NINTH ANNUAL REPORT

OF THE

# BOARD OF HEALTH

OF THE

## STATE OF NEW JERSEY,

## 1885,

And Report of the Bureau of Vital Statistics.

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# THE STATE BOARD OF HEALTH.

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# REPORT OF THE SECRETARY OF THE BOARD.

*To His Excellency Leon Abbett,*

GOVERNOR—I have the honor, in behalf of the State Board of Health of New Jersey, to present to you its ninth report. In the initial work of this Board, there was some occasion to feel that the public mind was not sufficiently interested in the object for which it had been created, and did not fully realize the evils resulting from preventable diseases.

As it has progressed, it has been able, from year to year, to recognize a growing appreciation for all that relates to the health of the people. The work no longer lacks a constituency. Indeed, our greater anxiety is to be equal to the responsibilities which it involves, and to be able to respond to the intelligent inquiry and aid which is so frequently manifest. It is now seldom necessary to argue the necessity of a care for the public health. The demand of the present is to know what are the real teachings of sanitary science, what are the appliances of sanitary art, and what modes of administration are the most practical and most successful. We are out from the long range of general principles into the close contact with actual applications. Just what to do and how to do it, are the close and urgent questions which do not admit of glittering generalities.

It is pleasing to know that such demands are being met. Any practitioner of the sanitary art, whether it be the architect, the engineer, the physician, or the sanitary counselor, is aware that there is far more of real and exact knowledge than has yet been applied.

If called upon to-day to execute drainage for health, to build houses, or form streets, to procure good water-supply, or provide for disposal of all decayable matter, there are those to be found who can construct and carry on a sanitary city at an expense that would be as economical of money as it would be of health and of life. Various sciences and arts have been laid under tribute and have transferred to the science of hygiene the items of knowledge that make up its aggre-

gated value. The sanitarian has so applied these to the vital problems of existence as to have organized a special department, whose aim and result is the diminution of human ailments and the prolongation of life. Its field has widened and is still widening with all the breadth of an applied science. It is no longer the question of how to remove filth or manage an epidemic. It enters upon definite plans to prevent such accumulations and to deal with disease before it attains the proportions of an epidemic.

It inquires into the modes of maintaining personal health for the population at large. It concerns itself as to the care of children, in the home and the school, and seeks to interrupt the many physical evils to which the young and growing populations have long been subjected. It enters the factory and workshop and claims that labor should be relieved of all the avoidable burdens of unhealthy conditions, and that the young shall not sacrifice bodily vigor and education to the demands either of the parent or the employer.

It examines into the quantity and quality of foods, and is able to designate the most valuable sources and combinations, and what cookery can do to aid in appetite and nutrition. It inquires into disease, in order that it may know where and how the departure from health began, and how to guard others from the repetition of the same error, as well as to apply the laws of hygiene to the recovery of those already affected. It keeps account with life and health, and with its statistics is able to show where the debilitating and destructive forces of misguided nature are disturbing or destroying mankind.

It proves that the greatest material resource of a State is its population; that to care for it is to husband these resources and turn them into channels of successful industry.

Hence, the statesman and the political economist are beginning to look to the health of the people as the central idea of happiness, prosperity and wealth.

This advance in the recognition of the meaning and intent of hygiene has led to some corresponding changes in the work of the Board. While it is still necessary, to some degree and in accord with the original law, "to gather information for diffusion among the people," it is now far more important to educate individuals in the technical work of oversight, inspection and execution, and to perfect the details of sanitary administration. The past year has been especially prosperous because additional legislation, and the decisions



of the highest court, have empowered local Boards, so as to make them more available and efficient, and because general impressions and promiscuous opinions have, to a larger degree than formerly, given place to accurate investigations and detailed reports.

Thus we have on file to-day a graphic outline of nearly every school-house in New Jersey, with answers to all those questions which most concern the teachers and pupils who, for a part of the time, inhabit it.

The same is true as to parts of some of our cities, in which a plan of house-to-house sanitary inspection and record has been adopted. The watchfulness which prevents evils and which provides an officer who counsels and advises as to sanitary matters is much more valuable than the old plan which always waited for a nuisance to occur and then created prolonged disturbance in its removal. That is always a great advance, when any community passes from the stage of complaint over nuisances to that in which it is definitely and efficiently organized for their prevention. There will not soon be the time when great evils can not be found. But he is a superficial observer who has not noted some localities, and some persons in almost every locality, who have passed the stage of doubtful disputation, and who feel sure that many an evil can be prevented, that better health can be maintained and more lives lengthened. Even the commotions and agitations which sometimes occur over great public improvements, and their temporary delay, mark progress. The fact that most of our cities are not willing to rest under the odium of neglect shows that the question is one which involves the growth no less than the health of a city. Townships, too, have their losses from defective drainage, or from villages in which, too often, the condition of some street is no better than that of a crowded city.

No doubt the fear of cholera has had some influence in favor of the greater activity of local Boards. But there are other evidences that there is a growing conviction of the feasibility of health administration. We have now no reason to doubt that the future will show a continuous progress in the State, in all that relates to health and care. While there will be local delays or failures, there will not be any weakening of conviction as to the need of skilled oversight of the public health, and reasonable expenditure for its preservation.

The report of Vital Statistics shows the following record for the year ending July 1st, 1885:

Marriages, 8,989; births, 24,077; deaths, 23,807.

## DISPOSAL OF SEWAGE.

The proper disposal to be made of the cast-off organic materials of persons and households must ever continue to be an inquiry having the most essential relations to personal and to public health. If it were stated as an axiom that all decayable or putrescible material should be disposed of so that it cannot, in any way, get into our food or our drinking-water, the principle would not be disputed; yet, in actual life, methods are constantly adopted which hazard the purity, both of the food and of the water-supply.

If we go still further, and say that these materials should be so disposed of as not to infiltrate the air beyond its power of rapid neutralization or removal, this, too, would be admitted; yet, in fact, too often the air is so laden with noxious matters as to be polluted to a degree not consistent with general health. Effort must constantly be made, both by structural arrangements and administrative care, to so dispose of all decayable matter as that it shall not be a menace to the public health. We claim that this is possible to a degree not fully realized, and that, even in the artificial conditions of crowded city life, it is attainable, and has sometimes been attained. Such a result can only be secured where the needs are fully recognized and provision made therefor. What now needs most to be impressed upon the population, and epecially upon organized authorities, is, that the thing is necessary to be done, and that the methods for doing are known. Each year witnesses improvements in the details of method and accuracy in the construction and administration of public works. While there are still various discussions as to dry methods, utilization and water-carriage, one who notes what is actually done will find that water-carriage methods are adopted in all cities of a present or prospective population of over 30,000 inhabitants, and that some form of it is practically used in many smaller towns. This results, not from any fashion, but because sanitary engineers and authorities are so agreed that fecal material and the fouled water of households should be carried away from dwellings while in a fresh state, and that the easiest and cheapest mode of carriage is through pipes, and by water. The chief questions are as to which is the most effective and economical method of disposal of the sewage-water.

Four methods are prominent, any one of which can be made effective and the choice of which depends, often, upon locality. Where



there are large and rapid streams of water, the cheapest plan is to pass the sewage directly into the channel of a flowing stream. We have, in previous reports, shown how remarkable and how rapid are the changes which fresh sewage will undergo when subjected to the forces of air, water, sun-light, the agitation of streams, and when it can be appropriated by the lower orders of life on which fish feed, and by growing vegetation in the rivers and on the borders. Where, as in some factories, the sewage is especially fouled, well-devised methods are now in operation by which some of the organic material can be precipitated and the effluent water be passed into the streams without discoloration or odor. While there is always very much to be said against the pollution of streams which, in their courses, are used as water-supplies for potable water, we are not to assume that fresh sewage passed into any stream affects the water ten, twenty or thirty miles below. The testimony of chemistry and of the microscope is, that nature rapidly forms new and harmless combinations; that low forms of animal and vegetable life are soon supplanted, and that thus there is a constant tendency toward what may be called natural correction, where such material is not too enormous in its proportional quantity, and where it has constant movement amid forces capable of transforming and disposing of it.

The second method we notice is that of "wide surface irrigation," which, for its greatest success, should be combined with "intermittent downward filtration." "Wide surface irrigation" means that fresh sewage is distributed over land in order to be appropriated by the land and by growing crops. For it is found that land which is not wet and not too compact, by the mechanical division which it gives to the sewage and by the air in the ground, so alters the sewage as not only to deodorize and neutralize it, but also as to enable it to be appropriated by growing grass or other croppage. The question of how much sewage a given plot will dispose of, depends so much upon the kind of soil, its lowness of water level and its tillage, that all these must be considered, and in most cases the land needs underdraining. A single acre has been made capable of continuously disposing of the sewage of 1,000 persons. To add to its capacity, it has been found best not to scatter the liquid sewage over the whole ground each day, but to alternate different plots of it, so that thus the sewage might filter through the soil and thus have alternate supplies of air and of sewer fluid in the numberless spaces between the particles of

earth. This is known as "intermittent" downward filtration. It is the union of those two ideas of wide surface irrigation and intermittent downward filtration that, together with tillage, makes up the second method of disposal. The chief objection made to it is the cost of methods of distribution of the sewage and the unsightliness and something of odor in the work of thus distributing it. Hence its adaptability depends much on choice of locality, etc.

### SMALL PIPE AND FLUSH TANK SYSTEM.

A third method of sewage disposal depends upon the same ideas of wide distribution of sewage and of intermittent downward filtration, but instead of spreading it on the surface of the ground, conducts it into automatic flush tanks or cisterns, from which branch out in all directions series of land tile or pipes from 10 to 18 inches beneath the surface. These automatic tanks are made of size proportionate to the amount of sewage, so as to empty themselves of the fresh sewage about each day. If open tanks are used where some of the cruder matter settles and some floats so as to be removed, it is possible by chemicals, as alum, potash, etc., to cut the greases and so relieve the sewage from a part of it which is offensive and which sometimes stops up small pipes. The relation of these tanks to the underground pipes is so arranged that some will be used at one time and some at another. The flush or rush of the stream of sewage through these pipes prevents the deposit which would take place from a small tardy flow; and the air which fills the pipes when no sewage is flowing helps to dispose of the more solid contents of the sewage, which is made less solid by the temporary maceration in the flush tank. The sewage-water and the broken-down organic material of the sewage escape through the loose joints of the tile. Where the construction is correct and the land adapted, one is surprised to find how thoroughly the sewage will thus be disposed of in small pipes and how well the land is enriched thereby. Where there is much greasy or soapy matter going into the sewage it is often best to have a grease trap before the sewage reaches the flush tank.

This might very properly be called the wide *sub-soil* irrigation and intermittent filtration system, as distinct from, but allied to, the broad *surface* irrigation system already noticed. In this, as well as in the former system, it is sometimes advisable to first strain the liquid sewage, by such grating as will retain sticks or gross material.



A fourth system is that in which sewage is subjected to some mode of chemical precipitation before any attempt is made to dispose of its organic matter or of the water which is its vehicle. In this the idea is to cleanse the sewage so that nearly or quite all of the organic particles or putrescible matter is separated from it and the water may be allowed as a comparatively pure effluent to flow away over land or into a stream. The arguments for this are that thus the water is made so pure as to be harmless and that the sludge or organic matter left behind can be utilized as a fertilizer. The most usual precipitants used are milk of lime, alum and sulphate of iron (copperas).

This method has been brought into greater prominence of late, because, by means of filter presses, it is possible quickly to reduce a part of the sludge to a dry state and to make of it a portable manure. The remaining liquid is generally allowed to flow back into the general sewage. Sometimes the method of wide irrigation and intermittent filtration is combined with this to the extent that the effluent from the precipitating tanks is allowed to flow over drained and tilled land before going into any stream; and when so managed is, by reason of its reduced quantity and greater purity, much easier to manage than the entire bulk of liquid sewage. This system is now in operation successfully in some English towns, as Coventry, Layton and Salisbury, with various modifications at other places. It also has been very strongly recommended by a Commission on the Pollution of the Thames. Salisbury, the last finished, is thus described:

"The Sewage Disposal Works at Salisbury, England, are now in operation. The scheme is one of chemical precipitation, and includes two sets of four tanks each, seven of which can be used at a time. From the main sewer the sewage passes through a strainer, and under the machinery building, where it receives the milk of lime by which it is precipitated, and then into the tanks. The effluent flows into a small stream, and thence into the river Avon, the condition of which is already greatly improved. When emptying a tank, the top water is pumped on to a plantation of osiers; the sludge is then drawn by vacuum into an iron receiver, and thence driven by compressed air into two filter presses. The sludge, which is pressed into one-fifth of its bulk, amounts to between two and three tons daily, in a nearly dry state, suitable for being carted away, and is being sold at 4*s.* per ton. The cost of the works was about £8,000."

We are constantly reminded by those who, though intelligent in other matters, may not have fully studied all methods of sewage dis-

posal, that there seems to be no successful way of handling sewage. Such is not the case; methods are now as well understood as are other methods in industrial art. The trouble is that most methods are expensive and, that being so, corporations, in order to save money, so cheapen works, and so do things by half, in administration, as to render them incomplete successes. There has been real advance, not only in perfecting, but in cheapening methods. The best investment that many of our cities could make, would be in the construction of more perfect methods of water-supply and sewage disposal.

