediment layer on the surface of the beds increases in thickness, the flow of water through them is retarded, and the level of the filtered water in the chamber is slightly lowered, thus opening the butterfly valves and causing the unfiltered water to rise until the head has increased sufficiently to close the valves. This process continues until the water over the sand is 4½ feet deep, when it passes out of the overflow. It then becomes necessary to clean the filters. A waste-pipe was provided for each basin, so that their contents could be drawn off at any time.

The filter was put in operation on May 4th, 1896, at which time the average daily consumption was only 225,000 gallons. Water was allowed to enter the basin at a slow rate until it was 1 foot deep over the sand, when it was turned on at full head.

The beds were cleaned on May 23th at a cost of \$6, or 50 cents per 1,000 square feet. At this rate the cost of filtration, not including interest on plant, is \$1 per 1,000,000 gallons.

An experiment was made to determine how nearly the friction in the underdrains had been compensated for by varying the thickness of the sand-layer. (As before stated, this layer was thickest at the corner nearest the receiving-chamber and thinnest at the corner diagonally opposite.) Water was let into the filter until it was even with the surface of the sand, and two holes, about 3 inches deep, were made at the points where the sand was thickest and thinnest, respectively. Water was then drawn from the filter at the rate of 3,000,000 gallon per diem per acre. As soon as it disappeared from the surface of the sand, the elevation of the water in the two holes was taken and found to be 0.11 foot lower at the point near the receiving-chamber. The difference in elevation is probably due to the fact that the friction of the water on entering the joints is greater than estimated, consequently, that portion of the bed nearest to the intake is performing higher duty than the more remote portions. While, in moderate-sized filters, this difference in the rate of filtration of the various parts of the bed is undoubtedly regulated by the sediment layer, it is extremely doubtful if the best results can be obtained from filters of considerable area, having pipe underdrains, without compensating in some manner for the friction in the underdrains.

The plant was constructed for the Lambertville Water Company from plans made by the writer, at a cost of \$5,200.

A STUDY FOR THE FILTRATION OF THE PASSAIC RIVER SUPPLY OF JERSEY CITY.

As an illustration of the possibility of rendering a badly polluted water-supply safe for drinking purposes, showing the means proposed to that end in an extreme case, brief reference may be made to a recent report on the filtration of the Passaic river

supply of Jersey City. This report was made in March, 1896, by Mr. Allen Hazen, of Boston, for the Jersey City Board of Trade and "Evening Journal." The report was an extended one,* but for present purposes it may be summarized in a few words. Mr. Hazen first showed the great necessity for purifying the water in question, if used at all, and then outlined a plan of double filtration. The first filtration would be at the comparatively low rate of 1,000,000 gallons an acre a day, on the intermittent plan. In other words, the water would be treated like weak sewage. After undergoing this process it would be passed through another set of filter-beds, at the rate of 3,125,000 gallons an acre, a rather high rate for ordinary practice when but one filtration is employed. These last beds would be covered, as a safeguard against a possible decreased efficiency through freezing in severe winter weather. Omitting some features designed as improvements to the old pumping works, and no part of a filter-plant, the estimated cost of such a double filtration plant, with a daily capacity of 25,000,000 gallons, was \$1,115,000, or \$44,600 per 1,000,000 gallons, and the cost of operation, \$5.75 per 1,000,000 gallons filtered, both figures of cost including the second pumping, necessitated, in this case, by filtration.

It may be added that the city is now enjoying a temporary supply of good water from the Pequannock drainage area, under contract with the East Jersey Water Company, and has under consideration bids for a permanent supply from pure, upland sources.

CONCLUSION.

In conclusion, it may be stated that while there is still much to be learned regarding water purification, as with all other branches of the arts and sciences, enough is now known to make it possible and practicable for any community to deliver itself from the danger and self-abasement of drinking impure water, especially water polluted by sewage. The first consideration, obviously, is to look for a naturally pure supply, but if this cannot be found, or would be too costly, some system of purification may always be found that will render the water both safe and pleasant.

DESCRIPTION OF THE LAMBERTVILLE FILTER-BEDS.

BY CHURCHILL HUNGERFORD, C. E.

The Lambertville filter-beds, which are two in number, are situated immediately below the reservoirs of the Lambertville Water Company. The water flows from these reservoirs to the filters as fast as used, and is maintained at a depth of from three to four and one-half feet by an automatic device. The beds are each sixty by one hundred feet, making a total filtering surface of twelve thousand square feet, and can be operated separately or in conjunction. They consist of sand, carefully washed and graded to a uniform degree of fineness, screened gravel and crushed stone. Collecting lines of four-inch vitrified pipe, running through the lower stratum of the bed, lead the filtered water to a conduit, through which it passes to a receiving-chamber, and from thence is delivered through the mains to the consumers. As the filtered water deteriorates rapidly when exposed to light and air, the water is filtered only as fast as used. The filters are large enough to meet the demand of any emergency that may arise.

In its operation the plant requires very little attention, neither are any chemicals used. When the beds are clean, the unfiltered water stands at a depth of three feet over the sand. The suspended impurities settle on the surface of the sand and partially impede the downward progress of the water. To correct this, an automatic device is arranged so that the water over the sand gradually becomes deeper as the layer of sediment becomes thicker and consequently more impervious to the water. This device is so delicately adjusted that the depth of water over the sand always bears an exact proportion to the permeability of the sediment layer, and a glance at the gauge shows the condition of the beds.

In time, the sediment layer becomes so thick that the water, even under the increased head, cannot pass through in sufficient quantity to meet the demand, and it then becomes necessary to

* For a full abstract, with accompanying editorial comments, see "Engineering News," April 3, 1896-

clean the beds by removing the sediment with hoes or shovels. This operation costs from fifty cents to one dollar per thousand square feet. The suspended matter lays entirely on the surface, leaving the sand bright and clean at all times. Like all properly constructed filter-beds, the longer the plant is operated the higher its efficiency.

The unfiltered water at Lambertville is turbid at all times, having from eight to twenty and even thirty grains of suspended matter per gallon. In addition to this, the water has a very offensive taste and odor during the summer and autumn, due to the decomposition of the organic matter in the stagnant water of the reservoir.

Since their installation, the filters have never failed to give a clear, bright and sparkling effluent, and, with the exception of a very short period, have removed all taste and odor. The exception referred to was during the latter part of August, when the effluent, though clear, had a very offensive odor. This was remedied by exposing the beds to the light and air for two days, and no further trouble has been experienced.

As the amount of suspended matter in the water varies, the length of time the filters will run between scrapings also varies from eighteen to fifty days. They require no other attention, and the total cost of filtering is about eight cents per hundred thousand gallons.

Not only is all the suspended matter removed, but also a large percentage of the dissolved organic matter.

On the whole, the performance of the plant is very satisfactory to all parties concerned.

At the German standard rate of filtration, the plant has a nominal capacity of seven hundred thousand gallons per day, but it has given good results when filtering twice that quantity.

The plant was constructed from plans drawn by myself at a cost of \$5,600.

An analysis was made some time ago by a local chemist. For some reason he allowed the unfiltered water to stand for six days, so that nearly all the suspended matter was precipitated. The resulting clear water was analyzed. In consequence, the apparent reduction in total solids was less than one grain per gallon.

At that time the filter was removing all of the suspended matter, which amounted to eight grains per gallon.

The analysis showed a reduction of 51 per cent. of the albumenoid ammonia, but as six days' sedimentation of a muddy water will carry down 90 per cent. of the suspended organic matter, even this is not reliable.

October 14th, 1896.

REPORT ON SEWAGE DISPOSAL.

BY NIART ROGERS, C. E.

To the Sewer Commission of Neptune Township, Asbury Park, Ocean Grove and Bradley Beach:

GENTLEMEN—In compliance with the instructions of your honorable body, the sewer commission, I have visited a number of the most prominent sewage disposal works in this country, and have also obtained a great deal of information relating to many others, both in this country and the old world.

METHODS OF DISPOSAL.

The principal methods of sewage disposal are as follows: Crude disposal, disposal by intermittent filtration, by broad irrigation and by chemical precipitation; the latter method being some times supplemented by filtration through land.

CRUDE DISPOSAL.

The sewer systems now in use at Asbury Park, Ocean Grove and all the other seaside resorts from Long Branch to Spring Lake are of this type, all of the several systems converging at one or more convenient points, and there discharging their contents, in its crude state, directly into the Atlantic ocean. When the currents are sufficiently strong and trending seaward, this method would be adequate, but when the currents are coastwise the sewage deposits along the shore soon cause a nuisance which is most offensive and detrimental to the bathing interests for which these resorts are famous.

INTERMITTENT FILTRATION.

This system of disposal consists of concentrating a large amount of sewage at short intervals on an area of suitably prepared soil thoroughly underdrained and sufficient in size to quickly absorb and cleanse it, cropping sometimes being resorted to as a matter of secondary importance.

In some places the solids, commonly called sludge, are intercepted in settling-tanks, and the effluent or clarified sewage only is permitted to cover the surface of the bed, and the sludge is taken away for use as fertilizer, or otherwise separately treated and disposed of.

The method of separating the solids is done in single tanks by sedimentation only, without the use of chemicals. The amount of land necessary to properly receive the sewage is variously estimated, according to the nature of the soil, at one acre for every 800 to 1,000 people.

BROAD IRRIGATION.

In this method the sewage is flowed upon the land for the combined purpose of irrigation for commercial profit, and also purification. The earth acts as a purifier of the foul liquid by intercepting the coarser particles on the surface, while the smaller particles penetrate the soil, allowing the water thus freed to be absorbed by the soil and oxidized by the air in the ground.

The land should be underdrained in such a manner that the purified water may be readily taken from the ground and conveyed to the nearest water-course.

All soils are not adapted to this method, owing to their different powers of purification, but the average area required is estimated at one acre for the disposal of the sewage of about 100 people.

CHEMICAL PRECIPITATION.

By this method certain chemicals are mixed with the sewage, which causes the suspended solids to precipitate.

The sewage, after mixing with the chemicals, is allowed to flow into tanks, where it comes to a comparative rest, sufficient to allow

the solid matters to settle to the bottom of the tanks, and there permitting the clarified effluent to flow into the nearest stream or body of moving water.

The precipitated matter is called sludge, and, after the effluent has been drawn off, the sludge, which is about 90 per cent. of the water, is drawn from the tanks and disposed of. The best method yet devised for the treatment of the sludge consists of filter-presses, operated by hydraulic power or compressed air, by which the amount of water is reduced to about 50 per cent. of the weight of the sludge.

This method renders the sludge nearly odorless, and in such a compact form that it can be easily handled.

The area required for this method is very much less than that of either of the other methods of treatment, and consists of mechanical arrangements for separating the larger particles from the sewage, and for dissolving the chemicals and mixing them with the sewage; tanks of the proper size and number for the process of sedimentation and purification; proper channels for the escape of the effluent, and pumping machinery for removing the sludge from the tanks and operating the filter-presses; conveniences for the removal of the pressed sludge, buildings for the machinery, etc.

A REVIEW OF THE VARIOUS METHODS.

Before drawing any conclusions as to the method best adapted to our especial needs, it will be necessary to consider some of the operations and results of the various processes employed by different towns and cities for the disposal of sewage.

CONEY ISLAND AND SHEEPSHEAD BAY.

These well-known seaside summer resorts are now a part of the city of Brooklyn and under its direct government. Some twelve years ago the sanitary condition of these places was deplorable. In 1884 the New York Legislature empowered the Board of Health of the town of Gravesend to construct sewage-disposal works in any portion of the town, upon the petition of a majority of the property-owners of the district affected. Since that time, the Board of Health has constructed plants for the

purification of sewage, both for the Coney Island and Sheepshead districts, after designs by J. J. Powers, C. E., of Brooklyn, who holds patents on certain features. The plans for the Coney Island plant were submitted in a competition, and were approved by Robert Van Buren, C. E.

The disposal plants at Coney Island, Round Lake, White Plains and Sheepshead Bay all employ the same general system of purification. The process as originally used consisted of the automatic addition of lime and perchloride of iron to the sewage as it flowed into the precipitating tanks, the disinfection and deodorization of sludge by chlorine and the removal of the clarified sewage from one tank to another by means of siphons.

The plant at Coney Island consists of two stations called Caissons No. 2 and No. 3. The main sewer at the works is a 30-inch pipe, and as it enters the building it branches off into two 24 inch outlets, each controlled by a gate.

The tanks are constructed in duplicate, and while one tank is in operation the other is being cleaned and prepared for use. Perchloride of iron was used as a precipitant until the fall of 1892, since which time lime has been used almost exclusively. The lime is slacked in a tank directly over the outlet of the sewer and allowed to flow into the sewage as it enters the building, and by the time it has reached the settling tank it has become thoroughly mixed, and sedimentation immediately takes place before the sewage enters the next tank.

The effluent is siphoned from the second tank to the pump-well, where it is lifted by two Davidson pumps, one 16''x 18''x 24'' of a capacity of 1,900,000 gallons each 24 hours, and one 24''x 24''x 24'', capacity of 3,000,000 gallons each 24 hours. The pumps are used intermittently to dispose of the effluent, discharging it into a creek of salt water near the works.

I will state that, during my visit to these different plants, the effluent was only partially clarified, the chief concern being the separation of the solids, as the effluent was emptied into a body of salt water.

At Caisson No. 3 the use of chlorine to disinfect the sludge has long since been abandoned, and instead two gallons of a 35 per cent. solution of phenol are used each week.

This plant treats about two-fifths part of the entire sewage of Coney Island, principally from the residence portion, and after the sewage flows through one tank during a period of two weeks, the other tank is opened and the first one cleaned out.

The method formerly used in treating the sludge was to mix into it ten to twenty barrels of charcoal dust and one to three barrels of plaster of paris, just enough to make the sludge stiff enough to shovel out; but this proved to be expensive and the charcoal dust difficult to obtain, so that the present method is to mix it with sawdust.

It is then shoveled into a bucket traveling on an overhead track, drawn to the end of the building, deposited in a small tram-car and dumped on the meadow. The amount of such mixtures aggregates twelve to fourteen tons every two weeks, of which at least 50 per cent. is water.

During my visit no odor of an offensive nature was observed either in the building or on the ground and the engineer with his family lives in one portion of the building the entire year. The cost of operating Caisson No. 3 is as follows:

Coal each 24 hours, 1,200 lbs. at \$3 per ton.....	\$1 80
Three men on 8-hour shifts, 2 laborers, 9 hours, chemicals, engineer and assistant.....	12 00
Total cost per 24 hours.....	\$13 80

At Caisson No. 2 the same tanks and appurtenances are used, except that the chlorine is used for the disinfection of the sludge. A very disagreeable odor may be observed at some little distance from the works, and is quite offensive within the tank-rooms. This, in my opinion, is due chiefly to the use of the chlorine, which is, in itself, a very dangerous gas to handle, and very offensive for inhalation.

Besides this they were engaged in removing the sludge, and evidences of carelessness in the use of chemicals and resultant solids were numerous. The greater part of the sewage entering these works is from the hotels and restaurants and it contains a large amount of fats and oily substances, but I have no doubt that some means could be found to purify the sewage to a greater degree than at present.

The summer population of Coney Island, visitors included, sometimes exceeds 100,000 during a few hours on some days. The resident population in June, 1890, was 3,313 in the village of Coney Island as then incorporated.

The works at Sheepshead Bay, although different in details of construction, use the same process as Caisson No. 2, the use of chlorine giving to its resultant that same peculiar odor, although the process of separation in the building showed signs of cleanliness, and was entirely free from any offensive smell. The effluent is only partially clarified, and is discharged into a large salt-water creek.

The pumps used at the Sheepshead plant are made by the Dean Steam Pump Company—one 16-inch by 22-inch by 24 inch, and one 12-inch by 16-inch by 18-inch. The amount of sewage per day is estimated at 2,000,000 gallons, a great deal of which is ground-water, owing to the flat bottom-lands through which the sewers are laid. The average cost of running expenses is \$17 per day.

PROVIDENCE, R. I.

The city of Providence has one of the finest and most extensive systems of sewerage in the United States on the combined plan. They have recently completed an elegant pumping station at a cost of \$205,000, including three massive triple expansion vertical pumps, made by the Holly Pump Works, each having a pumping capacity of 36,000,000 gallons per twenty-four hours, or a total capacity of 108,000,000 gallons, and the plant has been constructed to receive another pump of the same capacity, should necessity require it.

The present population of Providence is about 150,000, but their plans provide for a city population of about 300,000, besides outlying districts which would have to enter the sewers of the city. In 1884 the estimated dry-weather flow of sewage was about 3,000,000 gallons, besides about 4,800,000 gallons of filthy wastes and liquids from manufactories. The works are designed to carry a dry-weather flow of sewage of 24,000,000 gallons daily—this, of course, not including storm-water.

The present disposal is at Field's Point, at the head of Narragansett bay. Owing to the possibility, however, of being com-

pelled to clarify the sewage before discharging it into the bay, plans are already drawn and under consideration for a partial clarification of the sewage by the method of chemical precipitation and pressing the sludge, as at Canton and other works.

Mr. Samuel M. Gray, M. Am. Soc. C. E., who was city engineer at Providence in 1884, in accordance with instructions of the City Council, proceeded to Europe and inspected the sewerage systems and methods of disposal at the following places:

The Pail system at Birmingham and Manchester.

The Liernur pneumatic system at Amsterdam.

The Berlier system at Paris.

The Shone system at Wrexham.

The Combined system at London, Berlin, Paris and Frankfort-on-the-Main.

The separate system at Oxford, and also at Paris where it was in experimental operation to a limited extent.

Irrigation farms at Bedford, Berlin, Breslau, Croydon, Dantzic, Doncaster, Edinburgh, Leamington, Milan, Oxford, Paris, Warwick, Wimbledon and Wrexham. Precipitation works at Aylesbury, Birmingham, Bradford, Burnley, Coventry, Hertford, Leeds and Leyton.

Precipitation works in process of construction were also inspected at Frankfort-on-the-Main. As a result of these investigations Mr. Gray recommended:

(1) That a system of intercepting sewers be completed.

(2) That the system of intercepting sewers be so designed as to convey the sewage of the city to Field's Point.

(3) That the sewage be treated at Field's Point by chemicals in such a manner as to precipitate the matters in suspension and to clarify the sewage.

(4) That the clarified effluent be emptied into deep water at Field's Point.

In regard to precipitation, Mr. Gray says:

"My reason for recommending precipitation is that I am confident that the sewage can be so clarified that the effluent will be entirely harmless when emptied into the river at Field's Point, and the purification can be accomplished at less expense than by irrigation, although sewage is more fully purified by irrigation than by precipitation. I have felt justified in recommending its adoption, for, from careful and extended surveys, I am

convinced that the large amount of suitable land required for irrigation cannot be obtained at any reasonable cost within reasonable distance of the city."

In regard to the various suggestions for disposing of the sewage of Providence by irrigation and otherwise, Mr. Gray says:

"Experience indicates that the amount of land required for the disposal of sewage by irrigation is about one acre to 100 inhabitants. The population provided for in the proposed system of intercepting sewers is 300,000. The land necessary to properly dispose of the sewage of that population would be about 3,000 acres.

"By combining precipitation with irrigation a much smaller area of land is requisite, and should it hereafter be deemed advisable to adopt some system of irrigation, the proposed precipitation works will form a most useful auxiliary."

The final conclusions of the Sewer Commission were:

"That of the various schemes for final disposal of the sewage, the two which we consider best are those for intermittent filtration at Warwick Plains, and chemical precipitation at Field's Point. That either of these will dispose of the sewage in a satisfactory manner and in a way to free the city from nuisance.

"That in this respect the two plans are substantially equal. That of these two the precipitation scheme is, in first cost, the cheaper."

ESTIMATED COST.

FOR FILTRATION SCHEME.

Interest on \$4,820,000 at 3½ per cent.....	\$162,700 00
Operating expenses, including pumping and care of sludge.....	28,000 00
	<hr/>
	\$190,700 00

FOR PRECIPITATION SCHEME.

Interest on \$3,700,000 at 3½ per cent.....	\$129,500 00
Operating expenses, including pumping and cost of precipitation.....	65,000 00
	<hr/>
	\$194,500 00

"That in annual cost the balance will probably be in favor of filtration. That the organization needed for precipitation is simple, having in view but a single object—the purification of the sewage. That the organization at Warwick Plains will

have two objects—one, the purification of the sewage; the other the somewhat complicated business of conducting a large farm with a view to profit.

"In other words, it will be a business venture in which the city should not embark, unless there be no satisfactory alternative. For these reasons the scheme of chemical precipitation at Field's Point is, in our judgment, the one best worthy of adoption."

SOUTH FRAMINGHAM, MASS.

The town of Framingham, Mass., of which South Framingham is the principal village, is situated in the drainage area of Lake Cochituate, from which a portion of the water-supply of Boston is derived. Until recently the sewage of the town flowed into Beaver Dam Brook, a tributary of Lake Cochituate. In the latter part of 1889 sewerage and sewage disposal works were completed and put in operation.

In 1886 the selectmen of Framingham engaged S. C. Heald, M. Am. Soc. C. E., of Boston, to make the necessary surveys and plans of sewerage and sewage-disposal works for the town, and proceeded to obtain from the legislature an act authorizing the town to construct and maintain a system of disposal. Mr. Heald submitted his report to the sewerage commission in August, 1887, proposing a separate system of sewers, with disposal outside the town.

The sewage would flow by gravity to a point near the east line of the town of Framingham, where a receiving-tank and pumping-station would be located, from which the sewage was to be forced to a disposal area about one mile north. The population then to be provided for was about 5,000, and a volume of about 75 gallons per capita per day was considered a safe basis for estimate.

After describing the different methods of disposal, Mr. Heald gives accounts of different disposal works in Europe; mechanical filtration at Uxbridge, Canterbury and Buxton; chemical precipitation at Cowentry; irrigation at Banbury, Abingdon, Berlin and Danzig.

He says: "The method of mechanical filtration has not been successful, and has been abandoned and decided impracticable, except in a comparatively small scale and under favorable conditions."

Of chemical precipitation, he says: "There are numerous instances in England where this method has been successfully adopted. Sewage treated as in Coventry is a good illustration of this method.

"I shall not describe chemical treatment more fully, as I do not think it advisable for your village to adopt this method. The effluent, after treatment, would have to be pumped outside the drainage area of Lake Cochituate, or to nearly the same locality as it would be utilized upon the land, and even then would undoubtedly have to be further treated by filtering through the land before entering the brook."

Regarding irrigation, he writes: "Land is a natural filter, and when sewage is distributed over a large area of it, and the fertilizing ingredients of the sewage utilized so as to produce the greatest returns in marketable crops consistent with suitable purification of the sewage, the application is known as broad irrigation.

"When the sewage is applied intermittently in as great a volume as can be properly absorbed and purified by the land used, and while not necessarily excluding vegetation, yet making it a secondary consideration to purification of the sewage, the process is known as intermittent filtration. The area of land to successfully purify by broad irrigation a daily flow of 1,000,000 gallons of sewage should not be less than 200 acres of the most suitable soil."

Dr. Frankland, of London, estimates "that an acre of suitably constituted soil, well and deeply drained, with its surface level and divided into four square plots, each in succession receiving the sewage for six hours, would purify the sewage of 3,300 persons.

"It has been found by actual practice that it is advisable to allow one acre for each 1,000 persons."