In this country a good specimen of the wide irrigation system can be found at the Worcester Asylum, Worcester, Massachusetts, and of the flush tank and small pipe system at Memphis, at Bryn Mawr, Pennsylvania, at Princeton Seminary and Lawrenceville Academy, Mercer county, New Jersey, &c. We have no good illustration of a precipitating and compressive system, which we believe will hereafter come to be more extensively adopted. Mr. Grey, civil engineer, of Providence, Rhode Island, after a most careful research into European methods, has advised this for Providence. The Secretary of this Board has made a careful and detailed examination into the various English and European methods and believes this to be one of the most efficient. It is a utilization of sewage, and while it cannot be claimed that it can be conducted at a profit, the sale of refuse reduces the expense. For dealing with fecal sewage, as contained in outhouses, where the towns are not large enough for precipitating and distributing works, the following method of disposal has had such indorsement as to be worthy of trial, although it has not yet been tested so far as to enable us to speak with great confidence :

"To a vault containing forty barrels of fecal matter, add one barrel of common salt; in twenty-four hours add fifteen bushels of unslacked lime; chlorinated lime will then be formed. After eight days it is entirely dissolved and disinfected. Then add seventy-five pounds of sal soda. In ten days the sewage will be solidified and ready to form bricks, which, after drying thirty days, can be used as fuel in burning lime, etc., and are of twice the value of anthracite coal." (*See* Sanitary Record, March 16th, 1885.)

In addition to these four methods, the *aeration* of water, whether it be that of reservoirs for drinking use or of sewage-water, in order to purify it before its passage into soil or into rivers, deserves notice. In 1881, R. Angus Smith, in the report to the Local Government Board



under the River Pollution Act of 1876, speaking of aeration of water, says: "This subject has long interested chemists, and aeration has formed one of the plans of engineers from a long date back." He then refers to his paper on "The Mud of the Clyde," (Glasgow Philos. Soc., 1880,) in which its value was presented. Article VII. of the "Mechanical Aeration of Sewage" is also valuable. In his report of 1883, he follows up the subject both by statement and account of experiments. "When air is blown into sewage-water its properties and its composition are rapidly modified; *the water, saturated with air, is no longer liable to putrefaction.*" We are not aware that this fact received valuable application in this country until Prof. A. R. Leeds, of this Board, applied it most practically and successfully to the purification of the water in the Hoboken reservoir. Similar success has attended its application by him to the waters of the Schuylkill and to the refuse liquids of some manufacturing establishments. We believe that it is yet to be made very largely available as one of the methods of improving potable waters and for the purification of sewage.

## WATER-SUPPLY.

The purity of water-supply continues, as heretofore, to be a most important consideration to all who would guard the interests of public health. There is cumulative increase of evidence that it very frequently is the conveyancer of materials into the system which are the cause of disease. It does this either by the absorption or intermingling with it of befouled air or deleterious gases, by holding in suspension minute organic decaying or decayable particles, or the actual germs of disease, by minute animalculæ or by mineral substances in solution. Because water is such a constant necessity, and because it is the purveyor and dispenser through the system, and so the medium of exchange, it has been more frequently recognized as a carrier of disease than the air itself. The attention of chemists, of biologists and of practical physicians and sanitarians is now so fully directed to this subject that we are able to claim that there is much greater attention to the securement of pure water than formerly. But still there are many errors, and there is need of constant vigilance. Too often sources of water-supply are decided upon without that accurate examination by geologists, sanitary engineers and other experts, which is always essential in a matter of such importance, and

often of such expense. We have had occasion to examine the water-supply of a city, which at once proved both inadequate and impure, although the Sanitary Committee of Council had given their unanimous opinion that it would answer. In examining a claimed source of pollution of the water-supply of one of our cities, we actually found the water purer after the chemical material had passed into it than was the original stream. It had been accepted as a water-supply without due examination had. We were recently shown the water-supply which a Board of Freeholders had introduced at considerable expense into an important institution, because they had long known the pond and thought it would do. The first extra demand in a dry summer revealed the blunder made. These mistakes are generally made by responsible men, well-informed in their own line of work, but who are led to judge and decide upon this matter without the requisite knowledge, and with only the advice of some local surveyor. No town or city should introduce a water-supply without the most accurate written report from some one responsible for his opinion. Rain-fall, water-sheds and base of supply are no longer problematical, and can be determined with certainty. Where choice has been made, there is need of constant vigilance. The stream or source should be protected from pollution by frequent examination, or patrol, or chemistry should assure us that the apparent pollution is neutralized and overcome by reason of distance from the intake. Even where the source continues pure, it is to be remembered that reservoirs and stand pipes and distribution pipes need to be fully mapped and frequently examined, as it is well known that water sometimes undergoes serious change in these, and that the pressure of impounded waters, want of air in pipes, dead-ends and the growth of algæ and other causes seriously deteriorate water-supply. We cannot conceive that any water company is doing its duty to its patrons, unless there is this kind of expert surveillance. Generally it is unwise for cities to place themselves in the hands of private water companies, as by their combination and capital they too often become insensible to complaint, or to the prevention of it by such oversight, and because municipalities, by reason of contracts, or the influence of the individuals concerned, are unable to secure what public health demands. In cities it is important to know just how many depend on the public water-supply. Even where this is the only good and excellent water-supply, and is boasted of by the citizens, it is often found that the majority of the people



depend on wells. The recent clamor in Paterson over the stoppage of some polluted wells is an illustration of the pertinacity and innocence with which respectable people will cling to that which custom has sanctioned, and to the use of which their own lives have not succumbed. Dr. E. J. Marsh, President of the Board of Health, made excellent answer in his annual report. He spoke thus:

"In the early autumn months typhoid fever began to prevail to a greater extent than usual, and partly on this account, and partly with a view to prepare the city for the expected arrival of cholera, the attention of the Board was directed to the condition of the drinking water of the city, especially of the wells, which are always open to suspicion. A systematic examination and careful analysis of their waters was made by the Health Inspector, who found the water in the majority of cases to give evidences of gross pollution of animal origin. A few samples of these waters were also sent to Prof. H. B. Cornwall, of Princeton, for analysis, whose report in every respect corroborated that of our Inspector. As a result of these examinations fifty wells were ordered to be closed. In thirty-eight other wells the water was either pure or too slightly affected to be pronounced dangerous.

"As this action of our Board seems to have met with the disapproval of certain members of the Board of Aldermen, a few words of explanation may not be out of place.

"It is a common belief that when a well is dug pure spring-water oozing from the ground is obtained; that is true in the case of artesian wells, but, although possible, is rarely the case in the ordinary surface wells, and under this name are embraced all wells not more than fifty feet deep. The water obtained from these wells is merely the water which has fallen on the surface of the ground in rains, and has percolated the soil and becomes collected in this excavation. It is called ground-water. Even granting that some of the water may be spring-water, some of it must be the result of drainage, and the amount of this will depend upon the rainfall and the character of the soil. A moment's reflection will show that wells must act as drains to the surrounding soil. Just as a wet field may be dried by digging one or more trenches, into which the water of the soil may drain and be carried away, so when a deep trench or well is dug the water from the surrounding soil will necessarily tend to drain into it. This is not only a matter of reasoning, but a matter of experience. The following case is reported: 'In consequence of the escape of the contents of a barrel of petroleum or benzine, which had been buried in an orchard, a circuit of wells 60 feet below and 250 or 300 yards distant became so affected that the occupiers of fifteen houses, containing 82 inhabitants, were for ten days unable to use the water for drinking or cooking.' When wells are first dug in rural districts, the water is pure,

and may remain so for a long time. Fortunately the soil possesses some power of purification, and although the water may receive polluting matter on the surface of the ground, some of this matter is detained mechanically by filtration, and other portions may be decomposed and taken up by growing plants and trees. But this power of the soil is limited. When the sources of pollution are constant and numerous, as in cities, from privies, cesspools, slop-water, offal and the manure of domestic animals, and sometimes from leaky and imperfect sewers and drains, the soil becomes 'filth sodden,' and the filth is carried deeper and deeper, until finally it appears in our drinking-water. Sanitary literature is full of instances of the outbreaks of epidemics of diarrhœas, typhoid fever and cholera, which have been traced to the drinking of well-water thus polluted; and even though the city may go through one or many years without such epidemics, it is not a pleasant thought for the inhabitants to indulge in that they are drinking the drainage of their privies and cesspools, and yet they must realize the idea that their wells are and must be drains for the surrounding ground with all its contents that are capable of solution in water.

"Science cannot tell us that a given water is charged with the poison of a definite disease, but it can tell us that it has received the products of decaying matter from animal sources, and experience has shown, again and again, that such water is dangerous to health. It may therefore be laid down as a rule that in cities the water of all shallow wells is suspicious. The majority of them already contain matters dangerous to health, and the rest may become so at any time. In fact, wells cannot be tolerated in cities when any other water can be procured, and it is the reading of all history that wells have gone as the city has increased in size, or the citizens have paid the penalty by sickness and death.

"The sanitary authorities in other cities are attempting to do away with wells, as far as is possible. A recent report from Brooklyn states that during the past two or three years 296 public pumps were examined; of these 230 were ascertained to have water unfit for human consumption by reason of the entrance into the wells of filth of various kinds from the surrounding soil, or from the street, and these wells have been closed by the Common Council of that city. Mr. Seth Low, the distinguished Mayor of that city, in a message recommending the filling up of such wells instead of attempting to clean them, said: 'I do not understand why it should be esteemed a kindness to the people of any locality to perpetuate the use of bad and unwholesome water, neither do I think it wise to oppose to the results of chemical analysis the popular impression that wells do little harm.'

"In some few instances there may have been some hardships in enforcing the orders of this Board, but as guardians of the public health, it can have no more hesitation in preventing the consumption



of dangerous water than in prohibiting the sale of tainted meat, decaying vegetables, or poisonous candy.

"This Board cannot recommend to you the cleansing of these wells in the hope and expectation that the water would thus be rendered fit for use. In a few cases of accidental temporary contamination such might be the case, but as a rule the contamination will be renewed in a very short time. The only effectual method is to permanently fill in and close all those wells whenever a supply of river-water can be obtained. If it is advisable that the city should supply water, let it be done by hydrants and not by pumps."

It was a pointed comment on the action of this Board of Health, that in August, several months after there had been some conflict with the Common Council as to a favorite well, it was accidentally discovered, in examining a sewer near by, that it had an open connection with a drain pipe, and that within fifty feet of this well it was pouring its contents into the water-supply.

Where wells or cisterns are used there is need for the greatest care that they be properly constructed and kept from all contamination. Some directions as to this were given in the last report. If a well which has been good, suddenly becomes bad, it is not generally by any freak of nature. Something has fallen into it, or the soil about it, which has been in process of pollution, has finally reached a point of saturation beyond the reach of the conservative and protective adjustment which air and soil and filtration are always working at. Perchance some cesspool or vault has found leakage into the well. The wood of the pump or of the curb has become decayed or saturated with filth. We have known cases where a wooden curb or bottom, put in at the time of building a well to keep out quicksand, has served its purpose very many years. But after a time the wood decays, or by some accident the water is fouled and the wood absorbs the foulness. Wells unused for a time often become thus permanently unfit for use, so that no future outside cleansing serves to restore them. We often find, especially on the shore, wells and privies built near to each other, on the ground that the well is a driven one and that the privy is cemented tightly like a cistern. If the well is deep down, and if the vault is and is kept constantly water-tight, this would be safe. But facts too often show a crack in the cement or an injury of it by the contents, while the tube of the well serves on its outside as a conduit to lead foul liquids below. As a system it is never safe.

Where surface wells have been contaminated by cesspools, as in an

important city of this State, it has become common to substitute driven wells. This, no doubt, is an improvement, but is only safe when they go through a deep clay stratum. We have known, for economy, the boring to be begun at the bottom of the polluted well, after the water has been pumped out. It is an unsafe economy, for too often the new well eventually becomes affected.

No one can study the geology of this State without being struck with its wonderful facility of water-shed for the supply of our largest populations, and without being equally struck with our slowness and want of foresight in not sooner availing ourselves of these sources of supply. Some of our cities have excellent water-supplies, while others are still defective. But it is encouraging to know that now no new works are projected without great care. The success of driven wells on the New Jersey coast is fully assured. While there will be occasional failures, yet it can be said that in the cretaceous formation at good depths there are rivers of water enough to justify the choice of this coast for safe resort. The success of the first well at Ocean Grove led to the sinking of one after another, so that now Asbury Park, Ocean Beach and Lakewood, Red Bank and several other localities have availed themselves of this supply. In Asbury Park water from these wells was brought to the doors of houses and tents at one cent per gallon, and although there are many good wells in the city, it was in great demand. Besides other sources of supply, there is every reason to know from geological facts and actual testing that all along the coast such wells can be made, many of which will be flowing wells and others within a few feet of the surface. They are also being made available to sustain the water-level in lakes, the springs of which have been somewhat cut off by buildings and other changes.

There are many causes for variation in amount of flow. The history of these wells and some of these causes will be found fully given in the report of the State Geologist for the current year.

It is important to recognize that many kinds of wells are now promiscuously called artesian wells. The only true artesian wells are those in which water rises above the surface of the ground from a depth below without any mechanical drawing. These may be natural, as the so-called boiling springs, or artificial, when by boring through the underlying strata or rock the water beneath is thus furnished with exit. These latter are known variously as bored wells, driven wells or drilled wells, according to the methods used for passing through



the overlying strata. If the strata or rock passed through is impermeable to the surface-water above it, it is safer than a well merely pushed or driven down through soft material. Not all deep or so-called driven wells are safe from surface-water. If a well is not tubed at least for twenty or more feet down, the very hole made may serve as a drain or conduit for surface-water to be mingled with the water below or to take its place. Salt or analine dye thrown on the ground has been known to appear in these deep wells after some time had elapsed. Even where piping is used to prevent water trickling along through the bore outside the tube, it is often best to fasten the pipe with a tamping of clay or soft cement, and the pipe should extend well above ground. The best material for tubing is wrought-iron pipe. It is common with some to coat the pipe inside and outside with asphaltum or black oxide of iron, both to preserve it and to prevent so much of that unpleasant, but harmless, iron taste. Zinc, lead and galvanized iron pipes are not generally approved for this purpose. A constant, abundant and pure water-supply is one of the greatest securities for the prosperity of a community, and can now be guaranteed to all except those who persist in the use of surface wells, so liable to become charged with organic matter. The circular upon pure water, issued this year by the Board, has proved to be of much service in aiding cities and individuals in approximate test as to purity. But the greatest security is in the right location of sources and in guarding against all those evils now so well nnderstood. While the boiling of water, and filters and precipitation may be of some service, we should never be content with anything less than water which does not need such cleansing.

## MALARIA AND MILL-DAMS.

The attention of the Board has not been drawn to the prevalence of malarial fevers in the State as much as in previous years. It is, however, when there is not a general prevalence of any disease that we are best able to single out those localities in which they most abound, and which are most frequently the head-centers of causation. While it is so confidently asserted that forced vegetable decomposition, insufficient drainage and the rapid fall and rise of streams has very much to do with these fevers, and with all forms of chills and fevers, it is recognized that there are seasons in which atmospheric conditions

most effectually co-operate and bring out the evil otherwise latent. But where any locality maintains a constant tendency of malaria we may be very sure that local causes are in operation which are the more easily located and identified.

There are a few places in this State in which chills and fever are always endemic. The reports of medical societies, and the yearly records of death, show that they are permanent residents. Our attention the past year has been called to three very marked contrasts. We have had occasion to visit Bound Brook, where occurred the notable mill-dam trial, and where, at one time, the entire population was prostrated by the various forms of malarial fever. It could not then be denied that every year witnessed many cases of the disease, but that year the sudden wilting of swamp vegetation and sudden atmospheric and rain-water changes caused a sudden increase. Since the removal of the dam, and the drainage of the swamp, chills and fever have well nigh totally disappeared. Besides the testimonies of physicians and landowners, workingmen assure you of the blessings of their deliverance, and all testify to the marvelous change. In other sections, in Essex county we find amid the Oranges some of the choicest homes in the State and a plateau of land naturally very free from all malarial influences. But there is a single stream which flows by a tortuous and often sluggish course into the Passaic, which has on it five mill-dams in the course of about as many miles. Diversion of water by artificial ice-ponds, and the use of the upper brooks for city sewer purposes, has added to the pollution of vegetable decay. It is now notorious that sickness prevails in its immediate vicinity, either in the declared forms of periodic fevers and ague or in that more obscure form of general malaria, which is also evidence of unhealthy conditions. Unless those dams which most impede the stream are removed, and pollutions of it avoided, natural drainage will continue obstructed and the people will continue to experience the ill-effects. Again, along the upper Delaware chills and fever continue to abound. The stream itself seems to have some special aids to the accumulation of rich alluvial deposits. Besides this, mill-users, of high and low degree, so erect and use mill-dams as much to impede natural flow. The Delaware early attracted the attention of those seeking water-power, and under the various names of dams, sluices, feeders, etc., water was impounded. Often this has been done at points where proper drainage is too much hindered, and where the use of steam



should now replace that of water. At Milford, Frenchtown and other points there is still much need of relief. The time has come when sanitary and hydraulic engineers, with the aid of geologists and physicians, have little difficulty in deciding between those places in which mill-sites may be maintained with advantage, and those in which water can not be so impounded with safety. In no State are the facts more accessible than in our own. While no one should be deprived of any acquired rights without compensation, there should be, both on the part of owners and the public, a disposition to respond to the needs of public health.

## CARE OF STREAMS.

The whole subject of the care of streams and rivers is one that demands the careful attention of the public. These are the natural drainage tubes for the various water-sheds of the State, and are not to be impeded or misapplied, unless there is compensation and adjustment. Some few can be used for other purposes, as well; others can only be used when the interferences made are well understood, and are compensated for by adjustments which make up for the changed conditions; others still, must be left to their own natural flow, and even be so protected and enlarged as to make up for the demands made upon them by growing populations.

It is a nice, and yet a determinable, point to know what streams need preservation just as they are; what ones need enlargement; what ones admit of mill-sites or other obstructions, as for water-supply, reservoirs, etc.; what ones are capable of transforming sewage, and so serving as sewers of delivery. All these are questions upon which venturesome and unintelligent opinions are too often given.

But, if we take any three or five leading authorities on such matters, and allow them to make full examination, it is remarkable how fully they are found in accord. All new ponds and lakes, or extension of old ones, all new impoundings of water for any purposes, all ice-ponds, all increased pollution of rivers, all new feeders or canals, should be resisted by local health authorities until those competent have passed judgment that they are not likely to endanger the public health. The obstruction or pollution of streams seems to be so much a part of original depravity that it is very likely to occur, unless there are those who are resolved it shall not take place unless the propriety thereof is duly certified. This vigilance on the part of Health

Boards and the public will prevent much evil. In the case of obstructions already established, while there must not be too hasty judgments or a tendency to destroy, without compensation, there must be an honorable desire to get at the facts, and then to do that which public policy and personal health demands.

We are the more emphatic as to this because this State has so many rivers, and so many natural water-sheds; because there is such demand for water service for all purposes, from the mill-dam and factory-dam to the ice-house and the lake resort, as well as those other pockets for stagnant water so often made by railroad and mining excavations.

Each local Board should fully learn of all these conditions, and should be watchful against encroachments upon water-ways. The State has now an excellent system of drainage laws, and localities, without large expense, can avail themselves of reports as to local indications.

## DECAYING WOOD, SAWDUST, ETC.

In connection with the subject of malaria, the effect of decaying wood and of heaps of sawdust on disease, has attracted much attention.

It has long been recognized that the decay of wood, like that of other vegetable matters, is attended with putrefactive changes. It contains nitrogenous compounds, and so is subject to all that type of decay which is known in the changes of albuminoid substances. It is to render these albuminoids in wood less soluble that various chemical methods of preserving wood have been proposed. Practicing physicians have often noted that the decaying wood of cellars and cellar floors of negro cabins, etc., seemed to be associated with disease. Dr. Cabell, of Virginia, has noticed endemics of typhoid fever as associated with the tearing down of negro quarters, either from the decay of wood or its absorption of foul particles. Streams which have been greatly filled with decaying timber, have been noted for their unhealthfulness. Professor Brewer, of New Haven, in the fifth volume of the papers of the American Public Health Association, shows, by a series of experiments, the greatness of these putrefactive changes, and the abundant growth of septic ferments.

The changes which all woods undergo in the process of decay, the gases and putrefactive particles therefrom, and the various forms of



fungous growth, while incompletely studied, are so far recognized that we need to study them as related to health. Dry-rot or wet-rot of floors and buildings, decaying barrels and boxes in cellars, the changes in docks, and lumber submerged in fresh or salt water, or alternately submerged and exposed—all these are inquiries bearing on the public health. As to wooden docks there can be no doubt that from this, and associated causes, they are often a peril to health, and should, as far as possible, be surperseded by iron structures.

Perhaps the most accurate evidence as to the power of decaying wood to cause disease, especially that of a malarial type, is that afforded by investigations into the effects of decaying sawdust. In parts of Canada this has led to a close investigation, conducted by chemists and by the Ontario Board of Health. The commission appointed to report upon the malaria epidemic in Coboconk, use the following language: "As to whether the presence of decomposing sawdust, in large amounts, is a sufficient explanation of the prevalence of malaria in the locality would seem to be beyond reasonable doubt, from the fact that its chemical composition is of much the same nature as the vegetable mould of the prairie, which, when exposed to the air and decomposing, is known to be the cause of the wide-spread prevalence of malarial diseases. In addition to this fact, we have many well-known instances where malaria has been practically unknown in districts, until such time as the sawdust from mills had been exposed to the action of the atmosphere for several years, when, decomposing, it generated gases similar to those of organic compounds in general. * * * At Fenelon Falls the sawdust of the mills there had been spread out over the open commons and left to decompose. Malaria followed, but later on a kiln was built, in which all the sawdust has since been burned, a great decrease in the prevalence of malaria following as a result. No malaria occurs along the Gall river until some saw mills, seven miles above Coboconk, are reached." Similar facts are stated as to other localities in subsequent reports. A summary in the last report, after years of observation, says: "Where deposits of sawdust occur along the shores of streams, but more especially on those of bays and ponds, and undergo fermentation and decay, malarial diseases and other results, injurious to health, have very frequently followed." Sawdust is so harmless at first that it is piled and spread freely, but it is when decay begins that its evils are experienced. As this depends upon heat and moisture, it will vary

as to time and degree with the locality of the heaps. In Michigan the matter has received legislative attention, and the State Board of Health has declared it "practicable and desirable that sawdust should be kept out of streams, ponds and lakes." Prof. Kedzie refers to the subject thus: "The water of places where sawdust finds its way into streams, is highly dangerous, not only from what it actually contains, but from bacteria that it may produce and support. Examination of well-water, from four different sawdust areas, gives the following results: These waters contain an amount of organic matter sufficient to condemn them for potable and culinary uses. They all contain resinous and extractive matter in solution; they all contain nitrogenous material capable of yielding albuminoid ammonia greatly in excess of the sanitary limit; they contain all the chemical elements necessary to sustain low forms of plant life. In the presence of so large an amount of organic matter and the chemicals of plant life, these waters may become dangerous by nourishing and reproducing the germs of epidemic diseases, should they find lodgment therein." Dr. Hargis, a careful observer on the west coast of Florida, where malaria is so rarely found, informs us that so far as he knows it always has a saw-mill as its center. These facts are not only important in themselves, but as connecting the decay of vegetable fiber, under certain forced conditions, still more clearly with the etiology of malaria. There are many streams which ought to have a sanitary patrol each year, not only in order to prevent sewer pollution, but also that logs, branches and all vegetation, easily removed, can be taken from them.

## ICE-PONDS.

One of the frequent uses now being made of small streams and lakes is the formation of artificial ponds for the production of ice. We have seen several miserable specimens of these in the State. Many of them are excavations of marshy land, which not only furnish no good ice, but which in summer are either stagnant ponds or dry holes for the manufacture of foul air, or for providing good air with injurious organic particles. A law passed last winter to some degree protects cities, but should be extended to apply to townships. Any Board of Health is now justified in resisting the formation of ice-ponds where they believe it shall be injurious to health, and such regulation of, or interference with, those already formed, as facts as to their injuriousness justify.



It is also a mistaken idea that freezing fully purifies water, since several outbreaks of sickness have been traced to the use of impure ice.

Professor R. Pumpelly, of Newport, (*see* San. Eng., February 16th, 1882,) in the course of his experiments for the State Board of Health, had occasion to make tests as to the presence and susceptibility of living germs. He says that he thinks there is no doubt that ice can convey any disease that the water from which it is frozen can convey, in so far as such diseases arise from the germs of low vegetable organisms. Ice in freezing does not destroy or free itself from these organisms, as shown by the fact that samples taken from the center of blocks of ice, in every instance infected sterilized beef infusions with the germs of putrefaction. Ice in the act of freezing does expel certain gases and foreign substances, and, with the important exception above made, is somewhat purer than the water on which it forms. The outbreak of sickness at one of the hotels of Rye Beach, New Hampshire, in 1875, seems to have been proved to have resulted from impure ice.

"After the ice was suspected as the cause, it was found that it had been cut off from a small stagnant pond situated near the sea, until within a short time connected with the ocean, and into which a small brook entered, bringing a quantity of *sawdust from* several saw-mills. The pond contained a large amount of decomposing matter, and the gases arising from it in summer were very offensive.

"A portion of the ice was carefully melted, and was found to contain considerable decaying vegetable matter in suspension. A chemical examination was made, with the following results, which are, for comparison, placed by the side of the results obtained from the examination of ice of good quality:

"RESULTS EXPRESSED IN PARTS IN 100,000.

| | Rye Beach Ice. | | Boston Ice. |
|---|---|---|---|
| | Unfiltered. | Filtered. | Unfiltered. |
| Ammonia | 0.0208 | 0.0213 | 0.0045 |
| Albuminoid ammonia | 0.0704 | 0.0165 | 0.0050 |
| Inorganic matter | 7.80 | 6.88 | 0 45 |
| Organic and volatile matter | 5.72 | 2.84 | 0.31 |
| Total solids at 212° Fahr | 13.52 | 9.72 | 0.76 |
| Chlorine | | 3.23 | 0.02 |

"It thus appears that ice cut upon a very foul pond was itself foul, although, of course, the ice-water was not as bad as the pond-water. A sample of the latter was examined in the summer of 1875, taken under as favorable conditions as possible, with the following results:

| | |
|---|---|
| Ammonia | 0.0197 in 100,000 parts. |
| Albuminoid ammonia | 0.0597 " |
| Chlorine | 34.00 " |
| Total dissolved solids | 72.96 " |

"These results should be compared with the filtered ice-water above, and it will be evident that the water in freezing rejects some foreign substances. This is not, however, a purifying action, but amounts practically to diluting the objectionable matter or bringing a smaller amount at one time into the system. On this account, safety demands that ice should not be cut for domestic use on ponds or streams which are so polluted as to be rejected for water-supply."

The evils result from the use of ice from shallow or stagnant or artificial ponds. Some of the States have laws upon the subject, and our own Legislature at its last session passed a law prohibiting the cutting of, or sale of, ice in any city without a permit, where the Board of Health saw fit to pass such an ordinance.