J. Baily Denton says: "In every case the extent of surface must necessarily depend (1) on the capability of the upper soil to absorb, and of the sub-soil to infiltrate the liquid applied to the surface; and (2) on the depth to which the land may be thoroughly drained in order to provide the necessary bulk of filtering material."

In regard to the disposal area, Mr. Heald, in his report, concludes: "If we avoid the denser clays as altogether unsuitable

(unless they are so altered in their condition by mixing, burning, etc., as to lose their natural character), and regulate the application of the sewage within the limits of 1,000 persons to the acre of the land most suitably constituted, and 250 persons to the acre of the land least suitably constituted, all descriptions of cultivable land may be made capable of use for filtration. For the present wants of the town, I would advise taking about eighty-five acres of land on the northerly side of the Worcester turnpike and westerly of the road leading from said turnpike to Sax-onville. Should the town at any time desire to increase the area of its farm, additional land could be obtained on the northerly side of the brook. The soil is well suited for the purification of sewage, the surface being light sandy loam, and the sub-soil, for the greater part, being coarse gravel."

"I have reserved about ten acres of the land for intermittent filtration, the remainder to be used for broad irrigation. The filtration area is to be divided into nine fields, each of which contains nearly an acre of land; each field is to be surrounded by an earth embankment three feet high. These fields are at different elevations, depending upon the natural elevation of the land. Each field is given an elevation that would require the least amount of labor to bring it to a nearly level surface."

"In preparing a field, after it has been properly graded, a ditch or carrier about two feet wide and one foot deep is formed on one side of the field, and at right angles with the carrier a series of furrows are made. The furrows are from four to five feet apart from center to center, and divide the field into long, narrow beds. The beds may be used for raising root-crops, the sewage flowing through the carriers and furrows without coming in contact with the vegetables in the beds."

"In practice, it may be found that the filtration fields are not needed during the summer months, that the area devoted to broad irrigation and the demands for sewage from the owners of land along the line of the force main, even in rainy weather, will be sufficient to dispose of all the sewage. If such should be the case the fields may be used to take the sewage during the winter months, and in the summer any suitable crop could be raised in them without any special preparation of the beds. By having embankments around them the fields can be flooded to a depth of at least two feet, should occasion require it."

"It is impossible to state just how a sewage farm should be conducted in order to attain the best results in respect to crops or just what crops should be raised. But for the area devoted to broad irrigation a grass crop would undoubtedly be the best. Some of the land to be devoted to the broad irrigation may be plowed in the autumn, and lay fallow, receiving during the winter an occasional dressing of sewage, and in the spring cross-plowed and a crop of corn or oats started."

"The area devoted to sewage farming should be thoroughly cleared of all trees and bush. The sewage may then be applied, and the land be gradually put into a suitable condition for the growth of grass or other crops."

"The area of land recommended to be taken will undoubtedly be sufficient to meet the wants of the town for at least fifteen years. And the additional land referred to would be ample for any probable growth of the town."

"In advising your town to adopt this method of disposing of its sewage I am not advising anything experimental. In England the same treatment of sewage has been in successful operation for nearly thirty years."

On the Continent, the following cities, having a winter climate nearly like that of Massachusetts, dispose of their sewage upon the land: Danzig, in 1871, adopted this method; Berlin in 1873, and was followed in a few years by Breslau, and quite recently by Frankfort.

The cost of pumping and caring for the sewage at the farm in South Framingham is estimated at twenty-seven hundred dollars per year.

Herewith I give a report of the work of construction, as given by the engineer in charge: The two receiving reservoirs at the pumping-station are each one hundred and ten and one-half feet long and thirty feet wide. These are parallel to, and separated from each other by, a wall three feet thick and seven and one-half feet high. The side walls are three and one-half feet thick and eight and one-half feet high. The brick arches, two feet in thickness, rest on these walls. The bottom of the reservoirs are inverted, and are constructed of rubble concrete, varying in thickness from one and a half feet in the center and two feet at the walls.

In the center of the reservoirs the arches are eleven feet and nine inches above the invert and at the walls three and one-half feet. The reservoirs when completely filled will hold four hundred and ninety-one thousand gallons. Both the reservoirs may be kept free of sewage while the pumps continue to run, being fed by means of an eighteen-inch pipe extending through the center wall from the gate-house to the pump-well.

The pump-well and gate-house are both arranged for screens, but it is hardly probable that it will be necessary to resort to screening the sewage, since the pump valves are of the swinging type, eight by ten inches in diameter. The station and chimney in every particular are of ample size to accommodate a duplicate set of machinery.

The pumping-engine is one of the M. T. Davidson improved compound duplex condensing type, and is guaranteed to deliver through nine thousand feet of twelve-inch pipe two million U. S. gallons of sewage per twenty-four hours, against a total head of forty-feet. This total head does not include friction.

This, then, is at the rate of thirteen hundred and eighty-nine gallons per minute, or eighty-three thousand three hundred and thirty-three gallons per hour. Thus, if the reservoirs were completely filled, pumping at the rated capacity of the pumps, they could be emptied in five hours and ten minutes.

The farm, containing sixty-nine acres three rods and eleven and one-tenth rods, is now in good condition. About twelve acres of land have been taken for intermittent filtration; the remainder is to be devoted to broad irrigation. The area for intermittent filtration has been divided into eleven beds, with the banks about three inches high and four feet broad at the top, with sides sloping one and a half to one.

According to the financial statement submitted by the sewerage committee at the completion of the work, the total cost of the sewerage and sewage-disposal works was \$148,288.00.

The statement does not show the amount properly chargeable to sewage disposal works, but an idea of the cost of the same can be derived from Mr. Heald's original estimate, which stood as follows:

26,088 lineal feet of sewer, all sizes, with manholes.....	\$63,756 50
Pumps and boilers in duplicate.....	8,000 00
Chimney, engine and boiler-house.....	7,000 00
Foundations, screens, gates, etc.....	3,000 00
Receiving reservoirs (250,000 gallons capacity).....	12,000 00
10,200 lineal feet, 12-inch force main, at \$1.85.....	18,870 00
85 acres of land, at \$40.....	3,400 00
Clearing and burning 65 acres, at \$20.....	1,300 00
Filtration beds and carriers.....	10,000 00
	<hr/>
	\$127,326 50
Add 10 per cent. for engineering and contingencies.....	12,732 65
	<hr/>
Total estimated cost.....	\$140,059 15

The additional cost was caused by extra pumping, additional underdrains, deeper foundations and more extended supervision, etc.

In 1892, corn was successfully raised on three of the beds; 400 bushels of corn (in ear), three-fourths of an acre of cabbage and some squashes were raised and sold for a total of \$174.

In 1893, a large quantity of field-corn, squash, beans, potatoes and cabbage sold at public auction much below their value, by reason of the uncertainty of just how much each bed would yield.

In 1894, about nine acres of field-corn was raised on the several beds and sold standing at public auction for \$434.50. Some tobacco was also raised.

In 1895, three new beds were constructed. The principal crop was field-corn, which brought \$308.

The average number of gallons of sewage per day of twenty-four hours, in 1893, was 275,000; in 1894, 300,000 gallons; in 1895, about 400,000 gallons, and at the present time, about 450,000 gallons.

The amounts appropriated for the maintenance of the disposal works each year were as follows: 1892, \$6,500; 1893, \$5,600; 1894, \$7,200; 1895, \$6,500; 1896, \$7,100.

During 1895 the report is as follows:

Improvements and repairs.....	\$2,856 09
Expended for labor.....	2,540 00
Miscellaneous.....	592 30
Fuel.....	511 44
Unexpended balance.....	17
	<hr/>
	\$8,506 00

The amount of underdrained water received at the pumping station, in an open reservoir especially constructed to receive the same, is about 300,000 gallons each twenty-four hours. This is pumped on beds prepared for filtration of the same, adjoining the station, and necessitated the additional expense of procuring extra pumping machinery.

During my visit to this place I took particular notice of all the various features of the system, that I might be able to make a complete report to your commission, as these works were expressly called to my attention before starting out on my tour of inspection.

I spent considerable time at the sewage farm, examining the construction, the nature of the soil, the method of flowing the sewage upon the beds, the effect upon the growing vegetation, and upon the soil, and also the effluent at the underdrain-well near the beds and the spring near the brook.

The effluent at the well was odorless, colorless, and not unlike pure spring-water in appearance, and it was agreeable to the taste. The water in the spring was clear, cool and sparkling, and is used by the farm laborers for drinking.

Analyses of this water are made quite frequently by the Massachusetts State Board of Health, and while it sometimes contains chemical traces of sewage it also shows that nearly if not all bacteria are removed by filtration.

The soil is very well adapted for filtration, as it consists of a fine sandy loam, underlined with a porous sand and gravel. The drains are placed near the middle of each bed, about six feet below the surface, and converging toward a natural basin, where they terminate in an open brick well.

The beds are all planted in field-corn, which is of a dark green color. The stalks are a little taller than the ordinary growth, putting out ears of normal size, and containing considerable rot or smut. There is very little odor, I was told, except on hot or muggy days, when it becomes quite offensive.

From what I saw of the sewage at the beds, there seemed to be very little of the fatty, greasy matter, as at Coney Island, only a slight scum raising above the sewage at the hexagonal pits and chambers. The beds are quite distant from any habitations and owing to the fact that the Boston water commissioners

perfectly satisfied with the result, it seems that the Framingham sewerage committee have reason to believe that their system of disposal is the best in the country; but as it has only been in operation since 1889, it would be unwise to say that it will always remain as self-cleaning as at the present time.

INTERMITTENT FILTRATION AT MARLBOROUGH, MASS.

The above town in 1890 had a population of 13,800. It is situated on the influent streams to Basin No. 3 of the Sudbury river water-supply of the city of Boston.

An act passed the Massachusetts Legislature in 1888, authorizing the town of Marlborough to construct and maintain a system of sewerage and sewage disposal.

M. M. Tidd, M. Am. Soc. C. E., of Boston, was employed to prepare the plans, which, after a number of hearings, were approved by the State Board of Health on January 7th, 1890.

These plans provide for the delivery of the sewage completely outside of the Sudbury river water-shed, and insure its purity by intermittent filtration.

In consideration of these facts the Boston water board agreed to contribute \$62,000 toward defraying the expense of construction. The entire system, including disposal area, was completed in 1892.

Water-works were introduced in 1883, and in 1892 the daily consumption was about 325,000 gallons; but measurements taken at several times after heavy rains showed a flow of about 790,000 gallons, showing that the sewers, which were wholly of the separate system, were admitting a considerable amount of ground-water.

The city of Boston would not permit Marlborough to put in underdrains, fearing that sewage would leak through defective sewer-joints and into the drains, and thus finally pollute the Boston water-supply.

The filtration areas are about two miles in a straight line from the outskirts of the village, and one thousand feet from the nearest house.

The sewage flows by gravity to the filtration area through an outlet sewer of vitrified pipe, and enters a separating or settling-

tank, which removes the sludge from the sewage, after which the sewage is distributed through iron pipes to the various filter-beds as desired. Originally six beds were arranged to receive the sludge.

The sewage is conveyed from the top of the settling-tank through iron pipes along the embankments of the beds and discharged on the beds by means of gates and short branches, the portion of the bed being paved at the point of discharge.

The sludge is drawn from the tanks through a cleaning-out gate, into the sludge-carrier, and was originally run upon beds provided for that purpose, but it became offensive and the practice was discontinued. It is utilized by farmers at the present time.

The filter-beds are covered at times with a crust consisting of matters which were suspended in the sewage. This is harrowed in from time to time. The effluent from these beds empties through underdrains into Hop and Wast brooks, which are tributary the Sudbury river.

So far as casual observation indicates, the beds are doing good work and present no very unpleasant or disagreeable features, only a slight odor being noticed.

The cost of preparing the beds, excluding the cost of the land and including tank, tank-house and all appurtenances and engineering, was \$21,720.

The system, while practically on the same plan as the South Framingham disposal area, differs a little in construction of beds, and receives the effluent in a screened state.

The beds are also more thoroughly underdrained and are not devoted to the raising of crops.

WORCESTER, MASSACHUSETTS.

It is believed that the sewage disposal of the city of Worcester, Mass., has been the subject of more discussion than that of any other American city.

In 1872, a scheme for the utilization of the sewage of Worcester was presented by Phineas Ball, C. E., and at the beginning of its series of studies on river pollution the Massachusetts State Board of Health selected for special examination

the Blackstone river, which formerly received the crude sewage of this city.

From the reports of the board it appears that there were in the city at that time 44 woolen mills, employing 3,000 operatives; 27 cotton mills, employing 3,978 operatives; 12 iron works, employing 1,224 operatives; 1 tannery, employing 6 operatives, and 1 shamble, employing 5 operatives.

The sewage and various manufacturing wastes of nearly all of those establishments passed directly into the river. From a series of analyses of samples of sewage of Worcester, made by Prof. Wm. R. Nichols, it appears that the average day sewage of Worcester contained, at that time, 25.35 parts in 100,000 of the total dissolved matters, 1.876 parts of free ammonia and 0.316 parts of albuminoid ammonia.

The average night sewage contained 15.29 parts in 100,000 of total dissolved matters, 0.745 parts of free ammonia, and 0.144 parts of albuminoid ammonia.

The city of Worcester is supplied with water from the headwaters of the Blackstone river. In 1890 the daily consumption of water is stated at 4,635,000 gallons. In 1892 the supply was about 5,000,000 gallons per day, giving for a population of about 90,000 an average of 55½ gallons per capita per day.

The distance by river from Worcester to Blackstone, at the state line, is 26 miles, and the fall in that distance is 220 feet, and throughout this entire distance are located a large number of manufacturing establishments, which derive power from the river. Many of the natural bodies of water are converted into storage reservoirs for supply in dry weather, and many artificial reservoirs have been constructed by dams and dikes.

By this means the stream is kept at a moderate flow even in extreme dry weather. The mills, however, discharge into the stream much of their sewage and manufacturing wastes, which are nevertheless quite thoroughly diluted and removed more than they otherwise would be, owing to the large dry-weather flows caused by storage.

In 1892 the sewer system consisted of about 80 miles of sewers, discharging sewage into the river, chiefly through Mill brook, one of the tributaries, according to an act passed by the Legislature in 1897, permitting Mill brook to be used for that purpose.

Since that time it has been walled in and arched for much of its length through the city, becoming, substantially, a main sewer of the city.

The Blackstone river is not used at any point below Worcester for a public water-supply, and the chief reason for a demand on the part of the riparian owners below Worcester for the purification of the sewage of that city, was for the suppression of a nuisance so serious as to not only unfit the water of that stream for use in manufacturing operations, but to create conditions dangerous to health.

Because of these and many other reasons and complaints, projects for the treatment of the sewage were considered. Mr. Ball, in 1872, proposed to dispose of the sewage by irrigation, at a point about three miles below the city and not far from the village of Millbury, to which point it would be delivered by gravity.

In 1881 the town of Millbury employed Col. Geo. E. Waring, Jr., "to suggest some practicable plan by which the city of Worcester may withhold from the Blackstone river the waste organic matter produced by the population and its industries, and now polluting that stream."

His plan was as follows:

- (1) To separate the dry-weather sewage of the city and the early storm-washings of the sewers from the water of Mill brook.
- (2) To allow the earthy matters of the sewage to subside.
- (3) To screen out the coarser objects.
- (4) To expose the screened sewage in a thick sheet to the air, during its rapid flow, for a distance of 500 feet, at a sharp fall.
- (5) To carry it at a low velocity for about ten miles through ditches bordered by rank-growing trees or bushes; alternating to a second set of ditches as often as necessary, say once a week, so as to give each set a dry week for the aeration of the subsided matter.
- (6) To spread the resultant effluent over 126 acres of wooded swamp land, giving each area two days out of three for aeration.

The area selected by Col. Warring for this purpose was included in the area near Millbury, selected by Mr. Ball in 1873.

In 1881 the Legislature directed the State Board of Health to investigate the question of sewage disposal for Worcester, with special reference to preventing the further pollution of the Black-

stone river and its tributaries, and recommend a definite plan for preventing such pollution.

The board appointed as experts C. F. Folsom, M.D., and Joseph P. Davis, M. Am. Soc. C. E., who, acting in conjunction with Dr. Walcott, secretary of the board, designed a system of disposal by intermittent filtration.

By this project, the sewage would be diverted from Millbrook and conducted, partly by gravity and partly by pumping from a low area, to a tract of land midway between Worcester and Millbury, and in the vicinity of the locality previously selected by Mr. Ball and later by Col. Waring, but at a somewhat higher elevation. For this purpose it was proposed to distribute the sewage at a rate not exceeding 40,000 gallons per acre per day, the experts expressing the opinion that this daily quantity would not be large enough to prevent the successful raising of crops on the filtration area.

The estimated cost of carrying out the plan of intermittent filtration was \$408,490. The necessary pumping was estimated at \$3,500 per year. The cost of construction under Col. Waring's plan is submitted by the experts in their report, and reasons given why, in their opinion, it would not provide an efficient solution of the sewage disposal problem of Worcester.

At the first session of the Legislature following the presentation of this report, a bill was introduced in the interests of the residents along the Blackstone river below Worcester, by the provisions of which the city of Worcester was required to purify its sewage before discharging it into the river, within four months from its passage, and thereafter to cease discharging into the river all matter offensive or dangerous to public health.

Considerable expert testimony by the city of Worcester was given in denial and rebuttal, prepared by William E. Worthen, M. Am. Soc. C. E., and the City Engineer, Charles A. Allen, M. Am. Soc. C. E. The State's case was presented by the above-named expert committee, who had devised the project of intermittent filtration.

The opposition on the part of the city to the compulsory expenditure of the large amount of money which was required to effect the purification was sufficiently strong to prevent any-

thing being done at that time, and the Legislature adjourned without passing the act.

The bill was again introduced at the session of 1884, and after a spirited opposition on the part of the city again defeated, for reasons similar to those which had been previously urged.

In his report to the Massachusetts Drainage Commission in 1885, Mr. Clark, after reviewing the several reports previous to that time, concludes that a solution of the problem of sewage disposal at Worcester had already been devised by the experts of the State Board of Health in 1881, and he therefore investigated the conditions at Worcester only as much as was necessary to verify the essential features of their plans.

He states that an examination of the territory showed that the tract of land which had been selected as a filtration area was accessible and suitable for the purpose, as proven by borings and test-pits. The estimates were also verified by Mr. Clark and found to be ample, if not larger than necessary.

He closed the portion of his report with the suggestion that the drainage commission could, with propriety and safety, recommend that Worcester be required to purify its sewage in some way, but that a choice of method and its details be determined by the city itself.

During the period of discussion, the pollution increased from year to year, and in 1883 the city council of Worcester directed the city engineer, Charles A. Allen, M. Am. Soc. C. E., to proceed to Europe to acquire a thorough knowledge of sewage-disposal, as practiced there, with special reference to the conditions obtaining at Worcester.

In accordance with the above order, Mr. Allen visited England, France and Germany, and made a careful examination of the different methods in use for the treatment and purification of sewage. The works examined were located as follows: Croydon, two systems; Doncaster, Bunley, Bradford, Leeds, Barnsley, Wigan, Birmingham and Alherton, in England; Paris, in France; and Berlin and Dantzic, in Germany. Also, the sewage farm at Pullman, Ill.

After thorough deliberation upon all the various systems and comparison of climate and other conditions, together with reports of chemists and eminent engineers, both in this country and abroad, Mr. Allen makes the following recommendation

"After a careful study of the conditions as they exist at Worcester, and carefully considering the subject in all its bearings, I am of the opinion that chemical precipitation is the best method for the city of Worcester to use in disposing of its sewage.

"My reasons are as follows:

"(1) That the effluent obtained will without doubt conform to the requirements of the law.

"(2) That the cost of establishing a plant will be less than by either irrigation or downward intermittent filtration.

"(3) That chemical precipitation will not be effected by climatic conditions.

"(4) There will be no loss of water, and consequently no water damage to pay.

"(5) If this method of disposal is adopted by the city of Worcester, it will be in a position to take advantage, without material change in plant, of improvements that will undoubtedly be made in the methods of sewage disposal.

"(6) That precipitation will be a valuable auxiliary to irrigation or intermittent filtration, if it should ever be thought desirable to add either of these methods of disposal to the system.

"I therefore, recommend that suitable buildings and tanks be constructed, and proper machinery obtained for treating the sewage of the city by chemical precipitation.

"I desire to call attention to the fact that the question of disposing of the sewage of Worcester has been considered and reported upon by nearly all the engineers in this country who have made the matter of sewage disposal a special study. They have suggested chemical precipitation as a means of disposal, but have also advised some method of land treatment.

"In the light of recent investigation and experience, and with a full understanding of all the circumstances as they exist here, I feel that their decision shall be reversed. I therefore have suggested that under favorable conditions, downward intermittent filtration might be used, but have advised that chemical precipitation be the method adopted."

On July 8th, 1889, the city council ordered the construction of the precipitation works, and work began as soon thereafter as the detailed plans could be sufficiently matured.

In his report for the year ending November 30th, 1890, Mr. Allen gives the method of treatment adopted, and says:

"The treatment which we have finally adopted is the 'Continuous Process.' The sewage, after leaving the outfall sewer, enters the receiving chamber in the gate or screen-house. It passes through the screens, where all matter that would tend to clog the sludge-pump are screened out, such as paper and sticks of wood. It then passes through the outlet chamber into the mixing channel.

"The chemicals are introduced at the upper end of this channel, being discharged through pipes connected with the vats outside the building. After the introduction of the chemicals the sewage flows through the mixing channels, the chemicals being thoroughly mixed with it by agitation produced by the baffle-plates. From this channel the sewage passes through the first weir into tank No. 1; here there is a fall of one foot, which tends to more thoroughly mix together the sewage and the chemicals.

"It then passes very slowly through tank No. 1; out of this tank through the second weir into the main channel, then through the third weir into tank No. 2, to tank No. 3, and then through tanks Nos. 4, 5 and 6, until it is discharged finally through the last weir and over the overflow steps into the effluent drain, and from thence into the river; it takes about six hours for it to pass through all the tanks.

"When it becomes necessary to clean a tank, the flash-boards are placed in the weirs connected with the tank, and the sewage is passed around into the next tank, through the main channel. The sewage in the tank to be cleaned is then allowed to rest from three to six hours, so that thorough precipitation will take place before the water is drawn off. The water is then drawn off by means of a floating arm in the effluent drain, to the level of the sludge.

"The gate at the mouth edge of the sludge-drain is then opened and the sludge flows through the sludge-drains to the sludge-ways under the building. It is then pumped into a carrier and deposited on sludge-beds located on land owned by the city. The precipitation takes place principally in the first three tanks.

"The sludge has to be removed from tanks Nos. 1 and 2 about once in thirty-six hours, in warm weather, but during

weather we have been able to go four days without cleaning, without perceptibly affecting the character of the effluent.

"Tank No. 3 is cleaned every two or three days in warm weather, and once in seven or eight days in cold weather. Tanks 4, 5 and 6 accumulate very little sludge, but they are cleaned as often as it is necessary—about once a week in the hottest weather, and once in three weeks during the colder period.

"In the first two tanks, during warm weather, the accumulation for each thirty-six hours is about ten inches deep over the entire bottom surface. No. 3, about eight inches in three days. Nos. 4, 5 and 6, about six inches in a week.

"The sludge is about 95 per cent. water, and after it has been spread upon the sludge-beds for about nine days this almost entirely disappears. The precipitant principally used at the works is Vermont lime. This proves to be much better for our use than either Eastern or Western lime.