## CEMETERIES.

A bill passed by the last Legislature in reference to cemeteries is likely to be of much service. It has been revealed that some cemetery associations pursue their vocation with the highest methods of commercial pressure, and seek to fill their cemeteries with bodies, without regard to the fitness of locality or to the evils of over-crowding. Some of them have become cities of the dead in which the tenement-house system is applied, all the more vigorously because the ground conceals the massing of the bodies. While such abuses do not exist to a very large extent, they showed the need of some oversight of burial-grounds and cemeteries by local Boards of Health, and of a law which gives the local Boards some power over choice of locality and management. Where cemeteries are located close to city limits, and are surrounded by built-up village or town streets, the evils of intramural interments are easily repeated. It is believed that we now have a law mild enough in its restraints, and one which serves to draw the attention of cemetery associations to the duty they owe to the public. In some cases the receiving vaults need better construction and more skilled oversight. The location of cemeteries within city limits should be stoutly resisted even when the parts least likely to be built up are selected.



## SCHOOL HYGIENE.

This Board has long recognized that whatever it is desired to have appear in the type of a nation it is desirable to recognize in its public schools. The interests of the body and its care in the years of school life must not be overlooked. It is the first business of trustees and others in charge of school buildings to see to it that the child who goes to school shall not there find anything that will be a risk to health. Still more, he should find there such guidance and instruction as to physical education as will enable him to appreciate its importance, and to secure such information as will enable him to put in practice the laws of health. To this end hygiene needs to be understood by our teachers, and proper instruction and training needs to be secured. We are glad to state that the Superintendent of Schools, the State Board of Education and the Trustees of the Normal School have so far appreciated this as that it has been directed that weekly instruction be given in hygiene, and that examinations be had thereupon as in other departments of study. We believe this will greatly aid in the physical care of the pupils, and that the example will soon be followed in most of the largest schools of the State.

## LOCAL BOARDS OF HEALTH OF TOWNSHIPS.

These divide themselves into those that are for townships and those which have been formed in cities, towns, etc. As a rule, each city and town has its own Board of Health. The exceptions are where some very small borough or town, governed by a commission, has been formed, in which the township assessor and township committee still have relation, and in which it has not been seen fit to form a town Board of Health in place of the township Board. A township Board of Health is composed of the township committee, the assessor and the township physician, if there actually be such office or such officer. This generally means the physician to whom the care of the poor has been assigned by the appointment and election of the town committee.

Where there is no such mode of appointment, the township committee or assessor should apprize the State Board of Health of the fact. It then appoints a medical member for the Board. If there is none resident in the township, one may be appointed from an adjacent township. It is important that some one be selected who is really interested in local health matters, and who, both by his knowledge and judgment, can do much to aid the Board. Circulars XXXIX. and LIV. should be carefully read over by each member of the Board. The Board should acquaint itself with the various circulars issued by this Board for general distribution, and by these and other means seek to give sanitary information to the people of the township. We have had many instances illustrative of what signal advantage members of a Board can thus be, in imparting information and in drawing attention to the importance of sanitary care. In the case of very many evils complained of, prudent men will be able to secure their abatement without any severity either of language or of law. It is our experience that most men are unwilling to cause nuisance or be a detriment to the public health. They do not know, or they have come themselves so to tolerate the nuisance as not to realize it, or they are prejudiced by the cost of its removal, or imagine that objection arises from persons over-particular, or from some personal grudge. Generally they will be able to disabuse their own minds by seeking the private judgment of some who are often brought in nearness to the evil complained of. While Boards are not mere bodies of persuasion, and while time must not be lost in cases of peril, it is wise that some effort be made to get clear of the nuisance without process of law. Many need to be reminded that, in the eyes of the law, that is a nuisance which is detrimental or hazardous to the public health, as also anything that so affects the ordinary citizen as to produce repeated physical discomfort. Section 7 of Chapter CLV., Laws of 1880, (see Circular, page 7,) tells under what circumstances they need to examine as to nuisance, although, as themselves, freeholders and tenants, they can do it of their own accord. Section 8 prescribes one mode of procedure, and Section 10, Chapter CV., Laws of 1883, (see Circular LIV., page 15,) another mode. It is generally well, before either procedure, to give the notice, page 22 of Circular. If the township has passed no ordinances as to the public health, its mode of action is clearly defined in Section 8, Chapter CLV., Laws of 1880, (see page 8 of Circular,) or it may at once, as a Board, avail itself of the provision above referred to, Section 10, page 15 of Circular. If resisted in any form, when proceeding under Section 8, Chapter CLV., Laws of 1880, the inspector or member of the Board so resisted should use the ordinary methods as to resistance of an officer or assault. The following is a recent case:



It occurred as to a small hotel in Asbury Park, New Jersey. The owner of this property caused a well to be placed a few feet from a vault. The Board of Health protested against this proximity of vault and well, and caused an examination of the well-water to be made by a State Analyst. The water was found to be polluted. The tenant was then requested to discontinue the use of the well-water, and to close the well by removing the pump. This demand of the Board not being complied with, a Health Inspector was sent to close the well. An ex-policeman was employed by the tenant to resist the health officer and prevent the closing of the well. The resistance consisted by standing between the officer and the pump, and thereby making it impossible for the Inspector to perform his duty. The man was arrested and a warrant procured for his detention from a Justice of the Peace. He was indicted by the Grand Jury, and was convicted of assault in his trial before the Court of Quarter Sessions of Monmouth county, at the November term. This is the first case of this character which has been brought to trial in New Jersey, and the verdict of the jury will do much to strengthen the position of the Boards of Health in this State. The result of this prosecution shows that simple interference with a health officer, thereby preventing him from obeying instructions from a Board of Health, constitutes "an assault" under the law, and subjects the offender to severe punishment.

He having notified the person under the first law and having been resisted in removing the nuisance, while it renders the person liable, does not prevent recourse also to chancery. Because, however, it is often more satisfactory to proceed against a person before a justice, for having disobeyed an ordinance of a Board of Health, and to recover fine, many of the townships, and especially those having populous villages, prefer to act as provided for in Chapter CLV., Laws of 1882, and to pass in accord therewith such ordinances as they deem necessary. (See Section 5 of this act, Circular LIV., pp. 11 and 12, and outline of Code for Townships in this report.)

This is the plan generally to be recommended in all thickly populated townships.

The chief mode in which a Board of Health is to be provided with money is given in Section 3, Chapter CCXXV., Laws of 1885, (p. 18 of Circular.) In cases needing special investigation, the State Board is allowed to aid to the amount of twenty dollars.

Township Boards of Health should apprize the State Board when, in their judgment, a local inspector is needed. The State Board can, with or without such notice, act in accord with Section 4, Chapter CCXXV., Laws of 1885, (p. 18 of Circular.) Such, together with the circular itself and the laws in general, is a brief outline of mode of procedure. But no such outline can take the place of a thorough looking-over of the law, to find out various other duties. Besides, the local Board is often, as under the Drainage Laws and various others, the moving force toward securing what is needed for the public health, even when it does not act in its official capacity. Now and then, in some small and healthy township, the town committee, assessor, etc., assume that there is nothing for them to do. Here is a specimen of results:

"During the last three weeks, eight or ten cases of enteric fever have been admitted into St. Michael's Hospital, Newark, all of whom came from Sayresville. I thought best to call your attention to it, and you can investigate if you think proper."

The following is the report of one of our District Inspectors:

"On visiting S. I found that Dr. D., who had attended the men at the brick-yard, had left the township the week before. A number of men from different yards had been sent to the hospital at Newark, but none had been sent during the past month. I made an inspection of the brick-yards. I found that it is the custom to have the men live in shanties, which are about fifty feet by twenty feet. Each house has a dining-room running the whole length of the building, on the ground floor. Above this is one large sleeping-room. Each house contains from forty to sixty men.

"The water-supply is from wells, which are placed within ten feet of the door of the house. Some of the buildings had only a single privy, and none of them had privy vaults. The waste-water and slops are thrown close by the door or right in front of the wells. The smell around the houses was very bad indeed. There are no cases of sickness in any of the yards at present, and as they stop work this week for the season, and the men leave the place, there is no danger of any more cases now. Of course, there is danger of some of the men carrying the disease elsewhere. I insisted on an entire change in the condition of the shanties for the next season, and a thorough cleaning-up and disinfecting of the buildings and surroundings.

"I think it would be well for some officer of the State Board of Health to visit the place in the coming spring."



## LOCAL BOARDS OF HEALTH OF CITIES.

These are now formed as provided for in Section 1, of the amended law, given on page 6 of the Circular. Their usual method is to proceed at once to pass ordinances and so apply the law. Chapter CLV. Laws of 1882, pages 10 to 12, of Circular LIV., as also Chapter CLX. (1884), page 13, which is especially applicable to cities, etc.

These also generally give notice to parties, although the law does not absolutely compel this or prohibit action for a nuisance which has not been made a subject of ordinance. Cities, too, may avail themselves of the various forms of procedure already noted.

The mode of raising money for city Boards of Health is given in Section 3, Chapter CLIX. Laws of 1885, page 17 of Circular.

In every city of over 2,000 inhabitants, Section 2, Chapter CCXXX., Laws of 1885, (page 18 of Circular,) requires a Sanitary Inspector.

It is one of the most pleasant results of well-organized Boards of Health, that they are able to prevent or abate thousands of nuisances without recourse to any of the penalties of law. Where the offense is plain, and there is resistance sufficient, law is now provided.

It is worthy of note that two of the largest cities of the State—Newark and Camden—finding their charter methods of procedure ineffective, have now organized their respective Boards under the State law. This places the State, as a whole, under special and definite laws for the protection of the public health, so that now each city and township has the plan of organization and the power for effective administration. With the appointment of competent local Inspectors in the cities and more populous townships, and with a proper oversight on the part of the local Boards, it is possible to preserve very many lives, to diminish sickness and invalidism, to add to public and personal comfort and to the working capacity of our people.

## HEALTH INSPECTORS.

In the interests of health, there is no more important service than that of a Health Inspector. He should be a man made competent

for his service by a careful study of the means of preventing various nuisances, and the best methods of preventing and removing them when they occur. Some knowledge of chemistry, of physics, of plumbing and of the various appliances most in use is very desirable. He should know well, how to deal with those with whom he has to meet, and must realize that an Inspector is generally not welcome until, by his good service to individuals, to families and to the city, he has shown himself to be a public benefactor and not an inquisitive place-seeker. There is need of a real interest in the health of the people, a knowledge of the means of promoting it and a prudence in administration which knows how to temper firmness with kindness. In the work of sanitary inspection a system of visitation and of record is indispensable. While there is ever occasion for special inquiries into particular complaints and special nuisances, no city, town or borough has a satisfactory inspecting method unless, first of all, each house has been visited and a record made as to it. This Board has prepared a hand-book for this purpose, showing how it is to be conducted and how the record is to be kept. This must be placed on file and reference made thereto when any new inspection is made. After a street or the whole city is completed, a summary should be made, so that it can be stated how many houses have inside closet arrangements, how many have cesspools, how many are ten feet, fifteen feet, twenty feet, etc., from house or well, how many houses use well-water and all other facts of a sanitary bearing. With this, and with the records of the vital statistics, the health officer has what the manufacturer would call the plant. There is the basis for work which is intelligent, methodical, accurate, instead of that spasmodic or routine work which waits for nuisances and displays its only activity in abating them. This is useful, but that there should be a nuisance to abate where it could have been prevented is always the mortification of the true Sanitary Inspector. Chicago has thought this house-to-house sanitary inspection so important that it has appropriated $100,000 for that purpose alone. The Sanitary Inspector who trusts his wonderful memory will no doubt remember the house that has small-pox in it, and the one where he fell down the steps into a filthy cellar, but as to others will not know all those details which he ought often to have occasion to refer to. How simple and important a matter this is, the records of Asbury Park, for instance, will show. Paterson, also, for a large city, has made good progress in this



direction. The books for record are good in form, and can be had cheaply, or may perhaps be in part furnished by the State. Samples will be sent when requested. We have the past year furnished two for school-house sanitary survey and inquiry to each teacher of the State—one for the information of the trustees and one for file at the State House. The value of this methodical and recorded inspection is inestimable. It is the foundation of system in sanitary work. In the first attempt, it is not a visit of complaint or remedy so much as to get at the facts and record them. No doubt in some cases quick action is needed, but in general it is preparatory to that information, persuasion or enforcement which is needed in so many homes. In cities thus cared for, life becomes more valuable, freer from sickness and the power of individuals for labor is increased. Thus local and public prosperity are the direct results in this increase of the capital of health. This State has wisely provided that every town of 2,000 inhabitants shall have an Inspector, and has furthermore authorized the State Board of Health to require an Inspector in such townships as, in their closeness of population or in other respects, have localities that approach town and city conditions. We apprehend great benefit from these provisions when they come to be fully and systematically applied.

Whenever any ten of the Inspectors of the State request a week of special instruction in details of duty, the Board will arrange a systematic study and course of instruction, without expense. There is now a real demand for real and competent Inspectors.

It is the great desire of this Board to help all Inspectors in their work. The reports of this Board, so far as accessible, should be carefully examined. Any Inspector who will send us his name and address will receive, from time to time, the various reports, circulars and instructions issued by this Board. Hereafter, we desire that all Health Boards should send us the name and post-office address of Inspectors, with the annual October report, as also notice of any change that may occur during the year. We refer to the following books in this library, or that can be procured by Inspectors, as especially valuable to them:

Hand-Book of Hygiene: Wilson. Lindsley & Blakiston, Philadelphia.

Sanitary Science: Burn. Spon, 34 Murray street, New York.

Laws of Health: Corfield. Spon, 34 Murray street, New York.

Dwelling Houses: Corfield. Spon, 34 Murray street, New York.

Dirty Dust-Bins and Sloppy Streets: Boulnois. Spon, 34 Murray street, New York.

Manual of Public Health: Hart. Spon, 34 Murray street, New York.

Hand-Book of Rural Science: Marsh. Spon, 34 Murray street, New York.

House Drainage and Sanitary Plumbing: Gerhard. Van Nostrand, New York.

Sanitary House Inspection: Gerhard. Spon, 34 Murray street, New York.

Hygiene: Newsholme. Spon, 34 Murray street, New York.

### DISTRICT INSPECTORS.

Under the act passed by the Legislature of 1885, authorizing the appointment of District Inspectors, the Board has been able to extend its own supervision, and to secure, where needed, effective coöperation.

In May last, the following circular was issued:

"OFFICE OF STATE BOARD OF HEALTH,
"TRENTON, N. J., May 15th, 1885.

"Under a law passed by the Legislature of 1885, the State Board of Health is allowed to appoint Sanitary Inspectors to assist in promoting the interests of public health throughout the State. The Board has thus far made the following appointments:

"Henry Mitchell, M. D., Asbury Park, for Monmouth county.

"William K. Newton, M. D., Paterson, for Passaic and Bergen counties.

"James Meeray, Jr., M. D., Cape May City, for Cape May county.

"James Owen, C. E., Newark, for Essex county.

"James H. McGuire, Trenton, for Mercer county.

"D. B. Ingersoll, M. D., Mays Landing, for Atlantic county.

"A. V. N. Baldwin, M. D., New Brunswick, for Middlesex county.

"Wm. H. Iszard, M. D., Gloucester county.

"These will be termed District Sanitary Inspectors, and will attend to the counties in which they live, or to such adjacent localities as may be designated.

"The object will be—

"I. To thus have persons ready at hand who are familiar with the health laws of the State and with the details of their administration, so as to advise with and direct local Boards of Health in their work.

"II. To see that proper organization of Health Boards is perfected, where it has been omitted, or the plans therefor not understood.



"III. In case of sudden outbreaks of disease, at once to render such assistance as may be indicated, or as local Boards may desire.

"IV. To secure or aid in the sanitary inspection of schools, almshouses, jails or other places of public assembly or detention.

"V. To secure a more general vaccination, and a knowledge of the methods of preventing communicable diseases.

"VI. To aid local Boards in the enforcement of the laws as to vital statistics, as to adulteration of foods or drinks, as to dangerous kerosene, and as to the contagious diseases of animals, etc.

"Local Boards of Health now have ample powers, and the recent laws provide for the raising of money for health purposes in cities and in townships.

"If Boards of Health, or Assessors and Town Committees will notify the District Sanitary Inspector of their desire to have him meet with them and explain more fully their duties and powers, he will be glad so to do.

"By order of the State Board of Health.

E. M. HUNT, M.D., *Secretary.*

"District Inspector."

Care has been exercised to choose persons who have special knowledge, or have shown special interest in sanitary matters. We need those who are fully acquainted with details, as well as with general laws and principles. Many of the local Boards need to have some such assistance ready at hand, in addition to that given by personal visits of the Secretary or other members of the Board, when necessary. The reports of these District Inspectors, as outlined and condensed by Dr. Henry Mitchell, will show the work attempted or accomplished.

### SANITARY LEGISLATION.

The past year has been one of considerable importance as to the health laws of this State. The laws under which Boards of Health had been formed in the townships and the cities of the State were quite different from those by which the committees of chartered municipalities or township committees had exercised a jurisdiction over some matters relating to health. Under these a Board of Health had no efficient existence. In case its powers were disputed, the enforcement involved so many steps of procedure, and gave rise to so many technical questions of authority, as greatly to embarrass the administration of the laws. The various acts which have now been passed, recognize that while certain relations between the corporate bodies and Boards

of Health must be maintained, and while questions of large expenditure must have the approbation of the governing bodies or of the people, there must also be in the Boards of Health certain direct power, not the least of which is their ability to carry a case rapidly to adjudication by presenting it for summary proceeding to the Court of Chancery.

The various laws relating to the public health, so far as they have emanated from or come under the advisement of this Board, although approved in their passage by good legal authorities, had not been subjected to the test afforded by cases carried up before the Court of Errors and Appeals. During the present year cases involving most of the principles and practices of these laws have come before the court. The result has been that the laws have been fully sustained.

While these laws give large powers, such as characterize most police measures, yet they are easily brought to the arbitrament of the higher courts, and so, if erroneously framed or administered, a speedy restraint is put upon them. It is equally true that local Boards which should so far exceed their functions as to be constantly interfering with minute or mistaken nuisances, would, in the very nature of their work, soon find themselves changed by the nominating and confirming boards of cities and boroughs, and by the popular vote of the townships. Thus there is no real danger of the invasion of personal rights. Indeed, it is far more common, under the best sanitary laws, for the public health to suffer from the acts of single persons, than it is for persons to suffer wrong at the hands of Health Boards.

It is sometimes complained to us that local Boards do not do their duty for fear of a brief unpopularity. During the year we have printed an abstract of the most important laws, and an index of reference to others, which furnishes a ready guide to those who will carefully follow its outline or refer to the laws, of which the text is not fully given. The two laws passed by the last Legislature, Chapter CLIX. and Chapter CCXXV., have, in their application, fully vindicated their passage. By them the local Boards have been assured of an amount of money sufficient to meet those incidental expenses which necessarily occur. Also, the State Board has been able to appoint District Sanitary Inspectors, who have proved invaluble in the sections in which they have had oversight. All of the money appropriated for this purpose has not been expended, simply for the reason that the Board was not able to find persons competent for this special work, who had



the time to devote thereto. But it is believed that with care in selection, and with more experience in the details of such inspection and oversight of local Boards, we shall be able greatly to increase the value of the service in this direction. The text or reference to some of the legal decisions made are to be found in this report.

### CARE OF RAILROAD STATIONS AND PROPERTY.

In March last a letter was addressed to the officers of the various railroad companies of the State as to the need of more skilled oversight of the various conveniences of their railroad stations. It was as follows:

"TO THE OFFICERS OF
"RAILROAD AND TRANSPORTATION COMPANIES
OF THE STATE OF NEW JERSEY.

"TRENTON, N. J., March 16th, 1885.

"GENTLEMEN—The State Board of Health of New Jersey has the honor to address you in the interest of public health in this State. Not only because of anxiety as to the possible introduction and spread of cholera, but because of the intimate and constant relation between public conveyances and the spread of disease, we earnestly advise an expert sanitary inspection of all the property belonging to your respective companies.

"We are aware that some of the very best methods of structural arrangement and management are illustrated in some of the cars and stations of the various lines of railway. We are also aware of defects and neglects that are a menace to the health of the traveling public, and to the localities in which the buildings of your respective companies are located.

"The attention to rooms, cesspools, closets, water-supply, etc., too often devolves upon those not capable of skilled oversight and not acquainted with thorough modes of construction, cleansing and disinfection. In times of epidemic, these public places are especially hazardous. At all times they are subject to such general and frequent use as to make it needful to have a very watchful care and some system of inspection.

"At a meeting of this Board, held at Trenton, March 10th, 1885, this circular was directed to be transmitted to the officers of all companies doing business in this State.

"By order of the Board.

"E. M. HUNT, *Secretary.*"

Some kind and prompt responses were received, but it was found little was being done. The Board then authorized one of its Sanitary

Inspectors to make a tour of inspection and accurately report the result. These reports were at once forwarded for the information of railroad officials, and at once commanded attention. Some entirely unexpected defects were reported. The result has been not only a more comprehensive plan of inspection, but a special order as to sanitary care and much change in the methods of disinfection. In some cases skilled inspectors have been placed in oversight. We feel confident that, for a time at least, there will be much improvement, but each local Board should see to it that no such properties within the limits of their jurisdiction become a center of inspection. Complaints made as to the transportation or careless deposit of fertilizing material, have been duly brought to the attention of the companies.

## HEALTH RESORTS.

During the last year our State has well sustained its reputation as a place of resort for those seeking health and recuperation. It is believed that the aggregate of visitors has been greater than during any preceding season. Not a few of these become permanent residents. Their children form attachments which are local, and so whatever invites to summer residence also secures eventually a permanent increase of population. It is very noticeable how many have thus come to identify their interests with the State. It is one of the many illustrations of the fact that State and local care of public health has a great social and financial value. For the very name of "health resorts" shows that these places are first sought because of their pure air, good water and healthfulness of soil. Hence it is of the very first importance that the natural qualities of soil and purity of location be fully preserved. This will not be done unless there is organization and direct supervision in the interests of health on the part of the local authorities. We could cite many instances to show how those from other States have valued this care, and have admitted that New Jersey is far in advance in its sanitary oversight of localities. The details of care, for instance, at Asbury Park, are as exact as in the best English cities.

It might be argued that those who build for health, or who build large hotels for rental, will, in their own interest, secure the best sanitary conditions. This is far from being the case. Concealed work is slighted, or the most crude methods of disposal of sewage adopted.



We have had occasion directly to interfere in the arrangements of some of the hotels. In one instance we were about to take such measures as would dismiss all the guests, and would have been able to rest for defense on the facts in evidence. We can report for this year a better success on the part of local Boards than in any previous year. Not only is their advice generally listened to, but in many instances they have been able to enforce more stringent regulations. In addition to the usual number of visits and inquiries made by the Secretary of the Board, a District Inspector in each of the counties of Monmouth, Atlantic and Cape May has much aided local Boards. Former reports have had occasion to speak with anxiety and with some reproach as to the evils accumulating at Long Branch from the want of a sewer system. It is a great pleasure to strike out from the printer's proof what we again had occasion to say still more plainly, and to substitute in its place the information that the citizens have just perfected a thorough plan of sewerage, and that the engineers are already at work. Although there have been no serious results thus far identified, the state of things which has existed could not be continued without great peril. The good water-supply has, no doubt, helped to prevent the hurrying of results which happen where the water is derived directly from the soil. But it is not well to live along rows of pools of stored filth, even if the drinking-water is not derived from the adjacent soil, and we trust that another season will not pass without decided changes in the structural and other methods of disposing of the great quantity of fouled liquids, always furnished daily where there is an abundant water-supply.

It is not necessary to speak in detail of all the places visited. We now know of no prominent health resort without its local Board of Health. By visit and correspondence, these Boards are becoming more familiar with their duties, their privileges and the powers of the various laws under which they act. There is much need of some law to regulate the relative location of wells and outhouses, as also the plumbing of such as have closet and bath conveniences. There is one fault which is quite common to the most of these summer cities and villages, and which is not fully reached by local Boards of Health. When the time for the fall flight comes, it is often sudden and rapid. Hotels and private houses are deserted without any of the proper fall house-cleaning. Visits to the kitchens, laundries and other parts of hotels and boarding-houses often reveal an amount of decaying and

putrescible matter left behind, sufficient to cause much foul air in the late fall or in the warm days of the spring. The entire building is thus made a retort for holding foul air until the next June. We attribute to this cause as much as any other the occurrence of undoubted occasional cases of septic or typhoid fever at these resorts. A town is often thus said to be unhealthy, when it is merely the bad management of single households. In one of our coast cities much good is done by notices from the Board of Health, so that many who are warned put the house or hotel fully in order at the time of leaving. If only personal faithfulness will combine with public effort, the thorough summer healthfulness of these delightful resorts will be assured.

## CHOLERA.

It is with great satisfaction that we have to report our exemption from cholera during the past summer. Its fearful ravages in Spain, in France, and to some degree in Italy, assure us that it is the same dreadful scourge that has so often desolated many lands.

In Spain the official report gives the number of cases to November 1st as 273,808; the number of deaths, 101,448. This is believed to be below the real numbers.

Recounting the history of former European epidemics, this country can never be regarded as safe from an invasion of cholera so long as it is occurring in parts with which we are in constant communication, and so long as conditions exist here favorable to its propagation and desolation. One can not read the many reports from our Consuls in Europe, in 1884, and especially those of Mr. Mason, as to Toulon and Marseilles, without recognizing that we can not altogether claim exemption by reason of the better sanitary condition of our cities. Marseilles, especially, is believed to have a good and abundant water-supply. "The sewers throughout a large part of the city are admirably constructed and the pavements are probably as good as those of any European city. The failure of proper sanitary condition was chiefly in the amount of sewage thrown into the sea, which became so precipitated about the docks as to require dredging, and in the fact that the 'lower classes of people have generally the lax ideas of Southern Europe in respect to culinary and personal cleanliness.'" Yet when we take into consideration certain well-ascertained facts as to some of our own cities, we are compelled to admit quite similar conditions.



The great defects seem to have been in a want of well-sustained sanitary inspection, and that thorough sanitary organization which gets ready beforehand, and which is in complete order for dealing with first cases. Cities are not likely to be so cleanly but that an epidemic once under headway will find material, just as a great outbreak of fire is sure to find combustible matter.

Not less important than the diminution of the susceptible material is that thoroughness of preliminary organization which insures the most perfect administration. England was never so confident as now of its ability to prevent or control an invasion by cholera, because the methods of military discipline have been applied in sanitary law, order and police. And what is cheaper in the end? One hundred thousand people flying from Marseilles, although there were but 1,784 deaths, meant more of financial prostration for that city than can be reckoned by dollars. It is only systems of municipal and sanitary expenditure that prevent the wild waste and extravagance of epidemics such as were complained of in that city. This mode of systematic preparation is all the more important because it is as effective in dealing with the more common diseases and scourges, which, in the aggregate, destroy so many more than any one epidemic does. Since it is not claimed that any great advance has been made in the treatment of cholera, and since it is claimed that very great advance has been made in its prevention or its limitation by cleanliness, isolation and administration, it is better to trust to the latter than to place our reliance upon treatment only.