"It costs, delivered at the works, about \$7 per ton. The sulphate of alumina is used with the lime on occasions when there is not sufficient iron salts in the sewage to act with the lime in producing a good effluent, generally Sundays and Mondays. We have found by experience that there is no fixed rule that can be followed in the use of chemicals, the quantity varying with the varying character of the sewage."

As a practical illustration of what is accomplished, samples of the sewage and of the effluent taken at the same time have been saved. Sewage five months old is the color of ink, and the odor from it is so foul that it is sickening; while the effluent of the same age is clear, colorless and entirely without odor.

As to cost of treatment, Mr. Allen states that it is constantly being reduced, and at the time of making his report is well within his estimate of 1887, namely, \$32,500 for 3,000,000 gallons per day constantly treated.

On June 19th, 1891, the daily treatment of 6,000,000 gallons was begun, it being considered better to partially treat this amount than to treat a smaller amount thoroughly.

In 1892, the construction of ten new tanks was begun, making sixteen in all. During the year ending November 30th, 1891, there were treated 1,399,000,000 gallons of sewage, or about 3,830,000 gallons daily, from which 22,042,000 gallons of sludge

was precipitated, the sludge having been pumped to sludge-beds.

The solids in the sludge aggregated 1,230 tons, or about 3½ tons a day, all of which was diverted from the river. The amount of lime used during the year was 758 tons, and of alumina 65 tons, or an average of 7.6 grains of lime and 0.65 grains of alumina per gallon of sewage. The disposal of the sludge, the solid part of which, in 1891, amounted to 3½ tons per day, has been a serious problem from the start.

At first the sludge was put in heaps and covered up, but this did not give satisfaction. Three different sludge furnaces were tried, but the labor involved was too great, although the sludge formed its own fuel after once kindled. In one of these furnaces sludge containing 50 per cent. water burned quite rapidly, while some containing 72 per cent. water burned at the rate of 2½ tons in nine hours, unaided by other fuel.

In the spring of 1892 the sludge which had accumulated since September, 1891, was carted away at the expense of the city and put onto farm land. The new tanks are now completed, and while of no greater capacity than the first one, are longer and not so wide.

The total capacity of the tanks is 15,000,000 gallons per day, providing for the entire dry weather flow of sewage, which, in April, 1893, was reported as varying from 11,000,000 to 15,000,000 gallons daily.

A company in the city is also putting in a filter-press, for trial purposes, for pressing the sludge, which at the time of my visit was not quite ready for operation. At the present time the sludge passes into an open channel, and thence into a Shone ejector, the air for which is compressed by a Raud compressor by power from a twelve-inch Holyoke turbine driven by the effluent from the top of the tanks, which gives a head of about seven feet on the turbine. The capacity of the ejector is about 35,000 gallons per hour.

The sludge is carried by the ejector to the filtration beds before alluded to. The appearance of the effluent, as it flows from the tanks, is almost colorless and without odor. In his report ending November 30th, 1895, Superintendent H. P. Eddy, says regarding the treatment of sewage:

"The treatment of sewage has been rendered more difficult than in former years by the increased volume received and the copperas and vitriol contained in it.

"These chemicals, which are discharged promiscuously throughout the city by foundries, wire-working establishments and other manufactories, require large amounts of lime to neutralize them, and they must be neutralized before sedimentation can be effected to a satisfactory degree.

"The velocity created by so large a flow of sewage through the settling basins hinders precipitation, and every effort must be made to counteract this effect so far as possible. To these causes is due the use of a considerable portion of the 3,000 tons of quick-lime put into the sewage during the year. The volume of sewage treated has averaged about 15.7 million gallons per day during the year.

"For the treatment of this amount of sewage, about 3,000 tons of lime have been used, amounting to 1,030 pounds per million gallons, or about 7.21 grains per U. S. gallon. From the sewage there have been removed, in form of wet sludge, 66,440,333 gallons, equivalent to 1.16 per cent. of the flow. The sludge, as pumped, contained 7,972 tons of dry solids.

"As a result of the treatment, about 51½ per cent. of the organic matter contained in the sewage has been removed and the water has been turned into the river practically as clear and sparkling as it was when rippling along the brooks of Leicester or Holden, before its entrance into the pipes which supply the city with pure water.

"In addition to this appearance, it is a fact that this effluent water has attained a degree of purity which ensures no further putrefaction; it will not become offensive to the sense of smell. The cost of purification in 1895, was about \$8.25 per million gallons."

CHEMICAL PRECIPITATION AT CANTON, O.

The disposal works at Canton, Ohio, were put into operation about May 1st, 1893. Chemical precipitation works were recommended by Samuel M. Gray, M. Am. Soc. C. E., in March, 1887, who also prepared plans for the works.

The plant was finally constructed after detailed plans of L. E. Chapin, Assoc. M. Am. Soc. C. E., who, I am informed, made one or more visits to the disposal works at Worcester while formulating his plans. The tanks and paraphernalia are similar in many respects, and the system of treatment is practically the same as at Worcester.

The tanks are operated on the continuous plan. The plant consists of a building for machinery, an inlet-screen chamber for removing papers and bulky matters, an inlet channel leading from the screen chambers, the four precipitation tanks, an effluent chamber and sewer and a sludge well. The machinery to prepare chemicals and press the sludge consists of a boiler, engine, pressure pump, filter-press and two mixers.

The sewage disposal area contains 28 acres, of which the purification plant entire occupies about four-fifths of an acre. The population of Canton in 1890 was 26,189.

From gaugings of the sewers made in 1893, it was estimated that about 800,000 gallons per day would be the amount to be treated. The cost of the complete works in running order was \$26,483.76, not including the cost of the land. The tanks were designed to be of a capacity to treat 1,500,000 gallons of sewage per day with ease.

Mr. Chapin says of the plant: "This method of precipitation, as carried out in our tanks, has given entire satisfaction. No matter how foul the sewage may be, the effluent water is perfectly clear and contains no suspended matter. The precipitation agent used is common lime, to the extent of about 800 pounds per day.

"The final disposal of the sludge is effected by means of the filter-press, instead of reducing the sludge from its fluid state to a mass that could be handled by means of evaporation in the open air, and supplemented by filtration in shallow pits located on a loose gravel soil, as the plan first recommended.

"If the latter method had been adopted, a serious nuisance would have been created, that sooner or later would have been intolerable."

THE CHAUTAUQUA SEWAGE DISPOSAL.

Early in October, 1892, advertisements were inserted in the leading engineering papers, asking for bids to build a plant

furnishing all the machinery, etc., for complete sewage disposal, the effluent to be clear and odorless, and harmless to fish life, the plans and bids to be submitted to Mr. Samuel M. Gray, C. E., consulting engineer.

The plans and bid submitted by William B. Landreth, C. E., of Jamestown, N. Y., was accepted and a contract entered into with Mr. Landreth, at the annual meeting of the board of trustees of the Chautauqua Assembly held in Pittsburg, Pa., January 17th, 1893.

Work was commenced April 1st, 1893, under the supervision of Mr. Thomas McKenzie, resident engineer. The masonry work and the machine house was built by John W. Willard, of Jamestown, N. Y. The machinery was built and furnished by the Bonnot Company, of Canton, O. The plan consists of a machine house and four masonry settling tanks, designed for a capacity of 300,000 gallons.

The machine house is a wooden building, 40 x 40 feet. The sewage enters the building on the west side, the brick underpinning of the building forming one side of the brick channel. A screen made of iron bars, set sloping in the channel three-fourths of an inch apart, catches all the heavier particles which are raked off and disposed of by burning in the boiler. The chemical mixers are two large wooden vats, fitted with revolving arms, holding 850 gallons of solution, made by the Bonnot Company, of Canton, O.

The first tank contains a milk of lime solution, which is applied to the sewage as it passes along through the channel. After receiving the application of chemicals in the proper proportions, the sewage enters a brick mixing well where it is caught up by a vertical centrifugal pump, and discharged again into the main channel to the tanks through a four-inch discharge pipe. In this way the chemicals are thoroughly mixed with the sewage.

The tanks are built of stone masonry laid solid throughout in American cement mortar, and lined on the inside with one course of brick laid in Portland cement mortar. The two end walls are five feet across on the bottom and four feet on the top. A brick channel two feet wide of the west wall carries the sewage into any of the four tanks through weirs six feet long.

A channel of like dimensions in the east wall discharges the effluent oversteps into a fifteen-inch sewer-pipe emptying into the lake. The side walls are three feet on the bottom and two feet wide on top. The partition walls are two inches larger. The tops of the walls are covered with sawed sandstone coping, three inches thick, bedded in Portland cement mortar.

The bottom of the tanks is built of concrete, composed of two parts sand, one part cement, and three parts broken stone or gravel, twelve inches thick. The bottoms of the tanks slope from the sides with a fall of one in thirty, to a sludge channel in the middle of the tanks, two feet wide, which has a fall of two and one-half feet in fifty-six, to the sludge drain.

In each tank there is an eight-inch floating outlet pipe, made of galvanized iron, eight feet long, which is held suspended just under the surface of the water by a galvanized float. This floating outlet pipe is connected with the fifteen-inch effluent drain under the end wall.

When it becomes necessary to clean any of the tanks, it is shut off by means of the flash-board, and after a period of rest, for allowing all of the suspended matter to precipitate, the valve on the floating outlet is opened and the effluent is drawn off down to the sludge.

The effluent valve is then closed and the sludge valve at the other end of the tanks opened, and the sludge passes into the sludge-well through an eight-inch vitrified sewer pipe. The sludge well is built of brick, eight feet in diameter, sixteen feet deep, with twelve-inch walls fitted with a cast iron cover, flush with the machine house floor.

After drawing all the sludge from the tank into the well, it is then pumped with a No. 4, Baldwinville centrifugal pump, up to a tank on the machine house floor; from this tank the sludge is pumped into a press with a hydraulic pressure pump, fitted with a double set of plungers, and rubber valves resting on a cast-iron seat.

The valves are fastened with arches and are easily accessible in case they become clogged by waste or other fibrous material. The press is a sixty-cell Bonnot press fitted with pressure gauge, rubber baskets, etc.

The sludge is pumped into the press until the gauge shows a pressure of sixty pounds and the water ceases to flow out of the drip-cocks. The press is then opened, a car run under the press, and the sludge removed out of the building. The cakes are thirty inches in diameter, and one and one-half inches thick.

When first taken out of the press the average weight is twenty-one pounds; after being thoroughly dried, the average weight is twelve pounds, showing forty-three per cent. of water still remaining after pressing. The press, car-pump, chemical mixers, shafting and pulleys, were furnished by the Bonnot Company, of Canton, Ohio, and the work of erecting and fitting up of the machinery was done by the same company.

Experiments as to the best method, and the amount of chemicals necessary to run the works, were made by Mr. W. B. Landreth, C. E., and Mr. Thomas McKenzie, the resident engineer. Measurements were also taken of the flow of sewage, July 24th, 1893, showing a flow of 122,884 gallons. The intermittent plan was tried, but the effluent was not as good, and the extra amount of labor in filling, emptying and cleaning the tanks by the intermittent plan made it impracticable.

The continuous plan, allowing the sewage to flow from one tank into another; the effluent flowing from the last tank down over the steps into the effluent pipe to the lake, was found to give the best results.

By carefully watching the effluent, and regulating the amount of chemicals until a good effluent was produced, the amount of chemicals used was found to be eighteen grains lime, six grains alum and about one-half a grain of copperas per gallon of sewage. A sample of the effluent was sent to Prof. Maurice Perkins, a member of the New York State Board of Health, professor of chemistry in Union College, Schenectady, N. Y., for analysis.

He says in his report: "I think this quite a successful treatment of sewage. Most all of the albuminoid ammonia seems to have been precipitated, for originally I would expect to find at least ten times as much. I should have no hesitation in allowing effluent like this to flow into a large body of water. Would have no fear as to the fish."

This effluent was sent to Mr. Perkins during the early attempts at purification of the sewage. Since these experiments have been made, experience in the management of the works and careful measurements in the flow of sewage combine to produce better results, and no doubt an analysis now would show even a purer effluent than the one sent Mr. Perkins, July 15th, 1893.

It was estimated that there were on the grounds at Chautauqua about 4,000 people. An average of two presses of sludge per day has been taken out since July 15th. The whole operation of emptying, cleaning the tank and pressing the sludge occupies about five hours.

Two men, an engineer and assistant, are employed at the works through the day from 7 A.M. to 6 P.M. A third man then comes on and runs the works until midnight, when the flow of sewage ceases and the clear water is allowed to run through the brick channel in the building around the tanks in an open channel to the outlet pipes into the lake. The entire cost of running the plant averages \$10.00 per day.

CHEMICAL PRECIPITATION AND FILTRATION AT EAST ORANGE, N. J.

The town of East Orange, N. J., is situated immediately west of the city of Newark, and further bounded by the towns of South Orange, Orange and Bloomfield.

The area is 2,400 acres, with a population, in 1890, of 13,282. In October, 1893, the Town Improvement Society of East Orange requested J. J. R. Croes, M. Am. Soc. C. E., to prepare a plan for the complete sewerage of the town, with an approximate of cost, together with suggestions as to the best method of sewage disposal.

Mr. Croes' report was, in substance, that inasmuch as East Orange is entirely surrounded by other densely populated areas, which further cut it off from access to any large stream or to tide-water, if the waste products were to be disposed of or purified within the township limits, that the volume of sewage should be chiefly confined to house wastes.

The main outfall sewer would be extended to the northeast corner of the town, where a suitable location for disposal work could be found, near a tributary of the Second river, a stream emptying into the Passaic at the northern boundary of Newark.

He recommended that the sewage be treated with perchloride of iron and passed through a mechanical filter, consisting of saw-dust, which was to be used after filtration as fuel under the boilers required for the pumping plant which would force the sewage through the filter.

The effluent was then to be purified by passing through soil before reaching the stream. The cost was estimated at \$330,000. The society endorsed Mr. Croes report, but desiring to take further deliberation in regard to disposal, as certain advantageous privileges were accorded them by an act of the Legislature, permitting New Jersey townships having a population of 2,000 to a square mile and a public water-supply, to construct a system of sewage or drainage, or both, acquiring rights to drain through other towns and municipalities.

In September, 1884, the township authorities authorized Mr. Croes to prepare a plan and estimates of the cost of conveying the town sewage to tide-water in Newark bay, below the city of Newark, and also additional estimates for disposal in the township limits.

His estimates showed that the construction of a system of sewerage, sufficient for immediate purposes, would cost about \$77,000. If taken to Newark bay the outfall sewer would cost \$154,000, while if chemical treatment, supplemented by filtration through lands within the township limits, would cost about \$76,000. With disposal to Newark bay the cost of completely sewerage the town, including sewerage system, outfall sewer, etc., would be \$462,345, and for local treatment within the township limits the entire cost would be \$398,325.

The township committee, favoring the system recommended by Mr. Croes, but inclining to the opinion that the sewage should be delivered into the sewers of the city of Newark, provided suitable arrangements could be made with the Newark authorities.

The matter remained at a standstill until the spring of 1886, when Carroll H. Bassett, M. Am. Soc. C. E., was engaged to design the details of a plan providing for the purification of the sewage within the township limits.

The works designed by Mr. Bassett included a chemical treatment with lime and sulphate of alumina, supplemented by a filtration through a coke filter, further supplemented by inter-

mittent filtration through land. The disposal-works, and a separate system of sewers, embracing twenty-six miles of street mains, were completed under his direction, and placed in operation in June, 1888.

In his description of the purification works, he says: "The land secured for the works was singularly unfavorable for sewage purification. The total area available was about fifteen acres, of which five acres were covered by Dodd's mill-pond, and the character of its bottom may be understood when it is remembered that repeated complaint of its deposits had been made by residents to the health authorities.

"The drainage and transformation of the pond was held out to hostile residents as consolation for the location of sewage purification works in their midst. No reasonable expense was spared to make the plan efficient and attractive."

The method of precipitation was similar, in many respects, to those already mentioned, but, as it was supplemented by filtration, the effluent was not as completely clarified in the tanks as seen at other works.

I will not describe the process of preparing the filtration area in this report, nor enter into details of the operation of the plant. Suffice it to say that the results of the treatment showed the performance of the works and the character of the effluent as satisfactory from both the practical and sanitary standpoints until recently.

In 1891 it was estimated that 15,000 people were contributing sewage at an annual cost of maintenance, per capita, of 60 cents, exclusive of interest charges, and in 1892 the annual cost was about \$675 per month, or 56 cents per capita. The force of laborers at the disposal-works included a foreman, engineer and five laborers.

However, at the time of my visit the works had been abandoned. Operations were suspended in May, 1896, at the instance of the residents of Bloomfield and persons near the works, and the system connected with the Newark sewers, as at first proposed, at a cost of \$225,000. The machinery, etc., of the purification-works has been taken out and sold.

"Whether the above results were caused by carelessness on the part of the employes in the proper purification and treatment of

the sewage, or from an area of land not well adapted to the successful treatment of the effluent, or from the result of prejudices of nearby residents, or from the depreciation of the values of real estate in the immediate vicinity from some cause, is a matter of conjecture.

* * * * *

In considering the various systems in regard to the application of our present and future needs, I am convinced that under the conditions governing our location, chemical precipitation is best adapted to our needs, for the following reasons:

(1) If we cannot dispose of our sewage in its crude state as at present, we can at least dispose of the clarified effluent even in a partially impure state into the sea without offense.

(2) The area required for the treatment of this sewage can be procured at a location near to the gravity point of our systems and at small cost for land, pumping and railroad facilities.

(3) The area that might be selected for intermittent filtration would be at a considerable elevation above our present outfall sewers, necessitating a great deal of expensive machinery to lift the sewage; again, very little land of sufficient area suitable for filtration could be procured at any reasonable price, and not without considerable cost for preparation, besides being located in a portion of the country where the water-courses are small, and which, through carelessness or inefficiency in the filtration area, as at East Orange, would probably become a serious nuisance and source of pollution.

(4) The possibility of still allowing the crude sewage to flow into the ocean during the greater portion of the year, and treating it only during the warmer period, would lessen the cost of operation, and by locating the necessary disposal works near the outfalls would also make a saving in the cost of handling, through expensive force-mains and the use of pumping-machinery to carry it to a remote portion of the township.

(5) Inland cities, such as Canton, Ohio; Chautauqua, N. Y.; Worcester, Mass.; Mystic Valley, Mass., and other places, have and are using precipitation works without other treatment successfully, and producing an effluent sufficiently purified to enter the fresh-water streams without the least danger of polluting the water in them."

In conclusion, I will add a few remarks relating to the commercial part of the question.

AS A FERTILIZER.

It seems to be a popular impression that the manurial constituents of sewage are of great commercial value, and various methods have been devised in attempts to utilize the sludge for the purposes of agriculture.

As far as can be learned, none of the projects have ever realized anything from a commercial point of view, and as hard as it may be for those who have preconceived opinions on this subject to modify their views, it is still a fact that frequent experiments have plainly demonstrated that anything like a general utilization of the manurial properties of sewage for commercial purposes is practically a failure.

A consideration of the amount of the manurial constituents in comparison with the amount of water carrying the sewage serves at once to emphasize the difficulties of the problem.

Thus the average of total dry matter in a ton of sewage from an ordinary English town is from two to three pounds, while in American cities the amount is generally much less.

Of the fertilizing matters in sewage, the nitrogen compounds are the most important, but their amount is very small.

COMMERCIAL VALUE.

From such data it has been estimated that the sewage of English cities may contain from one to four cents' worth of fertilizing matter per ton, while a ton of the Boston sewage will contain say one cent's worth of such material.

The conclusion from the foregoing cursory examination is that the valuable constituents of sewage are so diluted that the cost of extracting them, is equal to or greater than the value of the extracted material.

At the present time commercial fertilizers can be procured cheaper than the manurial elements of sewage, and so long as this remains true, it is useless to talk of making sewage utilization, except under favorable conditions, a commercial success.

THE PROPER WAY TO CONSIDER DISPOSAL.

From the above discussion, it will be seen that the proper method to pursue in deciding the problem of sewage disposal would be different, if it were practicable to realize commercial profit, either by using the sewage for broad irrigation, or by the sale of manure manufactured or resulting from the various methods of separation now in use.

The experience obtained by other countries has practically settled both these questions, so that we may consider this subject in this country without reference to them.

When the public come to a full knowledge of the fact that sewage utilization is of practically little commercial value, the problems of sewage disposal will be more easily solved, and those interested in public health will insist upon the proper purification of sewage as the first and greatest object in its disposal, independent of the commercial returns.

It is the duty of every community contemplating improved sanitary conditions to consider health first, and questions of commercial utilization as a secondary matter.

It is not my intention in making the foregoing statements to assert either that broad irrigation may not be a successful method for both purifying and using the sewage when the conditions are favorable, or that the resultant from a chemical process or other sedimentation is not worth something as a fertilizer.

My object is to bring before you the idea that the question of thorough purification should be considered of far more importance than the utilization of sewage as a matter of commercial gain.

SEWAGE-WORKS NOT SUBJECT TO FRANCHISE.

Therefore I conclude that, generally speaking, the granting of franchises to private companies to construct and operate sewage-disposal works as a matter of speculation, should be very carefully considered.

The interests to be served are so important and the effect of neglecting to render proper service so serious, that the commercial or speculative spirit should be absolutely eliminated from everything pertaining to the disposal of sewage.

That the problem has generally been regarded in this light is shown by the fact that only a few municipalities, mostly small ones, have granted sewerage franchises, New Orleans being the only large city which has taken such action. * * *

NIART ROGERS, C. E.

ASBURY PARK, N. J., Sept. 4th, 1896.

THE CRANFORD, N. J., SEWERAGE SYSTEM.

BY CARROL PH. BASSETT, C. E., PH.D., CONSULTING ENGINEER,
SUMMIT, N. J.

The township of Cranford is located along the Rahway river, on the New Jersey Central railroad, about five miles west of Elizabeth. It has a population of approximately 2,150. In 1894 the authorities adopted a system of sewers planned by Carrol Ph. Bassett, C. E., of Summit, and immediately prepared for the construction of the principal portion of the system.

A comprehensive system covering the entire township was planned on the "separate" principle, making provision for the receipt of sewage from the entire drainage area embraced in the township. Eight-inch vitrified pipes were adopted for the laterals; sub-mains varying in diameter from 10 inches to 18 inches were designed to run through the drainage valleys and collect the sewage into a 20-inch outlet sewer extending to the Rahway river below the city of Rahway. Flush tanks to be used on all dead ends of lateral sewers, and manholes to be located at street intersections at sudden changes of line or grade and at intervals of not more than 300 feet. The manholes to be ventilated and contain a galvanized bucket supported beneath the ventilated cover to catch road detritus and prevent its entrance into the sewer. The construction work to be done was divided into three parts:

The outlet sewer—4.2 miles long—called Section B.

The sub-mains—3 miles in length—called Section A.

The lateral sewers—about 5 miles in length—called Section C.

The outlet sewer encountered deep cuts—as high as 30 feet in rock for considerable distances—and was therefore the most expensive portion of the work; the sub-mains were nearly their entire length close to the Rahway river and the work was very wet, requiring continuous underdrainage and some sheathing—this added to the expense under ordinary conditions—but the laterals were constructed under fair conditions and at fair cost.