Whatever may be the doubts as to the essential origin of epidemics, these, or the speculations as to them, do not invalidate the fact that where many are immured in an atmosphere of decaying organic matter, some zymotic disease is invariably produced. A locality breathing an atmosphere perfectly pure may not be exempt from every communicable or transmissible disease, but observation has shown that for such districts epidemics are very infrequent or fatal to very few persons of good habits and general good health. Internal sanitary arrangements and not quarantined or sanitary cordons are the chief safeguards of nations. A salubrious city, in an epidemic, is like a city built of stone as compared with one of wood in a conflagration. Disease-proof homes are nearly as attainable as fire-proof buildings.

During the year some cases of Asiatic cholera have been reported

to us, but we believe none of them to have been substantiated. The case in Camden county was fully investigated, and certainly had no transatlantic origin. We had occasion to examine into one case in Middlesex county, which an experienced physician still believes to have been Asiatic cholera. But although there were the severest symptoms of cholera nostras, a full examination gave to us no evidence of the more virulent and communicable variety. Our attitude as a State must be that of armed preparation. This merely means that each local Board of Health must do its duty, and that Inspectors must see to it that there is no accumulation of filth as to persons, places or things.

### SMALL-POX.

The ravages of small-pox in Montreal and the occurrence of some cases in the States, derived from that city, has anew turned attention to the importance of vaccination. It almost taxes the patience of medical men and of sanitarians to know that a disease which can be eradicated, should so often become epidemic. Every death is a record of the evils of neglecting preventive methods. We are not enough impressed with the ravages which small-pox would make if some of the people were not always secure. These, besides being safe themselves, are of great aid in caring for the sick and so diminishing fatality.

In a register kept in Kilmarnock, Scotland, from 1728 to 1766, it then being a town of from 4,000 to 5,000 inhabitants, we get some estimate of what a visitation of small-pox then was. It appears that there was an outbreak of the disease about every five years. "Each epidemic affected all or nearly all who were not disease-proof, and therefore its victims were almost entirely children under five years of age, who had come into existence since its last visit. Those who recovered were disfigured for life. There were in fact, says Dr. McVail, three Kilmarnocks. One had no fear of small-pox, for its people had already met it; some were blind, some were deaf, most were scarred or disfigured. The second Kilmarnock was under the green sod of the church-yard. The third Kilmarnock consisted of a band of about 500 little children which had yet to face the most terrible enemy it would ever meet. One can scarcely imagine what must have been the feelings of a mother during these visitations. Even when the town was free from pestilence, there would be the constant foreboding of its all-too-certain coming, and when at last the first case



occurred, it was a sentence of death to some member of almost every family containing little ones." The disease has not decreased in malignancy, but the prevention thereof is in the reach of every person and of every family. It is not necessary here to repeat the full information as to it contained in the sixth report of the Board (1882). Circular XLIV., to be had by any one on application by postal, gives all necessary details. Physicians are now very careful as to the sources of lymph, whether the humanized or bovine variety is used. The danger of receiving any disease through the blood of another person can now be wholly overcome by the use of the bovine lymph, although the risk from humanized lymph has been greatly magnified.

We urge upon all local Boards and all school trustees and all parents, to see to it that vaccination is well nigh universal. The law of this State as to school children is most important. While vaccination is not made compulsory, as in England, it is provided that children shall be allowed to attend school, without being subjected to that risk which the presence of unvaccinated school-mates would inflict upon them.

### ADULTERATION OF FOODS AND DRUGS.

The Board has, during the past year, to some extent carried out the law as to the adulteration of foods. The milk law has been enforced as fully as present arrangements permit, and is found of great service in restraining the sale of watered and skimmed milk. It proves that there is little other falsification of milk except the occasional use of chemicals to prevent it from souring. The most usual fraud is that of selling various fats as real butter. The manufacture of beef and lard and other animal fats, and of cotton-seed oil, bené oil, etc., into imitation butters, has come to be so extended as to defy any ordinary powers of inspection. While the most or all of these, if rightly prepared, are not injurious to health, they have not for all purposes the value of good butter, and should not be sold as such. Examinations made of various articles of food and of drugs show that the addition of anything injurious to health is rare, the object generally being to increase bulk or weight by inert substances. The great evil is to the working people, who often thus get much less than the worth of their money, or who do not secure the requisite amount of nourishment, because the food used lacks in food value, or is more difficult of digestion. A thorough system of protection would require

an analyst in almost every town, and a Board of Health collecting specimens and conducting suits. Or, if the State Board of Health was fully charged with this duty, it would require thousands of dollars instead of the single thousand to which expenditures in this direction are now limited.

Under the present law, as it seems to us, the thing feasible to be done is for city Boards to be watchful over suspected falsifications, and for them to seek occasional test examinations of certain articles. In large cities where sufficient funds are provided there should be the Public Analyst. But where this is not the case, within proper limits the service of the Analyst for the Board can be had at the expense of the State. It is because of great doubt as to the wise expenditure of the money outside of such applications, that the full amount allowed has not been expended. Yet we believe the law has been of some service, and will be made by us of greater benefit in the future. In this report will be found the report of the Committee of Analysts for the year. Local Boards should give special attention to the sale of anything which is suspected of being adulterated, so as to be injurious to the public health. Correspondence will secure full directions as to modes of collecting specimens, as also of securing the aid of this Board and of our Committee of Analysts.

### LIGHTS AND LIGHTING MATERIALS—THE PETROLEUM LAW.

Lights and lighting apparatus and materials have important relations to public health, not only in the care of the eyes but in the preservation of the purity of the air. A great amount of work has to be done by artificial lights and those who thus have to work, whether as scholars or as artisans, should be secured as far as possible against injury to the eyes or to the general health. Gas differs greatly in its quality and some of it gives off carbonic oxide and other deleterious gases. The quality of lights and the mode of their regulation deserves careful study in the interests of health. It is the great value of the electric light that it is free from all these defects, and when it is made more available by proper shades and fixtures it will become a desirable light for the school-room, the workshop and the places of public assembly. Kerosene, as furnishing a convenient and valuable light, is in such general use that its purity and safety need to be



secured. The law of this State as to it has proved of very great service. It is noticeable how few accidents now occur from actual explosions. Examinations of specimens show that most of the oil now in the market answers to the State requirements. The law has made it the policy of dealers to keep only oil up to the standard. Outside competition is occasionally started, but the companies themselves aid in watching this. The success of this brief law in protecting life in the State and at such small expense, has fully justified those who advocated it amid much active opposition. It still needs the attention of local Boards and notification to this Board where accidents from *explosion* occur or where impurities are reasonably suspected. Explosions now rarely occur. Most of the cases reported in the newspapers are from spilling of the oil or breaking of the lamp when lighted.

### HEALTHY HOUSING OF THE WORKING POPULATION.

It is a significant fact that in England the protection of the homes of artisans and of all those who have to rent dwelling-places has become so prominent a subject of parliamentary legislation. It is equally significant that a political party in one of the chief States of the Union should have regarded it as politic to have in their different sections of its platform reference to the care of the health of the people and one special section as to the regulation of tenements. It is the social interest of the State and the interest of all citizens, independent of all parties, that the law, especially in cities, should have something to say as to the construction and oversight of houses in general and of those offered for rental in particular. Some people are beginning to see that health is a workingman's question and that to secure healthy habits, healthy food and water, a healthy home and healthy surroundings, is one way of increasing wages. It was an important item in the semi-decennial census of the present year that we were able to secure a record of the number of houses and so to have in each precinct a record of the number of families and persons to be found in each house. The Tenement House acts relating to New York and other cities, and the specifications for plumbing, drainage and water connection, as to traps and trap ventilation, iron pipes and lead pipes, their thickness and joints, as required by the Board of Health and its Sanitary Engineer, have proved most valuable as

social benefits. There is need of similar laws in some of the cities of this State. It is impossible to secure health where faulty or leaky structural arrangements furnish a constant supply of organic material to the inbreathed air.

### CIRCULARS OF THE BOARD.

Especial attention has been given the last year to the preparation of a few circulars which were needed by Health Boards, by Inspectors and for the care of the school-houses of the State.

The collection of the laws in a small pamphlet, with reference to others, and such explanations as would aid in their enforcement, was made important because of their number and of the imperfections of index to some of them. These are now in the hands of all Health Boards, and are also valued by lawyers as furnishing more easy reference. Some of the directions as to mode of procedure will prevent errors on the part of local Boards in their first action and enable them to know when to seek legal advice.

The circular for Inspectors, in book form, enables them to conduct systematic examinations and to have their report on file with the Board of Health. Thus the city comes to know the history of each house, its observed defects at particular times and the remedies to be sought.

The school circular is alluded to in another connection. The circulars on drinking-water and its tests, and on cholera and disinfectants, have been widely distributed. The other circulars of the Board continue to be largely called for, and are found of great educational value to the citizens of the State.

### THE NEW JERSEY SANITARY ASSOCIATION.

The New Jersey Sanitary Association continues its valuable aid in all that relates to the sanitary welfare of the State. It brings together many of the prominent workers in allied departments, such as civil engineers, chemists, teachers, health officers, etc., and enables them to become more familiar with the practical progress and needs of sanitary science and art. The one need of the State at present is efficient local health officers and Inspectors. Many of the local Boards are availing themselves of membership in this association, or send delegates, who



become informed as to various matters pertaining to their work. No Board in the State should be willing to be unrepresented. Health Inspectors and medical officers especially should not fail thus to become acquainted with each other's methods, and with the constant improvements being made in structural facilities, and in effective organization and administration. Brief and valuable extracts from their unpublished proceedings, and an outline of the work done, will be found in this report.

# THE VENTILATION OF SEWERS AND HOUSE DRAINS.

BY RUDOLPH HERING, C. E.

One of the most important details which we are obliged to consider in a system of sewers and house drains is the question of ventilation. It is important because imperfect ventilation, or its entire absence, may not only impair the mechanical working of the process of sewage removal but permit the escape and discharge of sewer air at points where it might be highly dangerous to health.

In looking at sewers from the standpoint of ventilation, we may divide them into two general classes, namely, the ordinary kind, such as we have in our country, and the pneumatic systems; in other words, those which are open to the air, and others in which the air is constantly kept rarified by means of exhaust pumps.

In the latter, sewage is conveyed to the pump by atmospheric pressure, transmitted from the various inlets and receptacles in the houses. There is no tendency therefore in such a system for sewer air contained in the pipes to escape, but only for atmospheric air to be drawn into them and carried with the foul air to the exhaust pumps, where it may be passed through fires or otherwise properly disposed of.

In these systems the question of ventilation is at once settled and, as we must confess, in a most perfect manner. In fact, this simple and effective way of dealing with it forms one of the strongholds of the pneumatic systems, such as are proposed and built in some European cities by Liernur and Berlier. And were it not that other features make them, in all but rare cases, not only expensive but very troublesome, we should probably have little to bother us concerning the question we are discussing.

The method of sewerage which is employed in America, in England and in most cities of Continental Europe, is that of water-carriage, by

which the foul matters are suspended in water and propelled by gravity. It is nearly always the simplest, cleanest and least expensive one, and therefore bound to prevail. Whatever troubles it brings with it, such as, for instance, the proper disposition of the air in the pipes, they will have to be either mastered or, at least, sufficiently relieved to prevent dangerous effects.

It is the object of the following brief remarks to indicate the main principles of sewer ventilation, because it is found in practice that some of them are quite commonly misunderstood or not sufficiently appreciated.

The necessity for ventilating sewer pipes, such as we use, arises from the fact that conditions may exist within them, owing to a number of causes, that tend to break the water-seals or traps and thus permit the foul air to escape where it is intended to be held back.

It has been thought possible to solve the question by abandoning the water-seal and substituting a more powerful one. The idea was further encouraged by the announcement that a water-seal allowed gases to pass through it by absorption. In properly ventilated pipes the latter never occurs. But no substitute for water has been, and probably ever will be, found. Seals made by solid bodies are imperfect and liable to get out of order. Liquids alone can make a perfect one, as the passing sewage is found to carry along with it whatever liquid forms the trap, even when it is mercury, the heaviest of fluids; then, clearly, the only permanent material for the seal will be the water of the sewage itself, which can be and is constantly replenished.

I shall now indicate the various causes which tend to break the water-seals. It is not proper that we should include among them the evaporation of the traps. It is fair to assume that fixtures are used sufficiently often to be filled up long before the evaporation can destroy the seal. And, by being aware of this contingency, it is a simple matter, in case a house stands unoccupied for a season or longer, to allow water occasionally to run into all the receptacles in the building. The causes which are not so easily controlled are those which effect a *sudden* removal of the water, by exercising an unequal pressure upon the two sides of the trap, and these we shall now consider.

The air contained in the pipes is subjected to expansion and contraction by the hot and cold water discharged into them. One cause of unequal pressure inside and outside of the pipes is therefore to be found in a difference of temperature. If the pipe is open to the air,



this is very slight. Suppose the temperature of a house to be 50 degrees, and hot water is poured into a pipe so that its temperature for a height of 30 feet is raised to 122 degrees. The excess of pressure from 30 feet of cold air upon the outside leg of the trap against 30 feet of warm air on the inside, would cause a difference in the water-level about one-sixteenth of an inch.

But if the pipe is closed when the temperature is raised from 50 to 122 degrees, the increase of pressure, due to the expansion of the hot air, would equal the weight of a column of water 4 feet 8 inches high, which of course no ordinary trap can resist. The usual seal of 2 inches would be broken by an increase of temperature of about 2 degrees.

Further, the weight of the air in the pipe may become lighter by being saturated with moisture, while the atmosphere remains comparatively dry and therefore heavier. But this produces only an insignificant difference in the water-levels of a trap.