The following table will give some idea of the scope of the work and its cost complete:

	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	Cost.
Sec. A.....	.....	3,190.8	3,391.4	5,040.4	2,272.1	2,153.3	\$32,168 42
Sec. B.....	.....	.....	.....	3,987.7	.....	18,128.6	61,948 14
Sec. C.....	23,769.7	.....	2,079.1	.....	.....	.....	17,443 86
Totals.....	23,769.7	3,190.8	5,470.5	9,028.1	2,272.1	20,281.9	\$111,560 42

Total length of all, 64,013.1 feet.

Average cost per foot, \$1.74.

Section A, 16,048 feet, cost \$32,168.42; average, \$2 per foot.

Section B, 22,116.3 feet, cost \$61,948.14; average, \$2.80 per foot.

Section C, 25,848.8 feet, cost \$17,443.86; average, 67 cents per foot.

The system has been placed in operation and is working well. The sewage discharges into about 6 feet of water in the lower Rahway river, where it is subject to tidal influence, and is not likely to cause any offense in the near future. All the developed portion of the town is now provided with sewerage facilities, and such lateral sewer extension as the development of the township requires may be provided at a small additional cost compared with the cost of the work already done.

THE PLAINFIELD, N. J., SEWERAGE SYSTEM.

BY A. J. GAVETT, CONSTRUCTING ENGINEER.

The present year (1896) has seen the work completed which removes from the fair name of Plainfield its only blot—the lack of a system of sewerage.

Favored, as she was, with good air, soil and water, the reluctant admission by her inhabitants that all the wastes from their beautiful residences were confined in foul cesspools on their premises was sufficient, in the eyes of many visitors, to offset all the advantages offered by the city, and deter them from becoming residents.

To show that the need of drainage facilities was felt to be a vital one, it is only necessary to say that in the first four months after permission was given to make connections with the sewers 450 permits for connecting were issued, and this, too, in the unfavorable first four months of the year. At the present time nearly 600 buildings have been connected.

When it was first proposed to provide a system of sewerage for Plainfield, the objection was ready that "Plainfield was too flat and too far from tide-water."

The city certainly is a flat one, especially from northwest to southeast, but from northeast to southwest, parallel with the railroad and Green brook, the surface falls quite regularly at the rate of one in three hundred, while in the extreme eastern portion of the city the ground rises sharply into the terminal moraine of glacial formation.

The underwash from the ice sheet formed the plain on which the greater part of the city is built, the sand and gravel gradually changing to clear sand toward the west, where the sewage disposal beds are located, about forty feet lower than the business center of the town.

The nearest tide-water to which it was proposed to convey the sewage is at Martiu's Dock, on the Raritan river, nine miles distant by fairly direct roads.

A profile of this line shows that the highest elevation (120 feet) would be near the outlet of the sewer, which would have required the sewage to be pumped the entire distance.

The river below Martin's Dock is a circuitous stream, with low, marshy banks, and there was a strong probability that trouble would have arisen from fouling the shores. Considering, besides, the great cost of the force-main and pumping station, and especially the annual expense of maintenance, it was decided that disposal beds, located within the city limits, offered the best solution of the problem.

Another site, below Dunellen, in Piscataway township, which on some accounts was preferable, was investigated, but at the start the Piscataway town committee refused the city permission to locate the beds within their limits, so the plan was abandoned.

DISPOSAL BEDS.

The common council then acquired by purchase two tracts of land, about fifty acres in all, only a portion of which is used for sewage disposal. Part of the remainder is devoted to farming, and part was excavated to procure material for filling the beds, the excavated portion being left at the proper grade for future beds.

The beds as constructed are approximately 200 by 225 feet between centers of embankments, and were located on a side-hill and in the adjoining swamp.

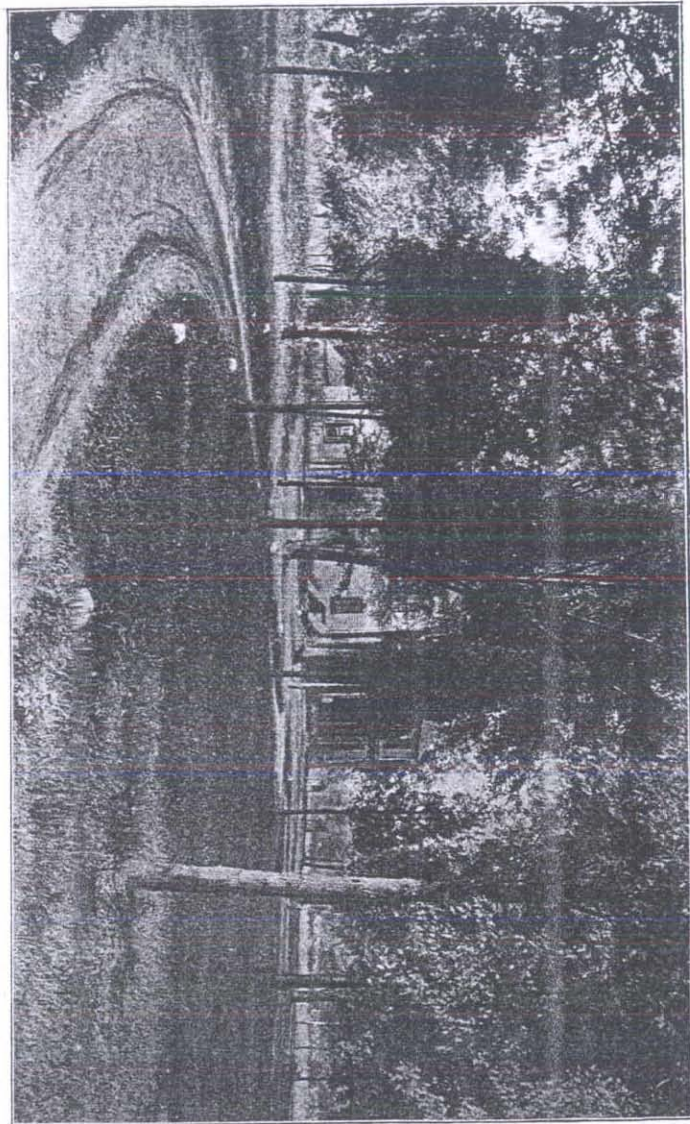
The hill was excavated, in some places ten feet, to form two tiers of beds, of four each, at an elevation of about sixty feet above mean tide, the material excavated going to the swamp land to fill two more tiers to a level about five feet lower. Still another tier along the brook remains for future improvement.

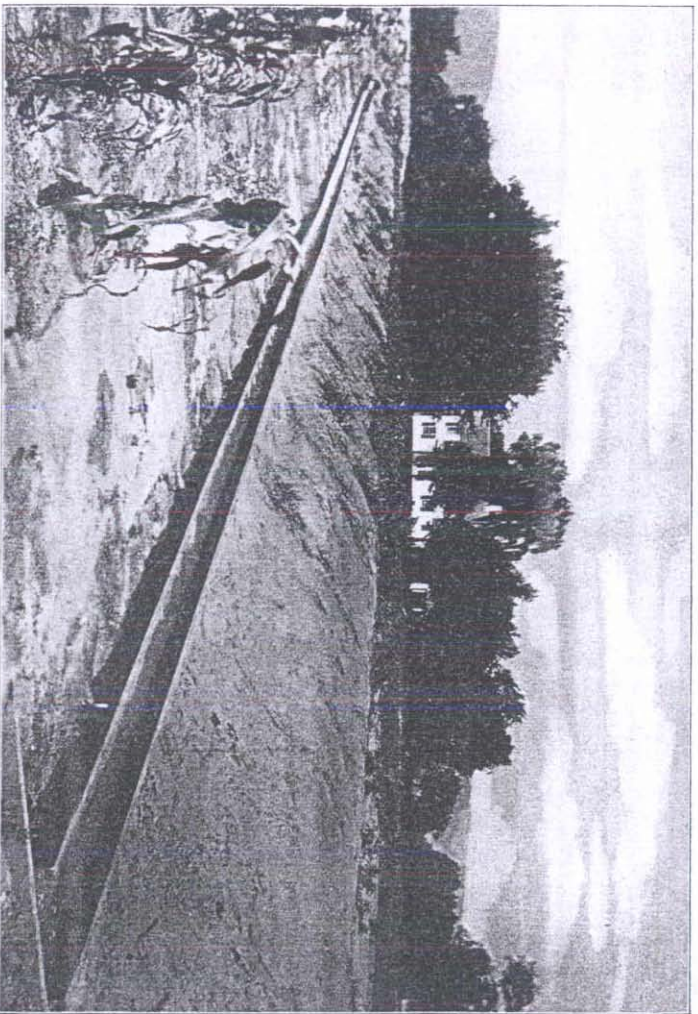
The sewage reaches the beds from the city through the 24-inch outfall sewer, terminating at the screen tank.

Under a trestle frame building are the two screen chambers, 5 by 8 feet, with horizontal screens of round rods, $\frac{3}{8}$ inch in diameter, spaced 1 inch apart in the clear.

At the ends of the screen chamber are the influent and effluent chambers, connecting with the former by 18-inch and 24-inch gates.

PLAINFIELD, N. J., DISPOSAL BEDS. ONE OF THE BUILDINGS. RESIDENCE OF MANAGER SLAPE.





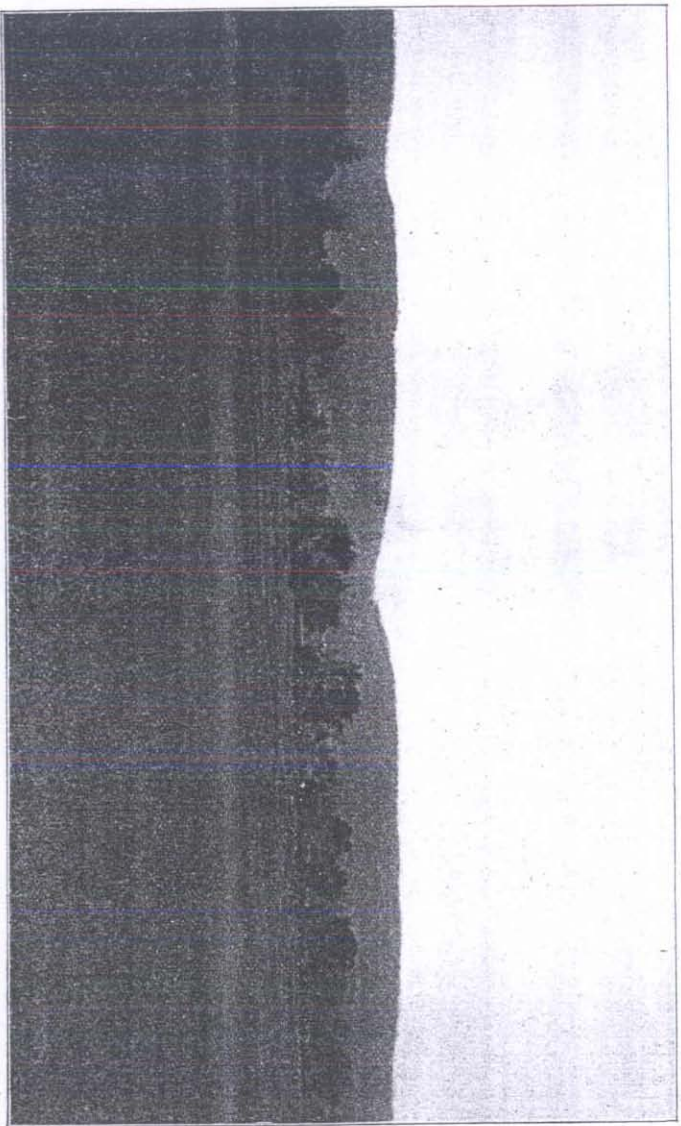
PLAINFIELD, N. J., DISPOSAL BEDS, DISTURBING CHANNEL, IN BED No. 1. (The Building Shown is to be Removed.)



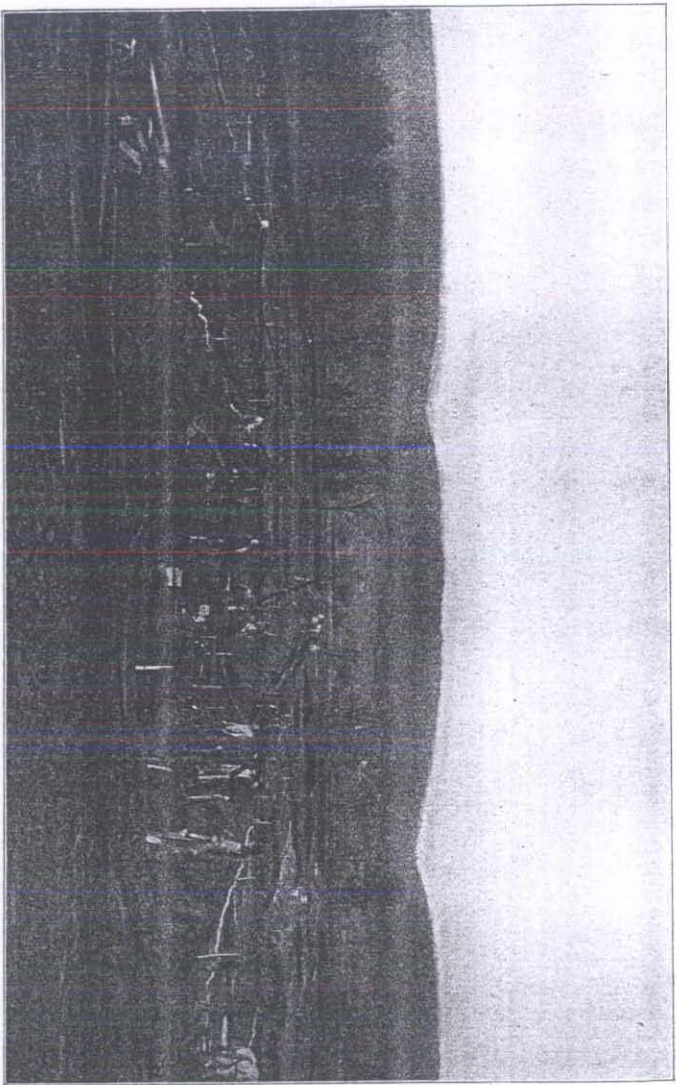
PLAINFIELD, N. J., DISPOSAL BEDS. View East from Bed 20 Before Startling Work. Swamp Land.

Oct. 19, '95.

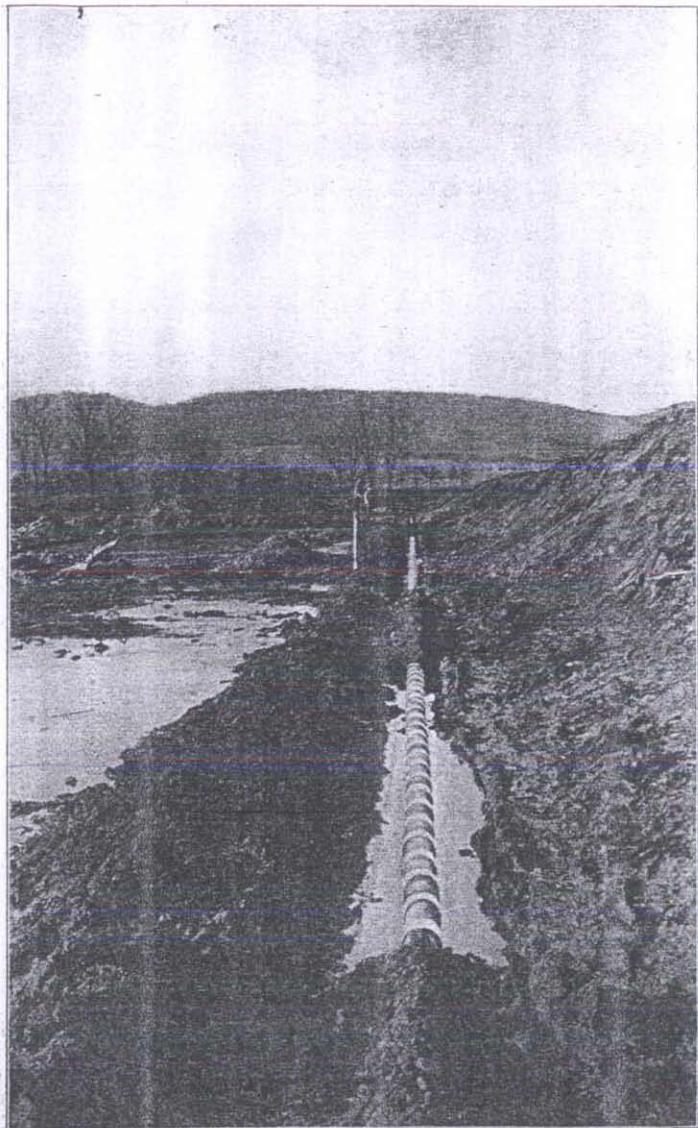
PLAINFIELD, N. J., DISPOSAL BEDS. VIEW FROM SOUTH CORNER (bed 4). STARTING WORK AT BROOK. Oct. 19, '36.



PLAINFIELD, N. J., DISPOSAL BEDS. LAYING UNDERDRAINS IN BED NO. 8.

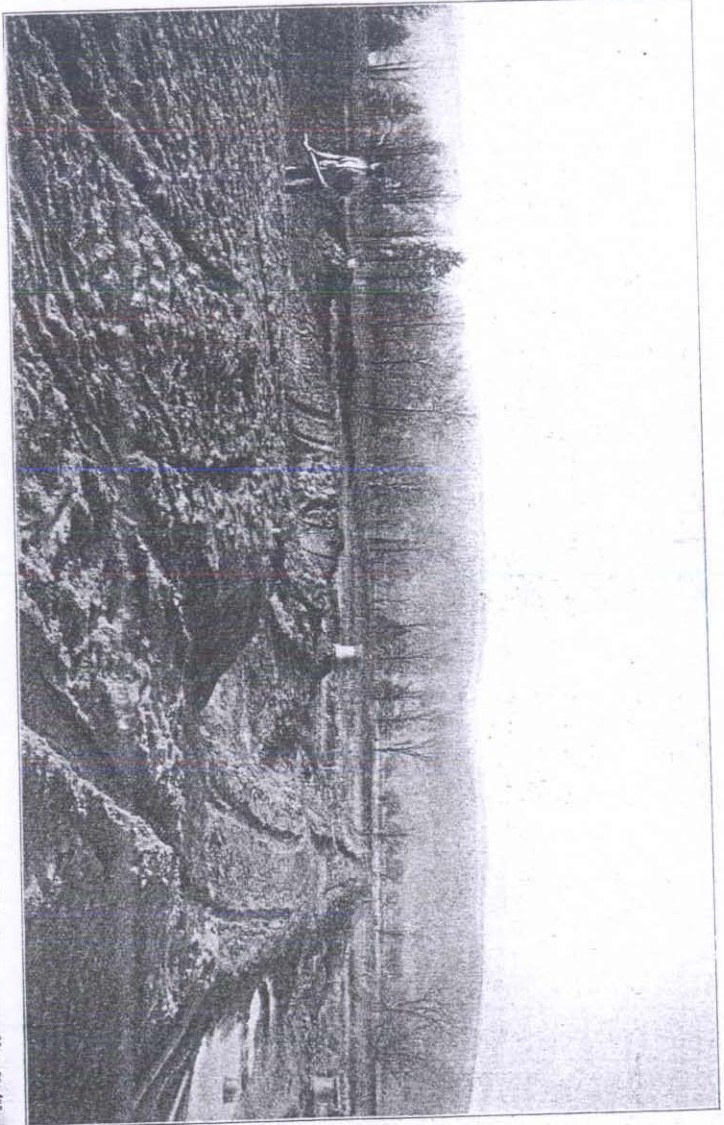


Nov. 19, '95.



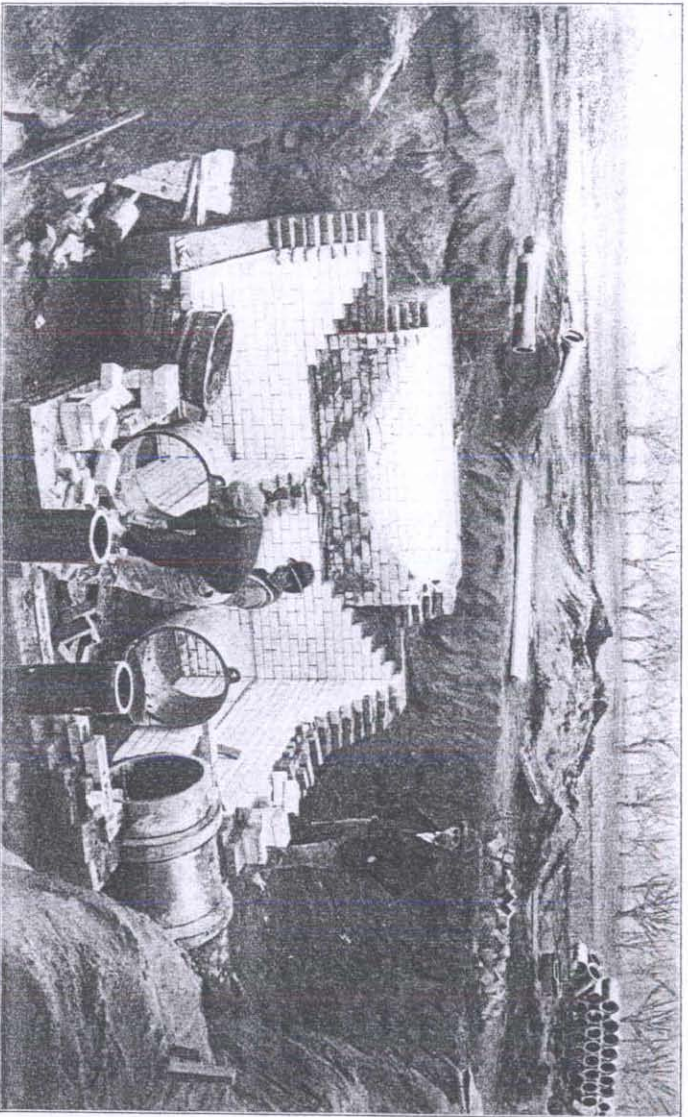
PLAINFIELD, N. J., DISPOSAL BEDS.
Covering 4-in. Underdrain in Bed No. 10, with Gravel.

Nov. 29, '96.