Another cause which affects the air pressure in the pipes is the wind. Suppose the sewer is entirely closed and that the wind blows steadily against the mouth at the outfall, until the same pressure exists throughout the system. If it blows with a velocity of 20 feet per second, the water-level in the traps would sink about an eighth of an inch. If it blows with a velocity of 40 feet per second, it would sink about $\frac{3}{8}$ of an inch; if 100 feet per second, about $2\frac{3}{4}$ inches. Therefore, as traps have a seal often as small as $1\frac{1}{2}$ inches, a very violent wind directed squarely against the outfall could blow them out, if they have no connection with the atmosphere by which to establish a relief of pressure.

The wind can also cause disturbances by blowing across the openings of vertical shafts or pipes. This action, as will be readily concluded from the foregoing remarks, while having a decided effect, yet cannot be sufficiently strong to endanger the traps. Its effect will be that of either exhausting or compressing the air in the pipes, according to the angle at which it strikes the opening.

Still another cause which tends to break the seals is the water falling in a vertical pipe or flowing in one that is nearly horizontal, and which will drag air with it by friction. The effect is the more powerful the more nearly full the pipe is running, and the consequence will be an exhaustion near one end and a compression near the other. This action is a very common cause of the siphonage of traps. The con-

ditions are so complex that a calculation of the effect is almost impossible. But we can obtain a good idea of it by imagining a body of water, completely filling the section of a vertical pipe, to fall from a fixture which is sealed by a trap. If no air can enter the pipe between the falling water and the seal, to fill the vacuum produced behind it, it is clear that the weight of the atmosphere will exercise its entire force to press the water from the trap into the pipe. This action can not take place if air is admitted just back of the seal. To guard against siphonage, otherwise than by this admission of air, many devices and patent anti-siphon traps have been brought into the market. It is not my purpose to describe any of them or state their relative efficiency. The best of them can be used to advantage in dwellings, under certain conditions, for small fixtures having large waste pipes. But none of them can make it safe to abandon a supply of air immediately at the sewer side of the traps in all the principal pipes which are likely to run full or nearly so.

Finally, another most powerful cause for disturbing the water-seal may be found in the varying quantities of sewage. Imagine a closed pipe to be empty, then suddenly an amount of water to enter it, filling it half full. The air contained in it will be compressed to one-half its bulk. As the pressure of air is inversely to the space occupied, it follows that unless the air can escape it would obtain an increase of pressure equal to one atmosphere, or the weight of a column of water thirty-three feet high. No traps, of course, could withstand such a force.

The necessity of having a communication between the pipes and the atmosphere is, therefore, apparent. Without it sewer air would constantly break through the weakest traps of the system, and carry the gases into the house, and even possibly from one house to another. It is clear, further, that communication with the air must also be had from points above the fixtures, to allow air to be drawn in when they are used. It will likewise be evident that there must be an opening at the lowest point of the pipe to allow air to escape when a flush of water is tending to compress the same before it.

These demands become the more urgent, the smaller the pipes are in proportion to the amount of water passing through them, as the variation of the air space is greater.

When it becomes imperative to have a direct communication between the atmosphere and sewer pipes at very many places, and as it is evident



that the escape of sewer air would be dangerous to the inhabitants, if foul and noxious, then sewer ventilation presents a second requirement, namely, that the air in the pipes should be rendered as innocuous as possible.

It is easier than might be imagined to accomplish a good deal in this direction.

The first condition is to prevent putrefaction within the sewers—in other words, instead of permitting deposits of solid matter and the stagnation of fluids, to arrange the designs so that from the moment it enters the system the sewage is kept moving until it is finally disposed of. This is accomplished by giving the flow a regular and a good velocity, and by avoiding all causes for eddies. A rapidly flowing stream, owing to its friction against the air, tends to prevent the latter from rising and dissipating its odor. It is a curious fact that a sluggish stream of foul-smelling sewage in a common ditch can apparently lose its odor when continuing its flow in a regular channel with a rapid velocity.

A second condition is the periodical cleaning of the sewer pipes, effected generally by a thorough flushing of water. A large amount of fine matter adheres to the sides, or some of it deposits along the bottom if the current is not swift. The scouring effect of a powerful rush of water generally carries it away without trouble. In houses where the pipes are small, a good flushing is obtained whenever the larger fixtures are used.

A third condition which is necessary to render the sewer air comparatively harmless, is the provision for a free circulation and a liberal admission of fresh air. Sewers in which these conditions have been secured are by no means foul or disagreeable to enter, and, if large enough, to pass through. The Paris sewers are visited regularly by strangers; in Hamburg and Frankfort they are so well built and maintained that they are frequently visited as models by those interested. The intercepting sewers of Boston are likewise kept in such condition that the air in them is quite good.

Circulation is produced by the following natural causes:

The difference of temperature between the inside of the pipes and the atmosphere, while it is too slight to force ordinary water-traps, as already shown, is an important factor in causing a movement or circulation of air. Suppose the difference in the case of a house pipe to be thirty-five degrees, and a shaft thirty feet high and four inches in

diameter, then the velocity of the air moving upwards would be about six inches per second. Suppose the difference between the air in a street sewer and the atmosphere to be eleven degrees, which is the mean difference for the winter in London, then the air would rise from the perforated manhole covers with a velocity of about two inches per second. In Munich, careful measurements were made by Messrs. Rozeahegy & Soyka of the circulation of air in sewer and house drains, and it was found that, generally in winter, when the outside air was colder, the currents were upward, and in summer, when it was warmer, the currents were downward, showing that the effect of temperature alone was sufficient to determine the direction. It is, moreover, the most constant cause for establishing circulation, as a difference of temperature almost always exists.

Another cause is the power of wind blowing into the outfall pipes. It has been found to be so great at times as to be a danger rather than a benefit, and it is usual to guard against this contingency. Still, use is made of the occasional air currents by allowing them to act on the ends of vertical shafts. That by this means strong draughts may be produced, needs no mention. The only disadvantage lies in their irregularity.

No perceptible air currents can be created in pipes by the varying barometric pressures of the atmosphere at different parts of a sewer system. The only effect due to this cause is to be found in a liberation of gases from the sewage in proportion as the pressure decreases.

The fact that an increase of humidity in the air decreases its weight, furnishes another factor inducing natural ventilation in sewers. The air in the latter is always moist. It is therefore evident that when the atmosphere is dry there will exist a tendency for the former to escape. When we consider, however, that the air of sewers varies in its composition—that it may at times contain more carbonic acid gas than the atmosphere, and, therefore, again increase its weight—when we further consider that the humidity of the atmosphere is not a constant quantity, we must conclude that this cause, as a means for sewer ventilation, is also insignificant.

The varying quantity of sewage in the pipes, again, is a prominent factor in exchanging the air contained in them, particularly in house pipes where the flow is more irregular than in a street sewer. If they are open to the atmosphere they will expel or draw in a quantity of air equal to the increased and decreased quantity of water flowing in them.



As air is moved and dragged along by friction with flowing water, we have finally another cause which tends to its constant exchange. The larger the sewer in proportion to the flow, the less will be the effect. In storm-water sewers we find, at ordinary times when they contain only sewage, that the effect is quite insignificant and more than balanced by other causes. During storms, however, when they are nearly full and the velocity of water is great, and also in small house pipes when the fixtures are emptied, the effect on the superincumbent air is considerable, as we have seen before.

From the above it will appear that there are numerous causes independent of each other which impel the air in sewers to move. Some act in one direction only, some at times in one and at times in the other, and when several causes occur simultaneously, they may together act in the same or in opposite directions. It also appears that seldom, if ever, a time will exist when there will not be some motion. Actual observation and experiments have amply demonstrated these facts.

As a difference of temperature is a great motive power, a number of suggestions have been brought out for using artificial heat to aid sewer ventilation. It may be well to refer to some of them briefly.

The ventilation of sewers has been thought to require a treatment similar to that of mines, and the means employed for the latter have been suggested for the former. Yet the two cannot be compared. Sewers are sealed throughout by water-traps, each having only a few inches depth, which, as we have seen, does not allow exposure to great variations of pressure; but in mines this condition does not occur, as it is possible to exhaust or compress the air in them to any degree. Consequently the schemes for drawing air into high shafts by special fires have proved a complete failure for common sewers. In order to reach any distance, the draught must be so great that no water-traps near the furnace can retain their seals against the suction. The fact that the cross-section of the mains is very much smaller than the combined sections of all their branches, being perhaps only 1-50th, makes it further evident that if the sewers were all tight and traps could not be drawn out, a velocity of twenty-five feet per second in the main would, on the above supposition, allow a velocity of only half a foot per second in the branches. As sewers are not air-tight, however, this amount would be much less. The great expense necessary to maintain such a draught needs no demonstration.

It has also been suggested that every lamp-post should be made to act as a ventilator, with the expectation that the heat of the flame will cause an upward current, and that a large number of small artificial draughts will accomplish what a few large ones could not do. Suppose the lamps were kept burning twenty-four hours, and that the cost of doing this was not objected to, it will be readily seen, after what has been said about the different causes for natural ventilation, that these flames could not prevent down currents, caused, for instance, by a lowering of the water surface. They would in this case even act as a hindrance to the otherwise more free circulation.

There are, of course, cases where artificial ventilation is effective and even necessary. The outfall sewer at Brighton, in England, which is five miles long and has no inlets along its line, is ventilated by a fire kept burning in a shaft, which produces a perceptible current several miles distant.

From the foregoing remarks we have seen, first, that it is necessary to have a communication between the pipes and the atmosphere, in order to maintain the seal of the traps, and to permit of a regular and undisturbed flow of sewage; and secondly, in order to have the air as pure as possible, that the sewers should not cause deposits and stagnation, but be provided with means for a liberal circulation and exchange of air. We have further seen what natural causes tend to produce circulation, that the difference of temperature within and without the pipes is the most constant one, and that artificial ventilation, on the whole, is less effective and very costly.

It remains, now, to point out by what arrangements and constructions a greater freedom of natural ventilation may be obtained.

Wherever it is not practicable to have a competent inspection and control over the house drainage on part of the municipality, it is best to disconnect it from the street sewers by means of a trap. In England and America this custom is followed almost exclusively. On the continent, such a separation is strongly opposed, the difficulty of control is not found to be so great, and the two systems are practically made into one. The advantage arising from this union is, the facility with which the street sewers can be ventilated to above the house-tops, particularly in winter, when the streets are covered with ice, and, also, the absence of fresh-air inlets, otherwise necessary at the foot of the house drain. As we, in this country, generally prefer to disconnect our dwellings from the street sewers than to run the slighest risk from



sewer air getting into the house, I will confine my remarks to this arrangement.

Free circulation in house pipes is obtained:

*First.* By carrying all the vertical soil and waste-pipes, full bore, to above the roof, so that the least possible resistance and the fullest exchange is secured. They can be carried up separately, or, to save expense, they may be united, where practicable, above the highest fixtures. In the latter case, the section of the combined pipe should correspond to the sum of the separate pipes.

*Second.* By providing an opening to the air from the main pipe, near its lower end, but on the house side of the trap, called a fresh-air inlet, because it usually operates in that way. When house drains are trapped against the street sewers, such an air-vent is absolutely necessary to produce circulation. Without it, they could no more be ventilated than a bottle being open only at the top. Usually, such an inlet is placed on the sidewalk, at the curb, and experience has shown that, when the system is otherwise properly arranged, no objection can be made. Where the sidewalks are very narrow, it is preferable to carry a vent-pipe to above the roof and thus secure, though less effectively, the desired circulation.

*Third.* To secure proper circulation it is evident that an unobstructed passage-way must exist from this inlet through all the vertical soil and waste pipes to beyond the roof, with neither traps nor abrupt bends on their course.

*Fourth.* To preserve the seal of traps that guard the fixtures, it is necessary to carry a vent-pipe from the sewer side of every one of them (unless an anti-siphon trap can be used) full bore, to the roof, either separately or united with another pipe above the highest fixture.

The upper end of the pipes should not be provided with any cowl or so-called ventilators, but left as they are. To attach any contrivance usually means to obstruct the exit of air. They may be carried up near or inside a chimney-shaft to secure additional heat, but it is not permissible to have any openings into the latter, because the changing currents might at times bring sewer air down the shaft into the house.

Rain-water pipes have been used for sewer vents, but very improperly, for two reasons. When they are most needed for this purpose, that is, when they are filling the sewers with rain-water, then they do not act because the falling water prevents a free escape of air.

And, as they terminate at the lowest point of a roof near or even below windows, an escape of gases from them might at times be noticed.

Herewith the essential principles are given for securing a thorough, a constant and a safe exchange of air within the house pipes. No odor is perceived from the pipes above the roof when thus treated, and none from the fresh-air inlets when properly placed.

The provision for the circulation through the street sewers and equalization of pressure, is obtained through shafts carried at frequent intervals up to the air. To leave a sewer for a long distance without such openings would, according to what has been said, be to endanger the existence of pressures, which, if there are any water-traps on the line, might destroy them, and it follows that the more frequently they are placed the better will be the exchange of air and the more thoroughly it will be diluted.

To prevent the escaping air from becoming objectionable, the following arrangements are used:

*First.* Special vent pipes are carried up to above the house-tops, or the house drains themselves are used for the purpose by omitting the main trap. The latter method has already been referred to as commonly used on the continent, and, as far as the street sewers are concerned, no better solution of the problem could be had. The former method, of course, answers the same purpose and is equally good, but the expense of extra shafts and the necessity of obtaining permission of house owners to attach them to the walls, has not favored its general introduction. When using either the house pipes or special stacks for ventilating the street sewers, it will be necessary to connect them with the latter at the top, so that by running full, the mouth of the vent pipes is not closed.