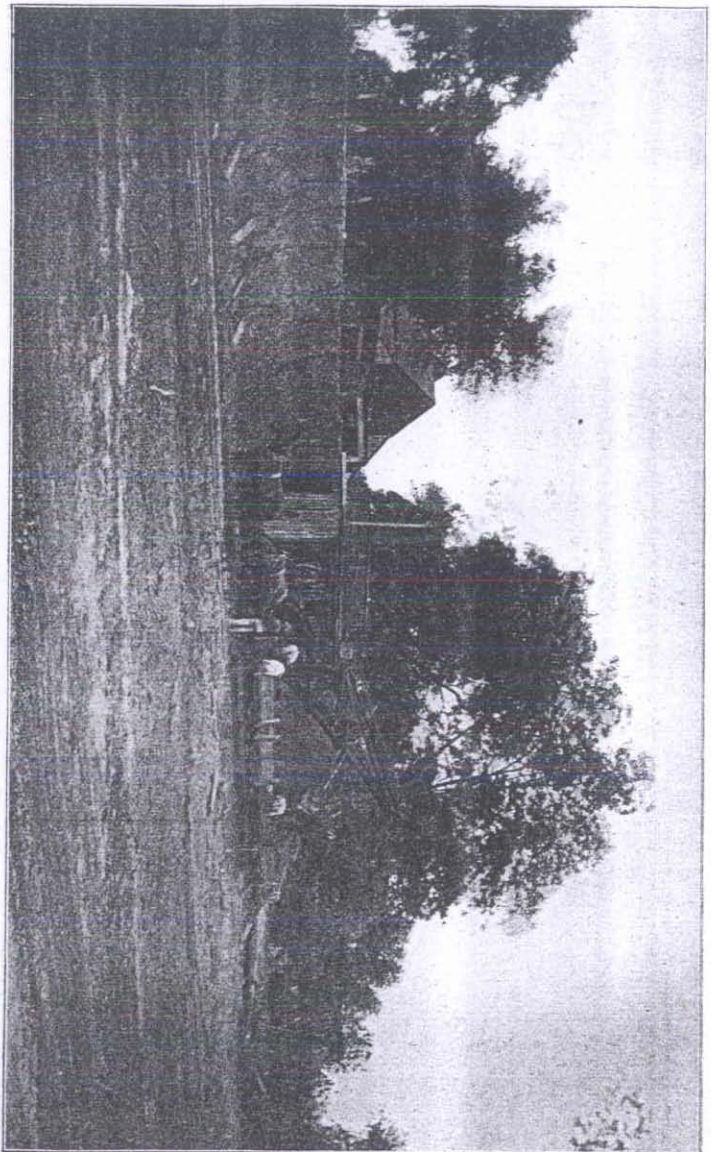
HAUNFIELD, N. J., DISPOSAL BEDS. Filling Bed 8. Showing 24-in. Manholes on Underdrains.

Nov. 29, '96.

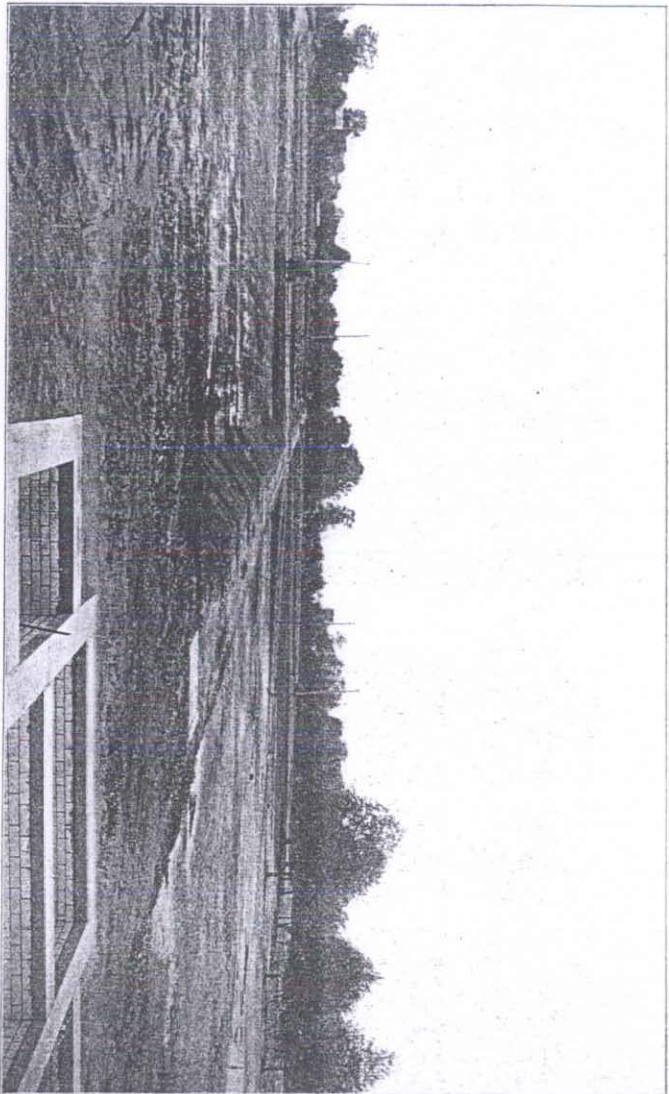


PLAINFIELD, N. J., DISPOSAL BEDS. SCREEN-TANK DURING CONSTRUCTION.

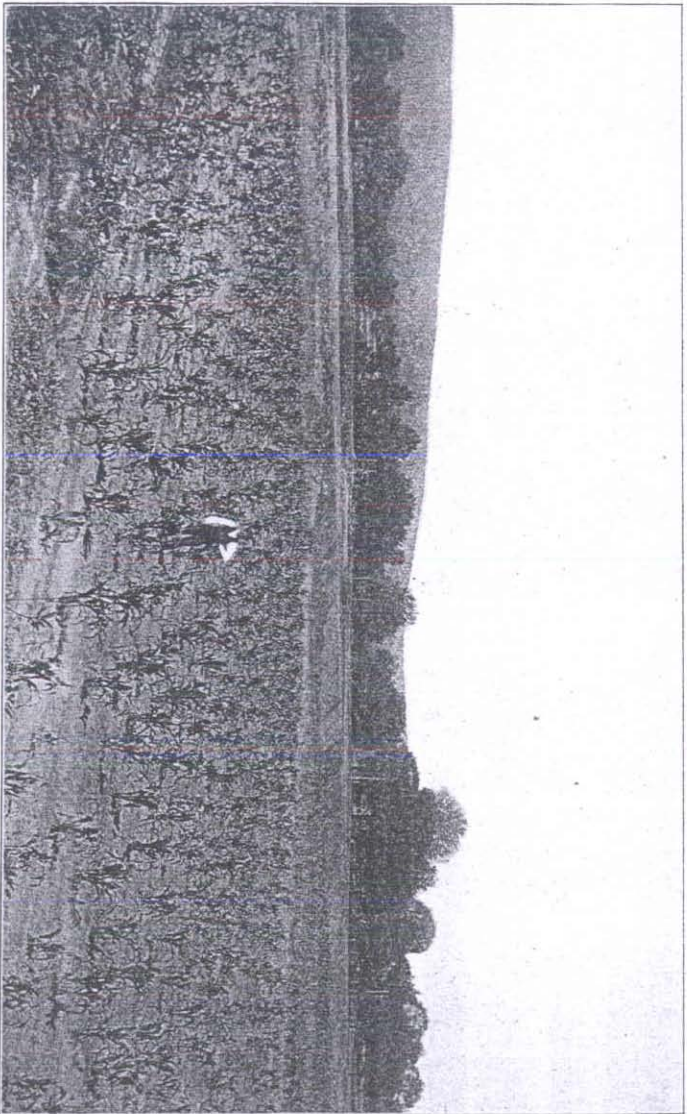
Dec. 31, '06.



PLAINFIELD, N. J., DISPOSAL HEADS, HORROWING SAND EAST OF ROOK AVE.



PLAINFIELD, N. J., DISPOSAL BEDS. View along Main Carrier from Screen-Tank (before Erection of Building). June 27, '06.



PLAINFIELD, N. J., DISPOSAL BEDS. VIEW NORTH FROM BED No. 4.

June 27, '06.

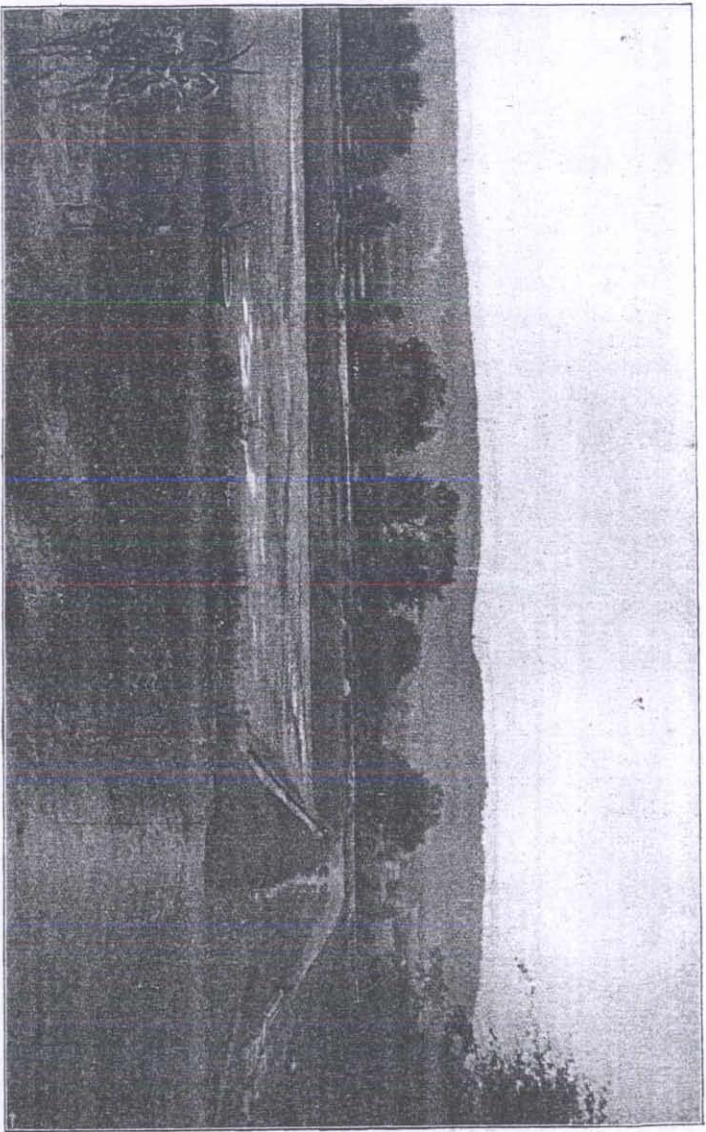


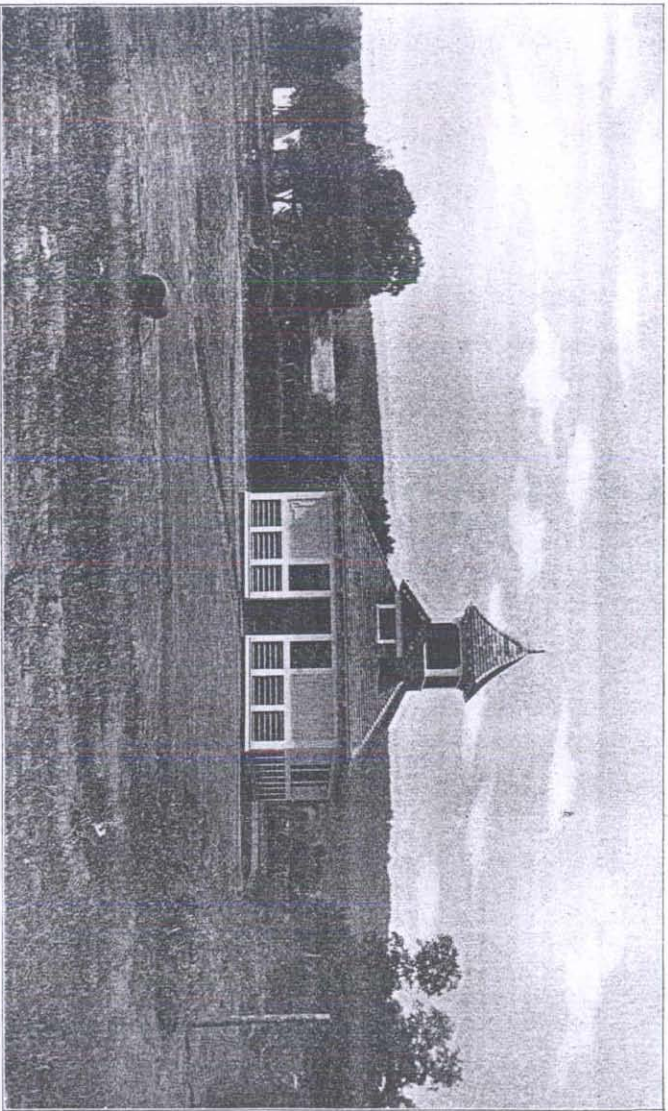
PLAINFIELD, N. J., DISPOSAL BEDS. IRRIGATING CORN IN BED NO. 8.

July 14, '09.

PLAINFIELD, N. J., DISPOSAL BEDS. VIEW OF FILLINATION BED NO. 10, IN WASHINGTON ROCK IN DISTANCE.

Aug. 17, '96.





PLAINFIELD, N. J., DISPOSAL BEDS. BUILDING OVER SCREEN-TANK.

Sept., 1896.

Only one screen chamber is used at a time, the other, meanwhile, being emptied and cleaned.

The sewage passes upward through the screens, the paper and coarser portions being retained underneath. Every two or three days, by opening one of two 8-inch gate-valves, the accumulation is run out on the screenings or sludge-beds, two in number, situated on the low ground near the brook.

They are 75 feet square, and are provided with under-drains 19 feet apart.

From the screen tank the sewage runs through carriers in the embankments, mostly 18-inch pipe, the gate chambers placed at the intersections of the embankments. From these it runs out in open wooden distributing channels, and, through openings in the sides, onto the beds.

In one of the gate chambers not much used at present, a weir has been constructed for measuring the quantity of sewage. This shows that at present the flow is about 225,000 gallons per day.

This sewage is now (September 1st, 1896) being all flowed on six beds, planted with field corn.

Eight beds are used for corn, but two of them are now ready for cutting, and no more sewage is being run upon them.

The corn has done remarkably well, being very sturdy, and is yielding a good crop; it was planted in clear sand, and received all its nourishment from the sewage.

The sewage is generally run on one bed for half a day, and then the bed is rested for a day or two.

When the corn was first planted, a laborer always controlled the flow of water when irrigating, diverting it into each furrow, as needed, by damming or opening up with a shovel.

As the corn grew and the "balk" between the corn rows was cultivated down, less attention was needed, until now, when there is a deep furrow between each row, the sewage distributes itself without any attention.

No deposit is ever removed from the corn beds, and yet the sand remains clear. The beds were never in better condition than at the present time, nor more free from odor. In flooding the filtration beds (those left level and not cultivated), a deposit is apt to gather wherever there is a slight depression. This is generally raked up and removed when dry.

The sand of which the beds are formed is much finer than that in other disposal beds, which have become well known. At Brockton, Mass., for instance, the "fine" sand is 0.30 millimeters (0.012 in.), effective size, and the "very coarse" is 0.76 m. m. (0.03 in.) At Plainfield the coarsest sand is about 0.30 m. m. (0.012 in.), and most of the beds are composed of sand of about 0.20 to 0.25 m. m. (0.008 to 0.01 in.), effective size. At Frammingham, Mass., the sand is also very much coarser than at Plainfield.

The effect of such fine sand seems to be to screen out a much larger proportion of the suspended matter than is done by the coarser sands, and leave it as a scum upon the surface. This does not occur at Frammingham, but is found at Marlborough, Mass., where the sand is finer.

The sewage, as it runs upon the beds, is a very turbid liquid, with considerable odor; the effluent as it flows into the brook is bright and clear. Chemically, of course, it shows its origin, but it is, to all appearances, as good as well-water.

For carrying off the effluent from the beds, three and four-inch agricultural tile drains are provided, laid about four feet apart, and from five to seven feet deep, emptying separately into Green brook. At the junction of these three-inch drains with the four-inch, a drop of about five feet occurs, and manholes of 24 inch vitrified pipe are constructed at these points.

SEWERS.

The sewers of the city are designed on the "separate" system, no rain-water being admitted to them; the flow of sewage is consequently quite uniform from day to day.

At the head of each eight-inch sewer a flush-tank is constructed which discharges 150 gallons of water automatically every twenty-four hours. These serve to keep the upper ends of the pipe clean, where the house connections are few and the flow correspondingly small.

Manholes and lampholes are provided at convenient points, so that every foot of the system, though buried deep in the ground, can be examined by means of mirrors or lamps.

Underdrains are laid with the sewers wherever the ground is wet; fortunately for Plainfield, few such places are found.

The system consists of over twenty-three and one-half miles of sewers, and more than six miles of four-inch curb connections.

The length of each size of sewer is as follows:

7,585 feet 24-inch sewer.

3,780 feet 18-inch sewer.

6,138 feet 15-inch sewer.

8,880 feet 12-inch sewer.

7,725 feet 10-inch sewer.

90,767 feet 8-inch sewer.

There are 195 manholes, 225 lampholes, 75 flush-tanks, 5,551 Y and T branches, and 779 extensions on these branches in deep cuts, to bring the opening nearer the surface for connecting. 12,788 feet of under-drains were laid with the sewers.

At the disposal beds 90,000 cubic yards of excavation were required, 11 gate-chambers were constructed and 2,900 feet of pipe, from 8 to 18 inches in diameter, were laid. Also, 2,900 feet of 24-inch surface drain and 19,500 feet of under-drains.

The sewers are ventilated through the the house-drains, sometimes by pipes outside the buildings, but generally through the soil-pipes.

The choice is left to the individual property-owners, but the experience in other cities with small pipe sewers (particularly in the Eastern States), tends to favor the omission of the disconnecting trap on the main drain, leaving a free opening 4 inches in diameter to a point above the highest part of the roof in every building.

The total cost of this work, with the amount paid for the disposal bed land (\$23,500) and including the necessary expenses, was \$160,000.

The force employed to operate the disposal beds consists of Mr. Clarence Sape, the manager, and two laborers. A horse is needed about half the time.

Some income is received from the rent of the two good buildings, and a third, intended to be removed, is occupied for the present by one of the laborers; some return will also be received from the crops, five acres of oats on the farm and eight of corn on the beds. Another year the area under cultivation can be greatly increased.

During the eight months in which the system has been in operation, no trouble has been experienced from stoppages of any kind, and occasional examinations of the sewers at the man-holes and lampholes have shown that everything is working in a satisfactory manner.

SEWERAGE AND SEWERAGE DISPOSAL AT PRINCETON, N. J.

BY FRANCIS HENRY, C. E., 120 BROADWAY, NEW YORK.

Princeton, the seat of Princeton University, is situated on a ridge in the center of Mercer county, along which runs the old post road from New York to Philadelphia. This ridge divides the drainage of the town, and in planning a sewerage system it was necessary to separate it into two districts.

The system used is known as the strictly "separate system," all storm-water being excluded and the pipes conveying sewage alone are regularly flushed by flush-tanks placed at the ends of branches.

The greater part of the town is provided for by the system and the few streets not having sewers may be connected at some later period at small expense.

The work as completed is as follows :

30,120 feet 8-inch pipe.

2,000 feet 6-inch pipe.

85 man-holes.

11 flush-tanks.

1 screening tank.

Man-holes were placed at all intersections and at all changes of grade, the pipe laid on a true grade and "Y" branches placed at points opposite every house and vacant lot. Tile-drain was laid in the trench at the side of the sewer in spongy ground, and wherever it was thought ground-water would accumulate in wet weather. Great care was taken in the prosecution of the work to secure tight joints, and in this the work was most satisfactorily done. At the head of each branch-sewer, with few exceptions, flush-tanks were built, some of the Miller type and others by simply building flap-valves in the man-holes and attaching the city water.

As has been stated, the system is divided into two districts, each having a separate disposal-field; district No. I providing for

the sewage of the Northern slope and discharging it two and one-half miles to the northeast of the town, and district No. 2 the southern slope, carrying it to a sewer-field a mile and three-quarters to the south. Both districts were built with 8-inch pipe, the minimum grade being 0.5 per cent., a grade sufficient to carry many times over the water-supply of the entire town with pipes running but half full.

DISPOSAL FIELDS.

In disposing of the sewage, Princeton has made use of a system bordering on intermittent filtration, and for that purpose the two districts were provided with fields ten and fifteen acres, respectively, sufficiently remote from the town.

The soil in these fields is of a character admissible of absorption, for the most part, being in the one case a permeable loam, underlaid with shale and clay, and in the other a loam having under strata of sand and loose rock in one portion and clay in another. The sewage is deposited on the fields by means of portable troughs, eight feet in length, of sufficient number to reach any portion of the field.

The fields are freed from water by means of underdrains, laid, on the average, three feet under ground and at varying distances from one another.

It is the intention of the town to use the utmost care in the regulation of the sewer fields, requiring the attendant to be constantly re-arranging the troughs and thereby resting the land and not overloading any portion.

At the time of writing the entire sewerage system has been in operation for over a month, the university buildings and those of the Theological Seminary, together with all the hotels, boarding houses and one hundred or more private families using it constantly during this time.

The system has been built by me partially after the plans prepared by Prof. McMillan, of Princeton College, some years ago.

SEWERAGE SYSTEM OF ROSELLE, N. J.

BY H. M. HERBERT, C. E., BOUND BROOK, N. J.

About three years ago the progressive citizens of Roselle saw the necessity of a sewerage system and brought the matter to the attention of the Mayor and Council. From the first they were confronted with the question as to the best manner of disposal. After a thorough investigation of the subject they wisely decided to discharge the crude sewage into tide-water in Staten Island Sound, a distance of about three miles.

Mr. C. P. Bassett, of Orange, was employed as designing and constructing engineer. The work was done by contract at a total cost of \$33,000, and consists of the following sizes of pipe:

TRUNK SEWER.	
2,663	lineal feet of 18-inch vitrified pipe.
9,100	" " 15 " " "
2,293	" " 12 " " "
1,193	" " 10 " " "
712	" " iron syphon.
498	" " 12 and 18-inch wooden flume.
<hr/>	
Total.....	16,459

LATERAL SEWERS.	
2,639	lineal feet of 12-inch vitrified pipe.
15,929	" " 8 " " "
<hr/>	
Total.....	18,568
Total length of both trunk and lateral sewers, 35,027 lineal feet.	

There are 15 Van Vranken flush-tanks, one at the dead end of each lateral.

This system has been in use for nearly a year and the sewer committee reports that it is giving perfect satisfaction. Since completing the sewers above described it has been found necessary to increase the system by extending the laterals to the western part of the borough. Last August, I was employed to

design and superintend the construction of the extension. The contract for this work was let on October 2d, amounting to \$7,500. The work consists of:

2,180 lineal feet of 12 inch vitrified pipe.
 4,260 " " " 10 " " "
 2,400 " " " 8 " " "
 21 manholes.
 14 lampholes.
 3 Van Vranken flush-tanks.

The material in the trenches is composed chiefly of stiff clay and coarse gravel, with some red shale. Water was also encountered on some of the sections. The work is to be completed January 1st, 1897.

SEWERAGE SYSTEM OF WESTFIELD, N. J.

BY F. A. DUNHAM, C.E.

Westfield is a suburban town on the line of the Central Railroad of New Jersey, about twenty miles from New York, with a population of about three thousand. The average elevation above mean tide-level is about one hundred and fifty-five feet.

The residence portions of the town have excellent surface-drainage, but in the business portion, through which flows a small stream draining a considerable area, great trouble has been experienced with ground-water. This trouble was so serious that, prior to the construction of the sewer system with its accompanying underdrains, no cellars could be dug over a considerable area in the most thickly settled part of the town.

The question of sewerage was first agitated in 1894, and the writer was employed to make preliminary surveys and plans for a system.

Two methods of disposal were considered; one by draining to tide-water below Rahway, via Cranford, in conjunction with that town, and another by land disposal. The former plan was rejected on account of the greatly increased expense and because it was deemed unwise to use a main jointly with another municipality, owing to questions of maintenance, etc., which might arise in the future and result in serious complications.

An excellent location for a disposal field was obtained about a mile and a half southwest of the village, at an elevation of about eighty feet above tide-water. The material ranges from a fine sand to a coarse gravel, so distributed naturally that no special assorting was necessary in the preparation of the beds. About twelve acres are at present ready for use and in case of necessity more available land owned by the town is immediately adjacent. The present indications are, however, that the area already prepared will be ample for many years to come.

The method of disposal is by means of intermittent filtration and broad irrigation. For the former purpose four level beds of

about three-quarters of an acre each, separated by earth embankments, have been prepared on the highest part of the disposal field. The remainder of the field, which is designed to be used for broad irrigation, slopes gradually from the filtration area to a brook which runs along the easterly side of the tract. The irrigation area is divided into a series of low, broad terraces with a brick distributing-channel at the upper side of each. These terraces decrease somewhat the rate of inclination of the field toward the brook, as the natural slope of the land was rather too steep.

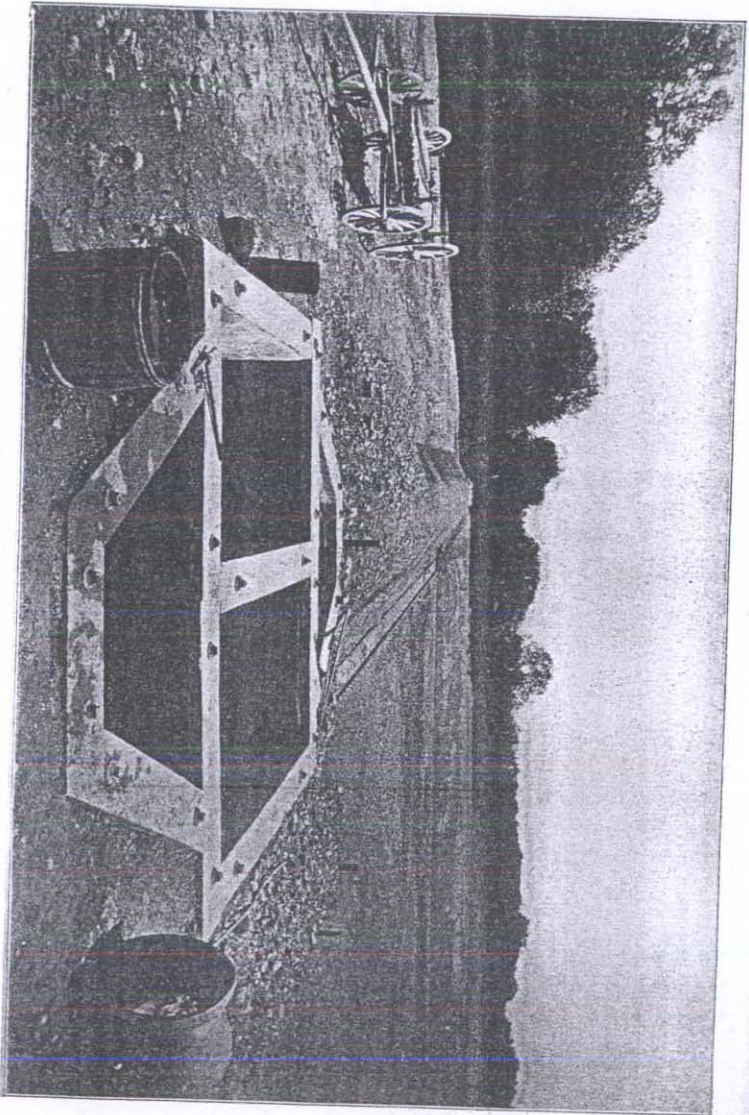
In the preparation of the filtration beds, which are all in excavation, the material was found to be such that no assorting was necessary. Three of the beds are composed of sand and fine gravel to the depth of at least six feet. These beds are not underdrained, the very porous substratum answering every purpose of drainage. The remaining bed is composed of a material which contains a large proportion of clay. This bed was underdrained with lines of four-inch agricultural tile laid fifty feet apart and about four and a half feet below the surface, leading to an eight-inch main drain which empties into the brook. The trenches in which the drains were laid were backfilled with sand and fine gravel. This bed filters more slowly than the other three, but gives equally satisfactory results.

The irrigation area consists of the natural soil with the most prominent irregularities leveled off, except near the brook, where the low land was filled in to a depth of from three to six feet with material obtained in excavating for the filtration beds. In making this fill, care was taken to keep the coarsest material at the bottom.

The sewage is delivered at the disposal field by an eighteen-inch main. It passes first into a screening tank, where the coarser part is retained by a horizontal screen having five-eighths-inch rods spaced one inch in the clear. The screening tank is built in duplicate, so that one chamber can be used while the other is being cleaned. The sludge chambers are emptied weekly on a small filter-bed, and after the moisture has drained off or evaporated, the sludge is removed from this bed and spread over the ground, to be plowed under or used for fertilizer.

SEWER SYSTEM, VIEW OF FILTRATION BEDS, LOOKING EAST, WESTFIELD, N. J.





SEWER SYSTEM, VIEW OF SCREENING TANK, WESTFIELD, N. J.

From the screening-tanks the sewage is led through an eighteen-inch pipe laid in the embankment which separates the filtration from the irrigation area to the gate-chambers, which are located at the corners of the filtration beds. The distribution of the sewage is controlled by means of gates in these chambers, from which it is conveyed, by means of brick distributing-channels, to any desired part of the filtration beds or irrigation field. These distributing channels are three feet in width, built of brick laid on sand, with openings about every six feet for distributing the sewage. They are built on two sides of each filtration bed and also in several places on the irrigation area. They have an inclination of one foot in a thousand.

The sewage is applied to the filtration beds, in turn, in "doses" of about 40,000 gallons. The irrigation area is seldom used at present. The sewage leaves a slight scum on the surface of the beds, which is raked up occasionally to be used as a fertilizer. No crops have been planted on the disposal field this year, but it is the intention to do so next season. One man takes entire charge of the beds at present, with occasional aid in moving and spreading the sludge. The work of constructing the disposal plant was done in a most creditable and satisfactory manner by Messrs. Smith and Conover, of Freehold, N. J., at a cost of \$8,434.99.

The sewers themselves compose a strictly separate system, nothing but house-drainage being admitted to them. They are kept clean by automatic flush-tanks at the head of every lateral, fitted with Rhoads-Williams siphons which operate perfectly. The single tanks have a capacity of one hundred and fifty gallons and discharge through a five-inch siphon. The double tanks, which flush two sewers, have a capacity of three hundred gallons and discharge through a six-inch siphon. A one-thousand-gallon tank with a six-inch siphon is placed at the head of the main which carries the sewage of the eastern portion of the town and is laid at the minimum rate of inclination. The flush-tanks, of which there are thirty-one, are arranged so as to discharge twice daily. No especially difficult work was encountered in the construction of the sewers, although considerable trouble was experienced with ground-water and quicksand in the lower portion of the town. Some deep cutting (from twenty to twenty-eight feet)

was made for a distance of about half a mile, in bringing the main, which carries the sewage from the eastern part of the town, through a ridge to the disposal field. A tunnel was driven most of the distance, as the material was favorable for so doing.

A feature of the system, which is highly appreciated by the residents of the town, is the relief from ground-water furnished by the under-drains, making possible the construction of cellars under buildings where it was heretofore impossible to do so, and to drain cellars already built which were formerly wet during the rainy season. The main underdrain is a ten-inch pipe and discharges into the brook, which drains most of the town. This pipe runs from one-quarter to one-half full constantly, and has the effect of lowering the ground-water in the lower parts of the town about five feet.

During construction, four-inch connections were laid from the sewer to the curb in front of all buildings on the line of the sewer, and in front of vacant property—where the owners so desired—to do away with the necessity of disturbing the streets in the future. There are about nine and a half miles of lateral sewers and three miles of mains in the system. Owing to sharp competition and low prices of material, the sewers were constructed at a very low cost. The laterals, with underdrains, cost about \$3,200 per mile, and the mains, \$5,900 per mile. The cost of laying the house-connections was twenty-one cents per lineal foot, with ten cents per foot additional when a cellar drain was laid in the same trench. The lateral sewers were built by Messrs. Stratford & Hawkes, of Brooklyn, N. Y., at a cost of \$29,840.05; the main sewers by John Marsden, of Utica, N. Y., for \$17,785.47, and the house connections by Messrs. Quinlan & Clark, of South Amboy, N. J., for \$4,120.13, making the total cost of constructing the sewers and disposal beds, \$60,180.64. The sewers have been in operation since July 17th, and two hundred connections have been made up to the present time.

The whole system was designed and the construction was superintended by F. A. Dunham, C. E., of Plainfield, N. J., and No. 150 Nassau street, New York. The construction was directly in charge of Mr. A. W. Vars, as principal assistant engineer. The total cost of engineering on the system was \$3,500; local inspectors were employed during the construction at a cost of about \$2,300.

Report on the Preservation of Food by Means of Sulphurous Acid.

At a largely-attended food exposition, held in the city of New York, one of the exhibits attracting much attention was that of a novel fruit, vegetable and meat preserving process. Great interest was shown in seeing fruit of all kinds, peaches, plums, apricots, pineapples, oranges, etc., and likewise vegetables, such as beans, corn, cauliflower, put up in glass bottles, loosely stoppered or not stoppered at all, and showing their natural colors and appearing as fresh as if newly dropped into clear water. The method of preserving also seemed so simple that at first it was difficult to suppress a certain feeling of incredulity.

In fact, however, the process is really only a novel application of a very old method of disinfection and preservation, depending upon the use of sulphurous acid. As is well known the disinfection of rooms in which a case of infectious disease has occurred is effected by burning sulphur. Furniture and wearing apparel are disinfected in like manner, although the process has the disadvantage of destroying the color of many articles, the sulphur gas being a strong bleaching agent.

Similarly, the process referred to uses the fumes of burning sulphur to destroy the germs of mould, fermentation, decay and putrefaction contained on the surface or in the interior of all fruits and vegetables. Whatever of novelty there is in it, consists in its affording an easy way, such as any housekeeper could employ, of burning the sulphur and of making the fumes effective for preserving, without at the same time doing other damage or suffocating the operator.

A small wooden box is employed—one 12 in. x 18 in. x 24 in., is recommended as of convenient size—and is placed on its narrow end. The lid is made to shut tight with hinges and a hook, like a door, and the chinks of the box closed by papering on the out-

side. Some trays are put in to hold the fruit, and on the bottom of the box a common earthenware bowl containing sufficient water to cover the articles when placed in the bottles in which they are to be kept. Then a cup containing a black powder, which consists principally of powdered sulphur, along with some added granulated sugar, charcoal, wood ashes, salt, and, in the case of fish and meat, some saltpetre, is placed on the bottom of the box. After seeing that the mixture is well lighted the door is closed and the combustion goes on until the oxygen is exhausted. The door should be kept closed for at least two hours.

During the interval the gas finds its way into the pores of the fruit and destroys the vitality of the germs. Finally, the fruit is taken out, placed in bottles, and the water, which is now acid from the rest of the absorbed gas, is poured into the bottles until the fruit is entirely covered. Sealing is unnecessary, the stoppers preventing the evaporation, and the dissolved gas preventing any germ development.

From the standpoints of health and dietetics, several questions of importance present themselves in connection with this process.

1st. Does it really preserve? So far as our present evidence is concerned, the answer should be in the affirmative. Many jars were exhibited, some of them stated to be a year or more in age, in which no evidences of change or decay were visible. And your committee prepared a number of fruits in this manner, and they have kept well during a period of eight months. If the fruit is intended to be eaten within a few weeks, one treatment is all that is recommended as necessary. If for a longer time, they are twice submitted.

2d. Are the flavor and nutritive value destroyed?

Apparently not. Much of the flavor and extractive matter finds its way into the liquid used to cover, but this liquid is not thrown away when the articles are used. It is raised to the boiling point, sugared to taste and then the fruit placed in the syrup and kept there until it is heated throughout and saturated with the liquid. Analysis showed, in the case of some plums which had been twice "processed," that the liquid contained 2.43 per cent. of dissolved vegetable juices and flavoring matters. If this liquid had been thrown away and the fruit cooked in fresh water, it would have had little of the characteristic taste and flavor of the fruit; it would not have been worth eating.

PRESERVATION OF FOOD.

The method above described is that recommended for preparing such "processed" fruit, and the reason of the recommendation is evident. On raising the liquid to the boiling point nearly all the sulphurous acid, which is a volatile gas, is expelled, the remainder being too little to affect the taste. By analysis it was found that there was contained in the liquor before heating four-hundredths of one per cent. of the gas. After boiling a couple of minutes only one-hundredth of one per cent. remained.

It is not recommended to eat the fruit without cooking, the sulphurous acid remaining in the liquid. Of course, vegetables would be cooked whether processed or not. The same remark applies to meat and fish.

3d. Is there enough of the chemicals left in the preserves to derange digestion or lead to more dangerous results?

With regard to the sulphurous acid, it has been already stated that, so far as the liquid is concerned, the amount is too small, after raising to boiling point, to be of any consequence. The same remark is true of the fruit itself, which contained, in the trial alluded to, only one three-hundredths of one per cent.

The sulphuric acid is a much more serious matter. This acid is generated in part when the sulphur burns. But the larger part is formed by oxidation of the sulphurous acid held in solution by contact with the air. The oxidation is hastened by exposure to sunlight, which also intensifies the bleaching. Thus it happens that the preserves eventually contain much more sulphuric than sulphurous acid. Experience with some twice-processed plums gave:

	In the liquor.	In the fruit.
Sulphurous acid.....	0.04 per cent.	0.005 per cent.
Sulphuric "	0.15 " "	0.06 " "
Fruit "	0.87 " "	0.23 " "

In other words there is little more than two-teenths of one per cent. of sulphuric acid in the liquor and fruit taken together. In eating a half-pound, which would be a rather liberal allowance for one meal, the total amount of free sulphuric acid would be seven grains.

The fruit acid gives flavor and piquancy and would be present naturally. It is not objectionable, but beneficial.

The saline chlorides are volatilized in the burning of the mixture. They are small in amount and of no consequence, amounting only to eight-hundredths of one per cent. in the liquor.

An examination of the various works on therapeutics and materia medica showed that whenever sulphuric acid is employed therapeutically, it is in much larger doses than those corresponding to the above figures. The consensus of opinion appears to warrant the statement that such a minute quantity of this acid in an article of food would not be detrimental to health.

ALBERT R. LEEDS.

STEVENS INSTITUTE, Hoboken, N. J.

The Paterson Isolation Hospital.

BY JOHN L. LEAL, A.M., M.D., HEALTH OFFICER,
PATERSON, N. J.

We have recently completed in Paterson an isolation hospital, the description of which follows. There were certain conditions and limitations to which we were subjected, however, which must be stated in order that the description may be thoroughly understood. We were limited to an expenditure of not more than \$26,670, the proceeds of the sale of \$25,000 worth of bonds. The site fixed by necessity was a hillside with a slope of twelve feet to the hundred on its most level part, which part terminated along its whole face in a sharp bluff twenty feet high.

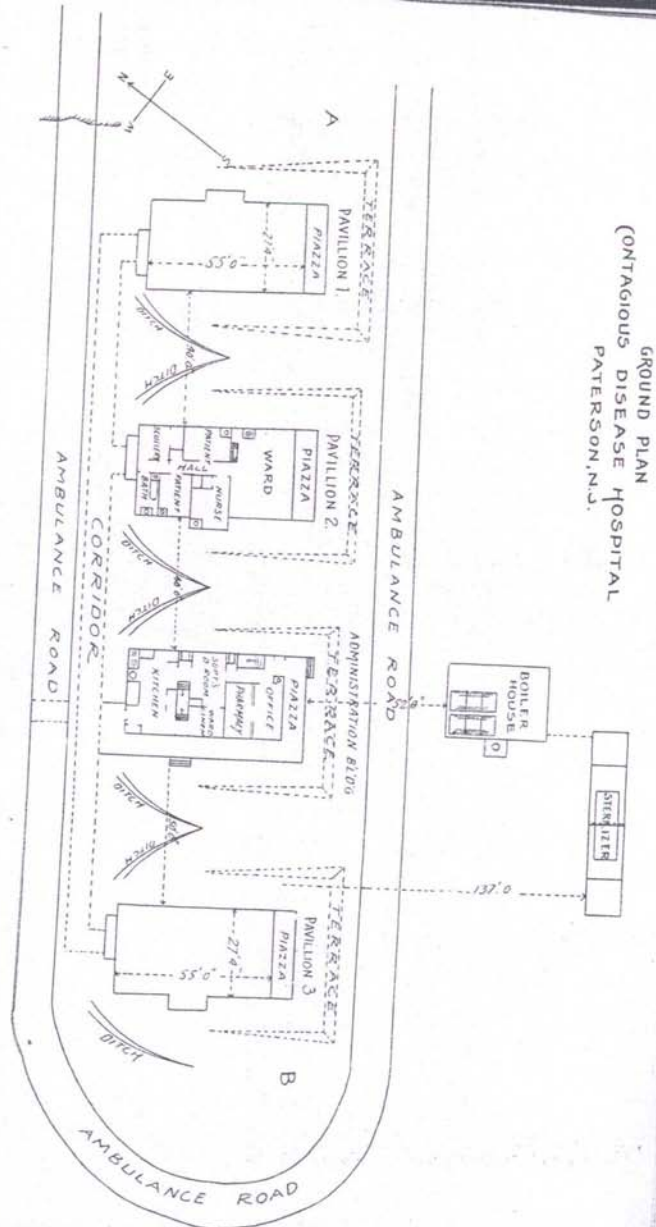
The means of approach and surroundings made it necessary to face the institution down the incline. The sewage of the institution had to be taken care of independently, and the water and gas had to be brought a distance of 2,000 feet. Grounds had to be excavated and leveled, roads made and bridges constructed. It was necessary to furnish enough beds to satisfy the present demands of a city of over 100,000 inhabitants, and to make possible future development on the same lines. Provision had to be made for the care and necessary isolation at the same time of patients suffering with at least three kinds of preventable diseases, for the separation of the sexes, and for private rooms for certain classes of patients. These then being the special conditions and limitations imposed upon us, we have attempted to solve the problem in the following manner:

The institution is composed of eight separate buildings, each building distant at least forty feet from its nearest neighbor. They comprise an administration building, three pavilions for patients, a boiler-house, a sterilizer building, a dead-house and a

stable. They are of hard-burned brick, pointed with red mortar, and with blue-stone trimming and slate roofs, with the exception of the sterilizer shed, the dead-house and the stable, which are of wood. The administration building and the pavilions, connected by a covered but open corridor, stand in a row, two pavilions on one side and one on the other side, the administration building facing and about fifty feet back from the bluff. The boiler-house and sterilizer shed, one back of the other, are in front of the administration building at the foot of the bluff. The dead-house and the stable are to the right, about three hundred feet from the nearest building and from each other.

The administration building is of three stories, with a wide piazza on the front and on one side which connects with the main corridor. It contains cellar and store-room, with laundry in the basement. On the first floor is the general kitchen for the institution, dining-room, pharmacy, office, and two water-closets, one for servants and one for officers. On the second floor are rooms for the keeper and matron, nurses, physicians, female servants and two bath-rooms. On the third floor are store-rooms and rooms for male servants. It is heated by direct steam radiation and lighted by gas throughout. Every precaution is taken to preserve the building from infection. In it eat and sleep all employees of the institution, except those in direct charge of patients, for whom provision is made elsewhere. Danger, due to the presence of the laundry in the basement, is averted by putting everything through the sterilizer before it is admitted to the laundry.

The description of one pavilion will answer for all, as they are identical in arrangement. The pavilion is of one story, with cellar and attic, and with piazzas at each end. Connection is made with main corridor by cross corridors from rear piazza. On this piazza open windows from service-room and bath and disinfecting-rooms. The door opens from piazza into a vestibule, from which doors open into a bath and disinfecting room, a service-room and main hall. The bath and disinfecting-room is equipped with tub, shower, basin, bicloride spray, stationary commode and slop-sink. In this room the patient is received and prepared for further admission. His clothing is placed in a bag, deposited through the window upon the piazza, whence it is taken



to the sterilizer building, sterilized and placed in the patient's clothes-closet. When a patient is about to be discharged the room is first disinfected, then the patient disinfected therein, the sterilized clothing passed in through window and the patient dismissed.

The service-room is equipped with sink, drip-board, hot-water boiler, with gas heater for use when there is no steam, gas stove for special and light cooking, steam warming table, dresser for crockery, and a closet for refrigerator and various kitchen utensils. The food is brought to this room from the general kitchen on a wheeled carriage, passed through the window from the piazza, transferred to other dishes, the original dishes returned through the window in a tray containing disinfectant solutions.

The hall extends from the vestibule to the ward. On the one side is the linen and general closet for the building and a patients' room. On the other side is another patients' room and the nurses' room. This room contains two beds, a closet and has an observation window looking into the ward. Two nurses are considered the full complement of a pavilion. They eat and sleep in it and are not allowed to come into contact with other nurses or employes, or indeed to leave the building, except for the regular exercise in a specified part of the grounds.

The two patients' rooms are similar; they contain one or two beds, as may be necessary.

The ward is the front half of the building, with windows on three sides; one of these on the end opening to the floor and serving as a door to the front piazza.

It contains from four to eight beds. The floors and base-boards throughout the building are of asphalt, the walls and ceiling double and ventilated from the outside and plastered with adamantine, the trimming is of well seasoned hard white pine, perfectly plain and rounded at corners. All furniture is of iron, glass and plain wood. Every corner of building made to be hosed out without damage, and floor is graded to escape-pipes for the carrying off of the water.

The heating is by steam on the direct-indirect system. Fresh air is drawn in from the outside through heated ducts, passes through radiators into the room, where we also have the direct radiation from radiators. The foul air is drawn out through flues

heated by coils of steam pipes, which flues extend above the roof. These are closed for purposes of disinfecting by a system of tight dampers operated from the attic. The fresh-air inlet-flues and radiators are all so arranged as to permit of thorough cleansing and disinfection. The windows are all double, both for the purpose of economy in heat and of assisting in the ventilation. The working capacity of both inlet and outlet-flues is based upon the requirements of the maximum capacity of the building. Twenty-one hundred cubic feet of air space, eight feet of wall space and two hundred feet of floor space is allowed for each patient.

The bedding consists of blankets to fold over the woven-wire mattresses, sheets, cover-blankets and spreads. Pillows are formed by covering folded blankets with sheets.

Furniture consists of brass-trimmed iron bedsteads, with adjustable head-rests and woven-wire mattresses, iron and glass bed-side tables, large iron nurses' table in ward, iron wash-stand for patient-room, iron operating-table, specially adapted for intubations and tracheotomy, rocking, and rolling reclining chairs, all of plain wood.

Every room in the building, with the exception of the service-room, has its stationary commode. These closets are all on the pail system. Under each closet there is a recess extending through the wall, closed from the outer air by an iron door. This recess is floored with asphalt, and its top and side lined with copper. A galvanized-iron pail with a long wooden handle is pushed through the door from the outside until it fits snugly under the seat of the closet. This pail contains disinfectant solutions, and may be withdrawn from the outside and emptied into precipitation tank as often as desirable.

There is no communication between the main floor and the cellar or attic. They are entered from the outside, and are only used as air spaces, and contain the various pipes.

The lighting is by gas, and there is telephone connection with the administration building.

It will be understood, on consideration of the above details, that, unless by reason of accident, no one save those belonging in it has occasion to enter a pavilion, with the single exception of the attending physician. He, moreover, is obliged to wear a

close gown and a hood, and to disinfect himself carefully on leaving.

The nursing service is in charge of St. Joseph Hospital Training School, and is performed by the pupil-nurses of that institution, each nurse being required to serve two months out of her two years' training service.

Disinfection of building and furniture will be by means of thorough flushing, live steam and bichloride sprays. Bedding, clothing, etc., are sent to the sterilizer.

The chief aim of construction has been to favor in every way possible this process. The idea has been to make the pavilions general utility buildings, capable of being used safely in any way necessity may demand. No attempt is made to devote a certain pavilion to the care of those suffering with a particular disease, but whatever its use may have been, after disinfection as above it is regarded as ready for any purpose required.

In the boiler-house is an arrangement whereby steam, gas and water may be turned on or off any building independently of the other. The boiler for heating and sterilizing purposes is a fifty-horse power. An auxiliary boiler for use in emergency will be put in shortly.

The sterilizer is a steel boiler shell, with an outer shell forming a steam-jacket. The interior of the shell is ten feet long and four feet in diameter. The bottom of the shell and the platform outside are tracked for an iron car which just fits inside of the shell. The car is loaded on the platform, pushed within the sterilizer, and the door, working on an overhead trolley, is closed and fastened with swinging bolts. Steam is first turned into the jacket and then into the shell. In the jacket, the steam pressure is limited to forty pounds; in the shell, it is limited to fifteen pounds. A pressure of fifteen pounds will raise the temperature of the shell to 248 degrees in eight minutes after the steam is turned on. When sterilization is completed, a vacuum is produced by means of a steam injector, the dry heat from the jacket continuing. The door is then opened, the car run out upon the platform and the goods unloaded. This sterilizing plant is intended for city as well as hospital use, and we consider it ample for the purpose. Probably the most interesting point about it is the cost. A year or two ago my friend, Dr. Hörbeck, astonished

us all by constructing a sterilizer for the needs of the city of Charleston, at an expense, if I remember correctly, of about \$1,200. This was, I believe, by far the cheapest ever erected up to that time. However, we have done a little better. Our plant, I think, is of somewhat greater capacity than the one in Charleston, and its cost, including absolutely everything but boiler and land, was \$815.

Surely that brings this most essential apparatus within the reach of every town.

The stable contains three stalls and shelter for four wagons, including the ambulance. The ambulance is so constructed that it may be thoroughly flushed and disinfected by bi-chloride spray.

The sewage is received into a tank in which it is precipitated and disinfected chemically. Solid matter is removed and used as fertilizer. Liquid flows off and through a set of three filter-beds, whence it is piped to a field and finally disposed of by broad irrigation. The total cost of this institution, including even the printing and advertising of the bonds, has been \$26,500, leaving a balance of \$180 out of the funds available.

Sub-Surface Drainage in the City of Orange.

REPORT OF INSPECTION.

To the Board of Health of the State of New Jersey:

Upon the request of two members of the local board of health of the city of Orange, viz., A. Eichhorn and G. H. Richard, M.D., an inspection of the natural water-courses in that city was made May 13th, 1896.

Two small brooks traverse the eastern slope within the city limits, and join together near the Washington street bridge; thence the water flows eastward and empties into the Passaic river near Belleville.

The western branch of this stream, the Watchung brook, still flows through its original bed, and it has not yet received sufficient fluid refuse to so seriously contaminate it as to make it offensive to sight and smell.

The course of the southern branch (Parrow brook) is through the built-up portion of the city, and this stream long ago became an open sewer.

To abate the nuisance caused by this offensive ditch, a storm-water drain was constructed to divert the water from the brook-bed. This drain is laid upon a grade considerably below the level of the bottom of the old water-course, and it is located beneath the roadway of streets, following the line of the old brook as nearly as possible.

The total length of this storm-water drain, together with the pipe laterals, is 10,838 feet, as follows:

Length of Drain.	Size of Drain.
5,823 feet.....	7-foot arch, 10 feet wide.
1,377 ".....	Diameter, 6 feet.
1,224 ".....	" 5 " 6 inches.
1,450 ".....	" 4 " 6 "
531 ".....	" 3 " 6 "
241 ".....	" 2 " 9 "

PIPE LATERALS.

Length	Diameter,	Size
78 feet.....	24 inches.	
269 ".....	20 "	
183 ".....	18 "	
154 ".....	15 "	

Total, 10,838 feet.

The total cost for the construction of this system of drains was as follows:

For the brick drains.....	\$234,454.13
For the pipe drains.....	87,810.59
	<hr/>
	\$322,264.72

The diversion of the waters of Parrow brook from the original waterway and the use of the artificial conduit has dried up much of the brook-bed, and in many places the old bed has been filled with earth and permanently closed. In other localities the old ditch remains open—a catch all for rubbish and filth, and in wet seasons a series of stagnant pools is created. At the time of my inspection numerous ponds of this character existed, all of them emitting foul exhalations.

Into several of these unfilled parts of the old brook and drain-pipes discharge waste fluids from dwellings.

In a considerable portion of the abandoned brook-bed the conditions now existing constitute a nuisance.

An abatement of these unwholesome and unhealthful conditions could, in my judgment, be secured by (1) closing up all house drains which now discharge into the old brook-bed, and (2) by providing for the quick disposal of the storm-water in the old bed by placing a line of porous tile along the bottom of the open portions of the ditch, said tile drain to discharge into the storm-water conduit which is already constructed, and (3) by filling up all unfilled sections of the brook-bed with clean earth.

It is reasonable to look to the local board of health for action in attempting to secure this very desirable improvement, and although legal complications may be met with in the effort to abate the nuisance caused by the present condition of the old ditch, yet the citizens of Orange will unquestionably sustain well-directed procedures to free the city from the series of filthy pools and pits which now exist along the old course of the brook.

On the west side of the ridge or divide which extends through the city, the east branch of the Rahway river flows southward along the west boundary of the city of Orange, and a large storm-water conduit has been constructed in this locality, similar in its uses to the one already described.

The length and size of this system of drains is as follows:

Length of Drain.	Size of Drain.
1,831 feet.....	Diameter, 6 feet, 6 inches.
433 ".....	" 6 "
2,033 ".....	" 4 "
400 ".....	" 3 "
734 ".....	" 2 " 9 "
651 ".....	" 2 "
<hr/>	
6,082 feet.	

Total cost of this drain, \$87,810.59.

Some portions of this brook-bed are open; others are partly filled with rubbish and water, and other portions are completely filled with earth.

This stream receives domestic and factory waste-fluids to a degree which renders it wholly unfit to discharge into the Rahway river, which furnishes the public water-supply for the city of Rahway. At the point of exit from the storm-drain, near Liberty street, Orange, the water of the brook was found to be inky-black in consequence of the discharge into it of the refuse from the dye-works connected with the hat factories located along the line of the brook and of the storm-water drain.

At Washington street, the discharging point of the great storm-water conduit, which carries the waters of Parrow brook, the outflow was found to be heavily charged with sewage, indicating that many dwellings have direct drainage connection with this drain. Inasmuch as this sewage-laden water flows to the Passaic river, and in view of the effort which now promises to be made

at an early day, to prevent further pollution of the Passaic by sewage, it seems clear that steps must soon be taken to entirely exclude sewage from all the natural water-ways and storm-water drains in the city of Orange. As sewers have already been provided, there is no obstacle in the way of promptly securing the disconnection of house-drains with the old water-courses and with the storm-water drains, and causing suitable connections of the house-drains with the public sewers.

This duty also falls to the local board of health of the city, and chapter 203 of the laws of 1896 gives the health board ample authority to speedily effect these changes.

RE-STATEMENT.

1. The unfilled portion of the old, disused beds of Parrow brook, and also of the brook emptying into the East branch of the Rahway river, lying in the city of Orange, constitute a public nuisance.

2. This nuisance should be abated by underdraining the said brook-beds, and by filling the old beds with clean earth.

3. All sewage now flowing into the old brook-beds and into the storm-water conduits should be cut off, and the discharge of sewage should hereafter be into the sewers only.

4. The local board of health should institute the necessary proceeding to accomplish these improvements.

Very respectfully,

HENRY MITCHELL,
Secretary.

New Jersey Sanitary Association.

The meeting of the New Jersey Sanitary Association, held at Atlantic City, December 6th and 7th, 1895, was well attended, and the papers and discussions indicated increasing interest throughout the State in the application of the principles of hygiene. The proceedings were published by the Association, and copies can be obtained by application to H. Brewster Willis, Esq., Chairman Publication Committee, New Brunswick, N. J.

Following is a list of the officers and members of the Association for 1896:

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First Vice-President—James Owen, C.E., Montclair.
Second Vice-President—John C. Smock, Ph.D., State Geologist, Trenton.
Third Vice-President—Supt. Vernon L. Davey, East Orange.
Recording Secretary—James A. Exton, M.D., Arlington.
Corresponding Secretary—Prof. J. Madison Watson, Elizabeth.
Treasurer—George W. Howell, C.E., Morristown.

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Townships—Local Sanitary Administration in—James A. Exton, M.D., C. F. Brackett, M.D., LL.D., D. E. English, M.D.

Publication—H. Brewster Willis, Counselor, Geo. W. Howell, C.E., James Owen, C.E.

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Davis, Wm. E., 44 Pine street, New York.
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 Davis, Jesse C., Bridgeton.
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 Meccary, Jas., M.D., Cape May City.
 Mickie, Wm. H., Ph.D., Trenton.
 Milnor, F. W., Burlington.
 Mitchell, Henry, M.D., Asbury Park.
 Morse, S. R., Atlantic City.
 Moses, Arnold H., Architect, Merchantville.
 Nelson, William S., Lakewood.
 Newhall, H. B., M.D., Plainfield.
 Olcott, Geo. P., C.E., East Orange.
 O'Neill, J. J., C.E., East Orange.
 Osborn, E. C., Princeton.
 Owen, James, C.E., Montclair.
 Parsons, R. H., M.D., Mt. Holly.
 Pierson, William, M.D., Orange.
 Pitney, Fred V., C.E., Morristown.
 Platt, I. H., M.D., Lakewood.
 Poland, Prof. A. B., Trenton.
 Powell, J. H., Bridgeton.
 Probasco, J. B., M.D., Plainfield.
 Raineer, Lewis, Ocean Grove.
 Raymond, Prof. C. H., Lawrenceville.
 Reeve, Dallas, Trenton.
 Reeve, R. H., Camden.
 Rochester, Roswell H., Englewood.
 Rockefeller, Geo. W., Plainfield.
 Ross, Randolph, Asbury Park.
 Saltonstall, G. D., M.D., Hoboken.
 Schaeffer, Joseph, Trenton.
 Schott, G. J. Van., M.D., Passaic.
 Scull, Henry S., Atlantic City.
 Shippy, W. H., M.D., Bordentown.
 Smith, Oliver Drake, Englewood.
 Smith, Robert W., Caldwell.
 Smock, J. C., Ph.D., Trenton.
 Spaulding, Prof. Randall, Montclair.
 Stickler, J. W., M.D., Orange.
 Stites, Wm., M.D., Washington.
 Stockley, George W., Lakewood.
 Struble, Daniel, M.D., Camden.
 Struble, W. McD., M.D., Trenton.
 Taylor, John E., Morristown.
 Tetreault, F. J. E., M.D., Orange.
 Underwood, Warner, Woodbury.
 Wallace, Shippes, Ph.D., Burlington.
 Ward, John W., M.D., Trenton.
 Ward, L. B., C.E., Jersey City.
 Watson, Prof. J. Madison, Elizabeth.
 Westcott, J. S., Atlantic City.
 Wetmore, Jacob S., 2 Wall St., New York.
 White, Urian, Asbury Park.
 Williamson, Nicholas, M.D., New Brunswick.
 Willis, H. Brewster, New Brunswick.
 Wilson, N. L., M.D., Elizabeth.
 Youngman, M. D., M.D., Atlantic City.

CONSTITUTION AND BY-LAWS OF THE NEW JERSEY SANITARY ASSOCIATION.

ARTICLE I.

This society shall be called THE NEW JERSEY SANITARY ASSOCIATION.

ARTICLE II.

The objects of this association shall be, the improvement of the sanitary condition of the people and (as far as connected therewith) the advancement of their economic and moral interests:

First, By promoting the investigation of facts and principles relating to personal, domiciliary and public Hygiene;

Second, By diffusing information on the laws of health and life, and the best means for their application;

Third, By such other influences and agencies as may be deemed expedient.

ARTICLE III.

1. The Association shall consist of the following members:

The Governor of the State, the Mayor of every city in the State, the County Superintendent of Schools of every county, and the Superintendent of Schools in every city in the State, shall be ex-officio members of the Association.

2. The Council of every city or town; every Township Committee; every Board of Health of any city, borough or township; every State, county or city Medical Society; any Pharmaceutical Society; any Association of Engineers or Architects which has regular meetings and has been in existence six months; any Sanitary Association of any city, township or county which has been organized six months and holds stated meetings—shall each be entitled to representation by delegates, not exceeding three in number from any one organization.

3. Besides these, any citizen of the state may, on the proposal of any member, be elected to membership at the Annual Meeting or by the Executive Council at any time, by a majority vote of those present at any regular meeting.

4. Each member, whether delegated or elected, shall pay annually the sum of one dollar as a membership fee.

ARTICLE IV.

1. There shall be a President, three Vice-Presidents, a Recording Secretary and a Corresponding Secretary and Treasurer.

2. There shall be an EXECUTIVE COUNCIL, composed of the above-named Officers and members especially elected thereto, not exceeding twenty-five in number. Ex-Presidents of the Association shall be Honorary members of the Executive Council, with all the privileges of elected members.

3. Any five members of the Council shall constitute a quorum.

4. The duties of the Council shall be to consider and present to the Association such subjects for discussion and to recommend such measures and order of business as they shall deem expedient. They shall have power to fill any vacancies that may occur in their own number or among the Officers specified in Section 1 of this Article. They shall, at a meeting of the Council held on the first day of the Annual Meeting, appoint two of their number to audit the Treasurer's accounts, who shall report to the Association; they shall also nominate Officers of the Association for the following year, and report the same to the Association, but other nominations for any office shall not be excluded.

5. The President shall appoint, before the close of the Annual Meeting each year, a Standing Committee on Legislation, consisting of not less than five nor more than nine members, who shall consider all proposed laws affecting the public health, advocating such as may, in their judgment, be beneficial and opposing such as may be deemed prejudicial thereto.

ARTICLE V.

All Officers and the Standing Committee shall be elected for the term of one year, and until their successors shall be elected.

ARTICLE VI.

An Annual and other Meetings shall be held at such times and places as the Executive Council shall determine, notice of which shall be sent to the members at least ten days before the time appointed.

Ten members shall constitute a quorum at all meetings of the Association.

ARTICLE VII.

This Constitution may be altered or amended at any Annual Meeting by a three-fourths vote of the members present, provided that the proposition to alter or amend be made at one session and action thereon be deferred to a subsequent session of the same Annual Meeting; but if such proposition be made at the last session of an Annual Meeting it shall require a unanimous vote to alter or amend.

BY-LAWS.

ARTICLE I.

The Executive Council shall meet at least once between the Annual Meeting, and at such other times as it may deem necessary, or the Chairman (or in his absence the President of the Association) may call a special meeting.

ARTICLE II.

The Order of Business for the Annual Meeting, as arranged by the Executive Council, shall be printed and sent to the members of the Association at least ten days before the Annual Meeting, and any changes in the programme shall be announced by the Secretary at the beginning of each session.

ARTICLE III.

1. Nothing of a political or partisan character shall be permitted.
2. Cushing's Manual of Parliamentary Law shall be followed in all cases not covered by the Constitution and these By-Laws.

ARTICLE IV.

These By-Laws may be altered, amended or suspended at any stated meeting by a two-thirds vote of the members present.

The meeting for 1896 will be held at the Laurel House, Lakewood. The programme is as follows:

FIRST SESSION.

Friday, December 11th, at 3:30 P. M.

1. Report of the Committee of Arrangements, Isaac Hull Platt, M.D., Lakewood.
2. Statement of the Objects of the Association, Shippen Wallace, Ph.D., President.
3. Report of Committee on Inspection of Factories, Joseph Wm. Stickler, M.D., Chairman.

4. Report of Committee on Improvement of Sanitary Administration in Townships, Jas. A. Exton, M.D., Chairman.
5. The Public Health Laws of New Jersey, Judge W. M. Lanning, Trenton. Discussion, Samuel A. Patterson, Esq., and Thomas P. McKenna, Esq.
6. Inspection of Dairies, Geo. W. McGuire, State Dairy Commissioner, Trenton. Discussion, Franklin Dye, Esq., Secretary State Board of Agriculture; Dr. Joseph F. Edwards.
7. Treasurer's Report.

SECOND SESSION.

Friday, December 11th, at 8 P. M.

8. Prayer by Rev. Charles H. McClellan, D.D., Lakewood.
9. Progress in Public Hygiene, Prof. C. F. Brackett, M.D., LL.D., Princeton.
10. Influence of Schools upon the Spread of Diphtheria, Samuel H. Durgin, M.D., Health Officer, Boston, Mass. Discussion, Prof. J. M. Ralston and James Owen, C.E.
11. The Influence of Clean Streets upon the Health of our Cities, George E. Waring, Jr., C.E., Commissioner of Streets, New York City. Discussion, Henry C. Greene, Esq.
12. Water Supply of the City of Newark, Illustrated with Lantern Views, Herbert B. Baldwin, Chemist of City Health Board, Newark.

THIRD SESSION.

Session will Commence at 9 O'clock.

13. Bacteriological Investigations and the Advantages Offered by the State Laboratory, H. D. McCormick, M.D., Princeton.
 14. Infectious Diseases Among Animals, William Herbert Lowe, D.V.S., Paterson.
 15. Improvement of the Newark Meadows, J. C. Smock, Ph.D., State Geologist.
 16. Milk—How it Should be Collected, Transported and Stored, Prof. Edward B. Voorhees, Ph.D., New Brunswick. Discussion, Richard Pearce Francis, M.D.
 17. River Pollution, E. J. Marsh, M.D., Chairman River Improvement Commission.
 18. Duties of Health Officers, John L. Leal, M.D., Paterson.
- Miscellaneous Business.
Election of Officers.
Unfinished Business.
Adjournment.

Circulars and Laws.

The following list of circulars is now in print and ready for distribution:

- Circular 7.—Protection to Bathers.
 " 39.—To Local Boards of Health, Their Duties.
 " 42.—Kerosene Oil.
 " 45.—Cholera.
 " 47.—Prevention of Injury to the Mind, the Eyes and the Ears.
 " 50.—Contagious Diseases of Animals.
 " 53.—Pure Drinking Water—How to Secure it.
 " 59.—Laws and Regulations Concerning Adulteration of Foods and Drugs.
 " 60.—Public Health Laws.
 " 61.—Care of Household Wastes.
 " 63.—Farmers' Houses and Their Peril.
 " 65.—Plumbing, Drainage and Ventilation of Buildings.
 " 66.—Marriage, Birth and Death Returns.
 " 67.—Care and Burial of the Dead.
 " 69.—Meat, Poultry, Game and Fish as Foods. How to Judge Quality.
 " 70.—Bulletin 1.
 " 72.—Vital Statistics.
 " 73.—Cities.
 " 77.—Diphtheria.
 " 79.—Laws Concerning Marriage.
 " 81.—Bulletin 2.
 " 82.—Isolation Hospitals.
 " 83.—Tuberculosis.
 " 84.—Bulletin 3.
 " 85.—Bulletin 4.
 " 86.—Bacteriological Diagnosis.
 " 87.—Dangerous Communicable Diseases.
 " 88.—Laws Relating to the Public Health.

NEW CIRCULARS.

The board has published two new circulars during the year. Circular 87, Dangerous Communicable Diseases, and Circular 88, Laws Relating to the Public Health. Circular 87 was pre-

pared to take the place of Circular 44 and others which are out of print. Circular 88 presents in convenient form the most important acts of the Legislature relating to the public health. This compilation has been in demand by health officers, and it will prove a valuable aid to all whose duties require frequent reference to the health laws.

At a future time the board will endeavor to publish the decisions having general application which have been rendered by the courts in cases brought to trial under these laws.

CIRCULAR 87.

CONTENTS.

1. Mortality from Infectious Diseases.
2. Instructions for Preventing the Spread of Infectious Diseases.
3. Disinfection of Discharges.
4. Disinfection of Utensils.
5. Disinfection of Clothing, etc.
6. Nurses.
7. Precautions during Convalescence.
8. Final Disinfection of Sick-room.
9. Disinfection of Refuse.
10. Attendance of Children at School.
11. Precautions in case of Death.
12. Notification of cases of Infectious Diseases.
13. Chapter 260, Laws of 1895.
14. Bacteriological Diagnosis.
15. Vaccination.

1. *Mortality from the Dangerous Infectious Diseases.*—The total mortality in the State of New Jersey, from all causes, during the year ending June 30th, 1896, was 30,634. Of this number 10,192, or thirty-three per cent., were caused by the ten chief preventable diseases, as follows:

Consumption.....	3,542
Diarrhoeal Diseases of Children.....	3,746
Diphtheria and Croup.....	1,484
Enteric Fever.....	568
Whooping Cough.....	272
Scarlet Fever.....	264
Malarial Fever.....	144
Measles.....	95
Erysipelas.....	74
Small-pox.....	25
Total.....	10,192

During the past seventeen years, 1878-1895, these diseases have caused 164,208 deaths, or an annual average of 9,659.

General Instructions for Preventing the Spread of Diphtheria, Scarlet Fever, Typhoid Fever and Small-pox.

2. *Isolation of the Sick.*—Promptly separate the sick person from the other occupants of the house, placing him, if possible, on the upper floor of the building and removing all hangings, carpets and other unnecessary articles of furniture and clothing from the room. In cases where the dwelling does not permit proper separation of the patient from other members of the household, he should be removed to an isolation hospital. No article whatever should be carried from the sick-room until it has been treated as described in paragraph 4.

3. *Disinfection of Discharges.*—All discharges from the sick person should be received in a porcelain vessel containing half a pint of a solution of corrosive sublimate. The solution should be made as follows: Corrosive sublimate, one-half ounce; muriatic acid, one ounce; aniline blue, five grains; water, four gallons. This solution is poisonous. Another half pint of the solution should be added to the discharges before they are emptied into the water-closet.

4. *Disinfection of Utensils.*—Dishes, spoons and other utensils, used by the sick person, should be placed in a metallic vessel holding not less than one gallon of water. This vessel should be placed outside of the door of the sick-room, and twice in each twenty-four hours it should be removed to the kitchen range and its contents should be boiled for at least thirty minutes.

5. *Disinfection of Sheets, Undergarments, &c.*—Towels, undergarments, sheets and pillow-cases should be immersed in water, in a metallic wash-bottle, and boiled for no less than one hour. Soft paper and small pieces of cotton cloth should be used instead of handkerchiefs, and when soiled these should be immediately burned in the sick-room.

6. *Nurses.*—Persons attending on the sick should remain within the isolated apartments. Dresses of washable material should be worn.

7. *Precautions During Convalescence.*—The scales and dust from the skin in scarlet fever, small-pox and measles are highly infectious, and all portions of the surface should be rubbed with vaseline very day to prevent the dry particles from being carried about by air currents. When sufficiently recovered, the patient should have a warm bath every day until the skin has ceased to peel off. When the patient leaves the isolated apartments or premises, he should first be bathed, including thorough washing of the hair and scalp, and be clothed in uninfected garments, and no article whatever should be removed from the infected premises until after the final disinfection of the sick-room.

8. *Final Disinfection of the Sick-room.*—Articles which are of little value should be burned in the sick-room. When practicable, remove all remaining clothing, bedding and other articles which can be transported, and expose them for thirty minutes to a temperature of 240° in a steam sterilizing chamber. In localities where no such disinfecting chamber is provided, all of the contents of the room should be treated by the free application of a solution of corrosive sublimate (1 to 1,000). This can be done effectually by immersing all clothing, garments, sheets, blankets, etc., in wooden tubs containing the solution, and by thoroughly saturating with the solution all of the articles

in the room, including the mattresses, pillows and carpet, and also the side walls, wood-work and floors, by the use of a garden pump and hose with a large rose or spray-producing nozzle. After twenty-four hours the garments, blankets, etc., should be boiled and then washed with soap and hot water. The wood-work and furniture should be scrubbed with soap and water.

9. *Disinfection of Refuse.*—All masses of infected filth, in privy pits or in heaps or piles, should be covered liberally with dry chloride of lime.

10. *Attendance of Children at School.*—Children should not be allowed to attend day-school nor Sunday-school from a house in which there is an infectious disease. No child should be allowed to return to school until a certificate from the medical attendant shows that there is no longer any danger that other children will be infected.

11. *Precautions in Case of Death.*—In case of death the body should be enveloped in sheets saturated with the solution of corrosive sublimate (1 to 1,000) and be placed in a coffin as soon as possible. The burial should take place without delay and the funeral should be strictly private.

12. *Notification of Cases of Infectious Diseases.*—Section 1 of the following act requires that physicians shall report certain communicable diseases to the clerk or other designated officer of the local board of health. In addition to the diseases named in this section, local boards of health may by ordinance specify such other communicable diseases as they may deem necessary, and require reports of the same. Section 2 provides that the clerk or secretary or other officer of the local board of health shall transmit, at least once in each week, by mail, to the office of the State Board of Health, Trenton, upon blanks furnished by the State Board, a statement of the number of cases of preventable diseases which have been reported to the local board.

13.

CHAPTER CCLX, LAWS OF 1895.

An Act for the protection of the public health.

1. BE IT ENACTED by the Senate and General Assembly of the State of New Jersey: That every physician shall, within twelve hours after his first professional attendance upon any person who is suffering from cholera, yellow fever, typhus fever, leprosy, plague, trichinosis, small-pox, varioloid enteric (or typhoid) fever, diphtheria, membranous croup, scarlet fever, or any other contagious, infectious or communicable diseases which hereafter may be publicly declared by the state board of health to be preventable and specially dangerous to the public health, report such sickness to the clerk of the local board of health having jurisdiction over the territory within which such sickness may be, or if such local board of health shall have designated some other officer thereof to receive such reports, then to such officer, which report shall be in writing, signed by such physician, and shall set forth the name, age and precise location of the person suffering from such disease; and every house-owner, or householder who knows that any person living, dwelling or being in any building under his control is affected by any of the contagious, infectious or communicable diseases hereinabove specified or referred to shall, when no physician has professionally attended such sick person, within twelve

hours after discovering the same, report the fact in writing to the same person and in the same manner as any physician attending such sick person would be required to do as hereinabove set forth; and on the thirtieth day of June and the thirty-first day of December in each and every year every physician, house-owner and householder making any report or reports as in this section required, shall be entitled to receive from the officer to whom such report or reports shall have been made during the preceding six months, a certificate in writing under the hand of such officer, setting forth the number of names of persons reported to have been affected with any of the diseases hereinabove specifically named or referred to, which certificate when presented by such physician, house-owner or householder to the proper disbursing officer of the city, borough, town or other local municipal government or township within which such affected person may have been, shall entitle such physician, house-owner or householder to receive from such disbursing officer the sum of ten cents for each and every name by such certificate certified to have been reported, unless such notification shall be found to have been erroneous; and any physician, house-owner or householder who shall refuse or neglect to perform the duty hereinabove required of him shall be liable to a penalty of fifty dollars.

2. *And be it enacted*, That the facts contained in every report filed with the clerk or other officer of any local board of health, pursuant to the provisions of the first section of this act, shall be entered by the officer to whom the same shall be delivered in a book kept exclusively for that purpose, which book shall be subject to the inspection of the local board of health and its proper officers, and to the state board of health and its officers only; the officers of the local board of health to whom such report shall be delivered, and whose duty it is to make record of the same, as in this section above set forth, shall also, at least once in each week, and daily when required by the state board of health, transmit the facts stated therein by mail to the board of health of the state of New Jersey, at Trenton, and shall further keep the said state board of health constantly informed concerning the measures which are employed by the local board of health to prevent the spread of the diseases in such reports mentioned, which facts and information shall be conveyed to the said state board of health in writing, and upon such blank forms as may be furnished by the said state board of health; any officer whose duty it is to make any report to said state board of health, as in this section above provided, and who neglects or fails to perform such duty, shall be liable to a penalty of fifty dollars for each and every such neglect or failure of duty.

3. *And be it enacted*, That it shall be unlawful for any common carrier to accept for transportation, or to transport or carry within this state any person affected with any of the contagious, infectious, or communicable diseases named or referred to in the first section of this act, or any infected article or articles of clothing, bedding or other property whatsoever, or the body of any person who shall have died of any of the said contagious, infectious or communicable diseases, except the same be enclosed in an hermetically sealed casket, and except a license for such transport be first obtained in writing from the local board of health of the municipality or township in which the said infected person, infected articles or dead body may be located; and any

common carrier knowingly violating any of the provisions of this section shall be liable to a penalty of one hundred dollars.

4. *And be it enacted*, That if the board of health of the state of New Jersey shall ascertain any vaccine virus, antitoxin or other animal product sold, or offered for sale, or held for sale or use within this state for prophylactic or remedial purposes, to be dangerous to human health, or so impure or inert as to be inefficacious in rendering immune or less susceptible to disease any person in whom such product may be used, it shall be lawful for the said board of health of the state of New Jersey to prohibit the further sale or use within this state of any vaccine virus, antitoxin or other animal product, as aforesaid, manufactured or produced by the party who shall have manufactured or produced such dangerous, inert, impure or inefficacious product: any person who shall, after such prohibition, and with knowledge thereof, sell or offer for sale or use, or offer for use within this state any such prohibited product shall be liable to a penalty of one hundred dollars.

5. *And be it enacted*, That any penalty incurred under any of the provisions of the first, second, third or fourth sections of this act may be recovered in an action upon contract, in any court of record within this state for the use of the state of New Jersey.

6. *And be it enacted*, That this act shall take effect immediately.
Approved March 22d, 1895.

14. *Bacteriological Diagnosis*.—The State Board of Health continues to supply facilities for the examination of specimens in cases of suspected diphtheria and tuberculosis. The laboratory is located in Princeton, and the service, rendered free of charge, is prompt and satisfactory. By an order of the postal department, dated February 5th, 1896, the transportation of diseased tissues through the mails is permitted under certain restrictions, when said tissues are enclosed in specified mailing-cases. These mailing cases are supplied, without charge, upon request, to physicians, health officers and school officers, and depositories have been established in many parts of the state where the mailing-cases may at all times be obtained. Reports showing the result of the examination will be sent out from the laboratory within twenty-four hours. Reports will be sent by telegraph if a request is sent with the specimen.

In cases where diphtheria is found to exist, specimens should subsequently be sent, at intervals of a few days, for the purpose of learning when the diphtheria bacilli have ceased to exist in the throat, and to guide in the removal of the isolation restrictions.

No specimen will be examined if it is sent through the mails otherwise than in one of the packages furnished by the laboratory.

15. *Vaccination*.—Local boards of health should prevent the occurrence of small-pox by securing general vaccination and re-vaccination.

Every parent should cause each child to be vaccinated before one year of age.

School boards should require that all children and teachers who attend the public schools shall first be vaccinated.

Local boards of health should offer, once each year, free vaccination to all who are unable to pay for this service.

In factories, the superintendent should advise or direct all employees to be vaccinated.

Re-vaccination should be practiced as often as once every five years, and if a case of small-pox appears in the neighborhood, all persons in the vicinity should be re-vaccinated.

Small-pox would forever cease if the preventive methods now well understood—vaccination, isolation and disinfection—were thoroughly enforced.

For copies of this Circular, address HENRY MITCHELL, M.D., Secretary State Board of Health, Trenton, N. J.

REPORT
OF THE
Bureau of Vital Statistics
OF THE
STATE OF NEW JERSEY
FOR THE
Statistical Year from July 1st, 1895, to July 1st, 1896.

(351)

Number of Marriages, Births and Deaths

By Counties, Cities and Townships, and Totals for the State,
for the Year Ending June 30th, 1896.

ATLANTIC COUNTY.

	M.	B.	D.
Absecon,	3	6	13
Atlantic City,	232	333	364
Buena Vista,	2	24	12
Egg Harbor City,	24	44	25
Egg Harbor Township,	41	77	68
Galloway,	8	24	39
Hamilton,	18	32	25
Hammonon,	43	102	57
Mullica,	1	19	13
Weymouth,	2	19	5
	394	731	613

BERGEN COUNTY.

	M.	B.	D.
Bergen,	19	43	26
Englewood,	45	34	79
Franklin,	22	36	27
Hackensack,	73	113	87
Harrington,	25	75	44
Hohokus,	15	49	51
Lodi,	20	146	74
Midland,	12	34	45
Orvil,	10	24	22
Palisade,	24	124	66
Ridgefield,	27	109	80
Ridgewood,	15	59	49
Saddle River,	19	88	43
Teanack,	1	1	7
Union,	42	114	110
Washington,	19	78	71
	386	1,188	872

BURLINGTON COUNTY.

	M.	B.	D.
Bass River,	3	25	20
Beverly,	28	31	59
Bordentown,	45	56	102
Burlington,	96	144	152
Chester,	25	74	64
Chesterfield,	10	16	15
Cinnaminson,	14	44	25
Delran,	7	21	20
Eastampton,	1	9	11
Evesham,	8	16	20
Florence,	10	44	24
Lumberton,	7	16	15
Mansfield,	12	33	18
Medford,	20	41	35
Mount Laurel,		30	23
New Hanover,	20	18	15
Northampton,	58	85	116
Palmyra,	17	37	21
Pemberton,	18	6	41
Riverside,	8	8	
Shamong,	1	13	6
Southampton,	7	2	14
Springfield,	3	13	24
Washington,	3	18	10
Westampton,		4	6
Willingboro,	1	6	3
Woodland,	2	5	4
	424	815	863

CAMDEN COUNTY.

	M.	B.	D.
Camden City,	*4,526	1,264	1,288
Centre,	3	21	31
Delaware,	2	23	20
Gloucester City,	66	139	144
Gloucester,	24	67	91
Haddon,	41	123	64
Pensauken,	11	27	36
Stockton,	84	106	162
Waterford,	28	52	37
Winslow,	6	25	23
	4,791	1,847	1,896

* Marriages of non-residents, 3,702.

CAPE MAY COUNTY.

	M.	B.	D.
Cape May City,	25	52	40
Dennis,	22	49	46
Lower,	12	37	28
Middle,	10	61	37
Upper,	15	32	36
	84	231	177

CUMBERLAND COUNTY.

	M.	B.	D.
Bridgeton,	112	322	197
Commercial,	20	51	18
Deerfield,	9	52	34
Downe,	17	11	14
Fairfield,	10	26	31
Greenwich,	5	17	16
Hopewell,	8	24	30
Landis,	74	143	116
Lawrence,	9	32	18
Maurice River,	9	48	23
Millville,	68	227	162
Stow Creek,	4	19	15
	345	972	674

ESSEX COUNTY.

	M.	B.	D.
Belleville,	18	66	56
Bloomfield,	62	205	146
Caldwell,	19	67	40
Clinton,	18	117	89
East Orange,	119	224	190
Franklin,	8	46	27
Livingston,	8	10	16
Millburn,	5	54	36
Montclair,	65	267	172
Newark,	2,093	4,364	4,028
Orange,	160	540	469
South Orange,	44	95	65
Verona,	4	18	11
West Orange,	20	119	70
	2,643	6,192	6,015

GLOUCESTER COUNTY.

	M.	B.	D.
Clayton,	14	44	27
Deptford,	7	34	29
East Greenwich,	9	24	12
Elk,	1	13	11
Franklin,	16	39	40
Glassboro,	31	89	33
Greenwich,	2	31	44
Harrison,	16	27	19
Logan,	12	18	19
Mantua,	9	27	19
Monroe,	19	19	26
South Harrison,	8	11	7
Washington,	8	28	16
West Deptford,	16	33	22
Woodbury,	58	74	66
Woolwich,	17	54	33
	243	567	445

REPORT OF VITAL STATISTICS.

HUDSON COUNTY.

	M.	B.	D.
Bayonne,	174	647	501
Guttenberg,	7	124	65
Harrison,	27	98	253
Hoboken,	818	1,915	1,249
Jersey City,	1,570	3,823	4,407
Kearny,	32	168	241
North Bergen,	29	160	299
Town of Union,	192	261	220
Union,	13	99	84
Weehawken,	2	63	65
West Hoboken,	162	527	315
	3,026	7,885	7,699

HUNTERDON COUNTY.

	M.	B.	D.
Alexandria,	1	14	14
Bethlehem,	18	15	10
Clinton,	21	25	38
Delaware,	25	38	40
East Amwell,	11	19	12
Franklin,	10	15	19
Frenchtown,	21	20	25
High Bridge,	24	24	14
Holland,	22	27	24
Kingwood,	8	19	30
Lambertville,	47	78	79
Lebanon,	20	53	30
Raritan,	31	61	60
Readington,	22	30	39
Tewksbury,	12	28	30
Union,	7	13	12
West Amwell,	1	20	13
	301	499	489

MERCER COUNTY.

	M.	B.	D.
East Windsor,	21	22	41
Ewing,	5	13	112
Hamilton,	18	29	159
Hopewell,	28	34	59
Lawrence,	8	11	26
Princeton,	33	83	99
Trenton,	*710	645	1,182
Washington,	2	14	18
West Windsor,	6	14	20
	831	865	1,716

* Marriages of non-residents, 120.

MARRIAGES, BIRTHS AND DEATHS.

MIDDLESEX COUNTY.

	M.	B.	D.
Cranbury,	14	24	18
East Brunswick,	33	93	84
Madison,	2	9	21
Monroe,	15	10	21
New Brunswick,	152	383	404
North Brunswick,	9	19	21
Perth Amboy,	157	328	245
Piscataway,	15	48	59
Raritan,	21	54	55
Sayreville,	15	86	61
South Amboy,	63	90	102
South Brunswick,	8	36	39
Woodbridge,	9	113	79
	513	1,293	1,209

MONMOUTH COUNTY.

	M.	B.	D.
Atlantic,	9	17	21
Eatontown,	18	25	40
Freehold,	50	77	103
Holmdel,	6	22	29
Howell,	36	33	42
Long Branch,	70	31	92
Manalapan,	20	15	20
Marlboro,	10	13	21
Matawan,	25	41	48
Middletown,	65	125	91
Millstone,	10	23	18
Neptune,	115	160	203
Ocean,	4	22	16
Raritan,	42	94	85
Shrewsbury,	76	123	155
Upper Freehold,	26	70	48
Wall,	61	128	54
	643	1,019	1,086

MORRIS COUNTY.

	M.	B.	D.
Boonton,	27	31	52
Chatham,	51	107	76
Chester,	9	23	14
Hanover,	27	51	142
Jefferson,	2	2	22
Mendham,	11	31	29
Montville,	7	6	10
Morristown,	91	176	202
Mount Olive,	7	20	34
Passaic,	10	8	14
Pequannock,	15	38	23
Randolph,	67	70	124
Rockaway,	29	81	86
Roxbury,	29	72	45
Washington,	12	38	26
	394	754	899

OCEAN COUNTY.

	M.	B.	D.
Berkeley,		18	14
Brick,	19	20	51
Dover,	20	45	38
Eagleswood,	7	17	19
Jackson,	10	12	25
Lacey,	6	14	12
Lakewood,	25	50	53
Little Egg Harbor,	18	47	31
Manchester,	3	6	16
Ocean,	6	14	10
Plumsted,	10	25	21
Stafford,	7	15	19
Union,	9	19	22
	140	303	331

PASSAIC COUNTY.

	M.	B.	D.
Acquackanonk,	6	34	42
Little Falls,	15	60	48
Manchester,	16	114	81
Passaic,	302	620	420
Paterson,	946	2,087	1,944
Pompton,	36	33	30
Wayne,	12	25	38
West Milford,	13	14	15
	1,846	2,987	2,618

SALEM COUNTY.

	M.	B.	D.
Alloway,	8	13	18
Eisimboro,	2	4	3
Lower Alloways Creek,	11	25	12
Lower Penn's Neck,	4	11	11
Mannington,	4	6	49
Oldmans,	8	30	23
Pilesgrove,	23	47	61
Pittsgrove,	15	61	39
Quinton,	10	19	20
Salem,	58	64	109
Upper Penn's Neck,	16	49	27
Upper Pittsgrove,	9	24	15
	168	353	387

SOMERSET COUNTY.

	M.	B.	D.
Bedminster,	20	28	26
Bernards,	6	22	42
Branchburg,	7	9	12
Bridgewater,	100	195	164
Franklin,	19	54	71
Hillsborough,	21	26	47
Montgomery,	6	7	33
North Plainfield,	16	59	84
Warren,	2	7	13
	197	407	492

SUSSEX COUNTY.

	M.	B.	D.
Andover,	11	17	16
Byram,	3	15	10
Frankford,	9	23	30
Green,	2	10	6
Hampton,		4	8
Hardyston,	20	3	16
Lafayette,	8	1	9
Montague,	5	2	9
Newton,	20	37	32
Sandyston,	12	15	14
Sparta,	23	7	30
Stillwater,	13	10	7
Vernon,	8	7	30
Walpack,		5	4
Wantage,	30	25	41
	164	181	262

UNION COUNTY.

	M.	B.	D.
Clark,	1	1	6
Cranford,	22	18	29
Elizabeth,	338	964	813
Fanwood,	8	22	27
Linden,	6	38	41
New Providence,	7	19	21
Plainfield,	107	257	259
Rahway,	58	31	139
Springfield,	2	19	13
Summit,	27	58	81
Union,	8	53	32
Westfield,	32	76	37
	616	1,556	1,498

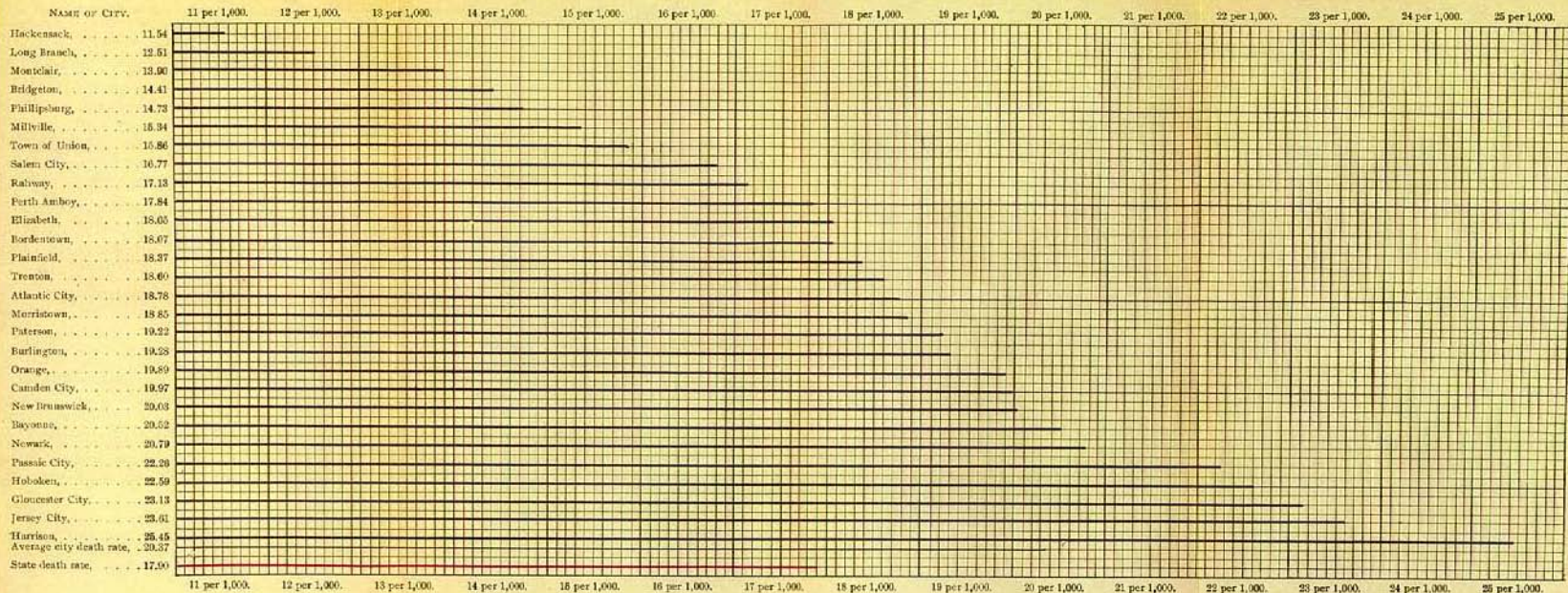
Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year Ending June 30th, 1896.

OCEAN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.										DEATHS FROM THE MORE COMMON CAUSES.																							
	Under one month.	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total, including undefined.	Estimated population.	Death-rate per 1,000.	Remittent fever, etc.	Enteric or typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Diphtheria and group.	Erysipelas.	Diarrhoeal diseases of children.	Consumption, M.	Consumption, F.	Acute lung diseases.	Brain and nervous diseases of heart and circulation.	Renal and cystic diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Violent deaths.				
																															1	2	3	4
Berkeley.....	1	1	1	1	1	1	1	15	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Brick.....	2	2	2	2	2	2	2	51	1,000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
Dover.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Eggswood.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Jackson.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Lacey.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Lakewood.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Little Egg Harbor.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Manchester.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Ocean.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Plainsboro.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stardort.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Union.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Totals.....	25	59	25	29	84	127	4	381	13,937	17.48	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year Ending June 30th, 1896.

PASSAIC COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.										DEATHS FROM THE MORE COMMON CAUSES.																							
	Under one month.	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total, including undefined.	Estimated population.	Death-rate per 1,000.	Remittent fever, etc.	Enteric or typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Diphtheria and group.	Erysipelas.	Diarrhoeal diseases of children.	Consumption, M.	Consumption, F.	Acute lung diseases.	Brain and nervous diseases of heart and circulation.	Renal and cystic diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Violent deaths.				
																															1	2	3	4
Asquabonk.....	1	1	1	1	1	1	1	42	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Little Falls.....	1	1	1	1	1	1	1	81	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Manchester.....	1	1	1	1	1	1	1	14	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Passaic City.....	1	1	1	1	1	1	1	430	13,857	31.26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Pateron.....	1	1	1	1	1	1	1	1,044	10,145	19.23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Pompton.....	1	1	1	1	1	1	1	30	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Wayne.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
West Milford.....	1	1	1	1	1	1	1	10	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Totals.....	213	603	353	315	900	428	2	2,261	13,936	16.56	13	47	2	23	8	46	173	6	439	141	148	305	191	198	111	151	131	47	3	21	117	2		

DIAGRAM SHOWING DEATH RATE PER 1,000 IN CITIES, COMPARED WITH STATE DEATH RATE, 1896.



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