*Second.* Perforations are made in the covers for manholes, usually placed in the center of the street for the purpose of inspection and cleaning of sewers. In wide streets, and when the sewers are well built and kept clean, this method has been found to be entirely satisfactory. And under these conditions an odor is rarely observed as emanating from them, and then only in their immediate neighborhood. This method is, in fact, the usual one, and it is undoubtedly the simplest and cheapest. The perforations should be made as large as practicable, and arranged so that they will not clog up with dirt. It is also necessary to place a receptacle beneath to catch the matter which drops through and to prevent it from falling into the sewer.



In Northern climates, where the streets and, therefore, the manhole covers are liable to be covered sometime with ice, and, also in narrow streets where the escaping air will be too near the buildings, it does not answer to ventilate sewers in this way, and special pipes must be attached to the system and carried up to the tops of the buildings at the most convenient points, both to relieve the pressures and allow of ample circulation.

A number of expedients have been suggested to purify the air escaping from perforated manhole covers, in order to avoid the expense of high shafts. The best one was to pass it over and filter it through pieces of broken charcoal while ascending the shaft. The effect, however, was not satisfactory. The moisture in the air soon saturates the pores and makes the charcoal inactive, and the obstruction it necessarily gives to the passage of air impairs the circulation in the sewers.

In concluding my remarks I would say, that the question of ventilating sewers is not difficult of solution, as we have seen, when we base it on the supposition that a high dilution of sewer air by fresh air deprives it of the objectionable qualities. Whether this supposition is absolutely true or not, we do not know; but we have abundant evidence that it is true, at least to a very great degree, that, where the emanations from decomposing matter have been discharged into and mingled with vast currents of air constantly passing over our habitations, injurious results have never been observed. Until we are prepared to pay fabulous sums for passing all the foul air that is generated in the large centers of population, through fire or through some other destroying or purifying agent, no disposal is left but an extensive dispersion in the atmosphere. To show how this can be most effectively done at a reasonable cost has been the object of the above remarks.

# HEATING AND VENTILATION OF DWELLINGS.

BY E. M. HUNT, M.D.

The heating and ventilation of dwellings becomes an important consideration for health, in a climate such as that of New Jersey. It will not be the aim of this article to treat of all that relates to the general subject. We desire to consider heating and ventilation as they are practically related to each other and how to secure the conditions of comfort and health as to each of these. While some consideration will be given to places of public assembly, we desire, chiefly, to inquire how the homes of the people shall be heated and ventilated.

The first division of the subject is into what are called natural and artificial systems. The truly natural system is where we depend upon the natural warmth of the body and the heat derived from the sun. Clothing and change of position are merely our methods of adapting ourselves to changes, and are found sufficiently available under various circumstances. While these can not be entirely depended upon, they are nevertheless to be emphasized. Those who build houses with a southern exposure, and with windows giving good access to light and heat, and yet interrupting draught, have practically carried out this idea. Clothing and proper changes of clothing and the use of such garments as can be easily put on or off at pleasure, are to be considered. It is fitly urged, that we may become too dependent on such forms of artificial heat as are furnished by fire.

It is always to be remembered that the body itself is a heat-producer, and that exercise and care of the skin and that proper quantities and kinds of food and sleep, have much to do with the generation and utilization of heat. We must not educate ourselves or our children to be more dependent on fire heat than is necessary. Those who too constantly hover around the stove, or who so receive heat as that one side of the body is overheated and another part exposed to cold or draft, are not enough impressed with the need of availing themselves of the

strictly natural sources of heat to a degree that shall limit our demand for purely artificial methods. Where the thermometer is at 70° F., and here and there a person feels too cool, there must be inquiry as to any improper source of draft, or else such person should have more clothing, more food or better health.

Our special need for special sources of heat arises from the variations of actual temperature, and from the necessity of surrounding ourselves with houses in which there are many artificial arrangements. Our special need of ventilation arises from the fact that the dust, gases, etc., incident to house-living, tend to deteriorate the air, and that we ourselves, in the process of life, are burning out or consuming the oxygen which it contains, as well as conveying to it decomposable or organic matter and noxious gases. The fires, the gas jets, and every thing that has breath and life within the house, tend to exhaust the air of its life-sustaining properties, while the myriads of floating particles load it with organic matter more or less unfriendly to vital purity.

The atmosphere provided for our use is composed of three gases—oxygen, nitrogen and carbonic dioxide, usually known as carbonic acid. With these the vapor of water is always associated. The first two are usually called essential elements, but water and carbonic dioxide are so far accessory, that air is never found, in nature, absolutely without them. The oxygen, nitrogen and carbonic acid form a simple mechanical mixture which is very perfect, although the same bulk of these gases has each a different weight. When thus mixed, the diffusion of gases is so perfect that they do not separate, except as they come in contact with some substance which will absorb or combine with some one of these constituents.

The usual proportion in which these normal components are found, is about as follows: Nitrogen, 79; oxygen, 20.96; carbonic acid, .04. There are slight variations, within a range which can not be said to affect human health. Ozone is oxygen in a peculiar state, but as it is not usually found in the air of dwellings, it need not be treated of here.

The active principle in the air, in its relation to breathing, is oxygen, so that any considerable variation from 20.96 per centum at once indicates deterioration. If the proportion comes to be as low as 20.60, it is to be regarded as bad. The quantity of nitrogen may become of undue proportion because of the diminution of the oxygen, but does



not by any actual excess become a danger to life. Carbonic acid, although always present as a normal constituent, is so only in very minute and evenly-sustained proportions where there is no peculiar artificial relation. This is shown by the fact that in outdoor life the millions of beings of all varieties do not, in their use and deterioration of the air, produce any sensible increase of it. It is only when we come to the artificial conditions of indoor life that we find any great change from the normal constituency of the atmosphere. This change chiefly consists in a decrease of oxygen and an increase of carbonic acid. The decrease of the former is more serious than the increase of the latter, and more serious as an evidence of the presence of organic material from the lungs and the body, than in itself considered. Pure carbonic acid may be present in the air to the amount of fifty or more parts in 10,000 without serious inconvenience, but if the carbonic acid present is the result of the burning out of the oxygen of the air, as in the process of breathing, the case is far different. Under usual circumstances, the amount of carbonic acid present has a double significance. It indicates to what degree there has been a diminution of the oxygen of the atmosphere breathed; and because the amount of organic or decayable material present in the expired air bears a pretty regular proportion to the amount of carbonic acid exhaled, it becomes a measure of this also.

When, therefore, we say that the amount of carbonic acid is beyond the usual amount, we indicate two other results which have taken place. When the normal amount of 4 in 10,000 is increased to 6 or 7, the air is apt to seem close to a person entering from the outer air. This will be a little modified by the condition of the person and the temperature of the air. A room is close or stifling when the amount is as high as 8 parts to 10,000. As good a test as any of this condition is the well-known lime-water test proposed by Dr. R. Angus Smith, which is thus given in our first report:

"Shake burnt lime in a bottle with water, and allow it to settle clear. (You thus have fresh lime-water.) Clean a very wide-mouthed bottle inside with a linen cloth, exhaust the air by suction through a tube, with great care not to breathe into the bottle, which would have to be cleaned again. Pour in one half-ounce of clear lime-water and shake well. If the air contains not more than the percentages of carbonic acid below, and the sized bottles there given are used, no turbidity will ensue from the carbonate of lime.

"Table to be used when the point of observation is 'No Precipitate':

| | | | | | |
|---|---|---|---|---|---|
| 20.63 | oz., | avoirdupois, | bottle | will have no precipitate if the carbonic acid is..... | 0.039 |
| 15.60 | " | " | " | if it is only..... | 0.040 |
| 12.58 | " | " | " | " ..... | 0.050 |
| 11.57 | " | " | " | " ..... | 0.060 |
| 9.13 | " | " | " | " ..... | 0.070 |
| 8.05 | " | " | " | " ..... | 0.080 |
| 7.21 | " | " | " | " ..... | 0 090 |
| 6.54 | " | " | " | " ..... | 0.100 |
| 6.00 | " | " | " | " ..... | 0.110 |
| 5.53 | " | " | " | " ..... | 0.120 |
| 5.15 | " | " | " | " ..... | 0 130 |
| 4.82 | " | " | " | " ..... | 0.140 |
| 4.53 | " | " | " | " ..... | 0.150 |
| 3.52 | " | " | " | " ..... | 0.200 |
| 2.92 | " | " | " | " ..... | 0.250 |
| 2.51 | " | " | " | " ..... | 0.300 |
| 2.01 | " | " | " | " ..... | 0 400 |
| 1.71 | " | " | " | " ..... | 0.500 |
| 1.51 | " | " | " | " ..... | 0 600 |
| 1.10 | " | " | " | " ..... | 1.000 |

"In other words, as instances from our table, a bottle holding eight and a half ounces of air, with a half ounce of lime-water shaken in it, would show no precipitate or turbidity if the amount of carbonic acid was not more than .08, *i. e.* eight parts of carbonic acid in 10,000 of the air in the room and bottle.

"If a six-ounce bottle is used, with the same amount of lime-water, there might be .11 parts of carbonic acid to 10,000 of air, and yet there would be no turbidity; or if a two-ounce bottle was used there might be forty parts of carbonic acid to 10,000 of the air, and yet no turbidity ensue.

"Now, if a bottle of eight ounces, with a half ounce of clear lime-water, gives turbidity, you know that there is more carbonic acid in the air than is regarded as desirable for a school-room.

"If a six-ounce bottle, with a half ounce of lime-water, gives turbidity, you will know that there is more than eleven parts of carbonic acid to 10,000, which is an excess.

"If a two-ounce bottle should give turbidity, you then know that there are over forty parts of carbonic acid to 10,000, while there should be not much over eight parts to 10,000.

"By testing with different sized bottles, after you have once found turbidity, you will be able to find out nearly the proportion of carbonic acid."

The lime-water is prepared by dissolving a piece of common caustic lime, about the size of a black walnut, in a quart of water, and then allowing it to settle.

"The sensation of uneasiness produced by breathing impure air is an indication of the injurious effects that result from it, which is too often neglected. When the air is not sufficiently pure to effect the



complete decarbonization of the blood, we have already seen that the result is the circulation of venous blood through the brain; the respiration then becomes impeded, and the nervous system deranged; the extent of these effects, of course, varying with the amount of the exciting cause, and with the peculiar constitutions of the individuals exposed to their influence. Dr. Harwood remarks on this subject, 'The want of wholesome air, however, does not manifest itself on the system so unequivocally, or imperatively; no urgent sensation being produced, like that of hunger, and hence the greater danger of mistaking its indications. The effects of its absence are only slowly and insidiously produced; and thus, too frequently, are overlooked until the constitution is generally impaired, and the body equally enfeebled."

The amount of air-space needed by each individual depends primarily upon the amount of oxygen that is being burnt up or removed from the air of the room.

Our first data are derived from the amount of air consumed or deteriorated by each person. From 350 to 400 cubic feet of air passes through the lungs of a man of usual activity in the twenty-four hours. If every breath took out only a certain amount of air and its oxygen, and the expiration or outbreathing of the air from the lung did not return to the room, the problem would be a simple one, for new and pure air would take the place of the air extracted by breathing. But a cubic foot of air, as it comes from the lungs in ordinary respiration, has lost most of its oxygen, and contains, instead, upwards of seventy cubic inches of carbonic acid, besides organic matter and fouled watery vapor. This air has not only been devitalized, but infused with injurious particles. If there are fires or lights, every cubic foot of coal gas consumes the oxygen of ten cubic feet of air, and produces two cubic feet of carbonic acid. The combustion of a pound of oil consumes the oxygen of 130 cubic feet of air, and produces about twenty-one feet of carbonic acid.—*Huxley.*

While the latter is not laden like the breath with organic matter, it is a devitalization of the air. The need of air-space or ventilation also depends upon shape of room, height of ceiling, floor-space, etc.

With all these facts in view, those who have most carefully considered them, and have tested by experience also, claim that in a room ordinarily tight, 2,000 cubic feet of air must be admitted each hour for each person in it. This is based upon the conclusion that about 650 feet of air is actually needed each hour for each person, but that as practically we can not move the entire air of a room oftener than

three times an hour without draught, we must introduce three times the amount actually used up.

The amount of cubic space required may be stated as from 250 to 300 feet for dwellings, school-rooms, etc., while for tenements, hospitals, etc., it should be much more.

As height of ceiling over twelve feet is not counted, this would give to each person in a room, or to each scholar in a school, a floor-space of about four feet by five, or five by five.

It is well to consider all the various theoretic needs and modifications, because they help us to attain to accuracy. What is called experience needs to be tested by scientific facts, just as scientific facts need to be tested by experience. In this case, with the fact that there are so many modifications, and the additional fact that no room is dependent upon any one inlet, since windows, crevices and even bricks, admit much air, the statement of test most relied upon is that of Parkes and De Chaumont, which is, that the amount of air required for any occupied room is the amount needed to keep the room free from any perceptible odor to a person entering it from the outer air, and to keep the percentage of carbonic acid (carbon dioxide) as near as possible to the normal rates of four parts in 10,000, and never beyond seven parts in 10,000.

In heating a room, the problem with which we are chiefly concerned is, how so to heat it as to maintain a comfortable warmth and a purity of the atmosphere in accord with the conditions we have mentioned. While, technically, ventilation means to restore the air to its outside purity, this is never done; it practically means the keeping of impure air so diluted or mixed with pure air as to secure a standard compatible with health. Fortunately, within certain limits, there are powers of adjustment within the human organism which render it possible to be comfortable in, and not to be injured by, air which approaches to normal purity. But, if we go far beyond these bounds, there are embarrassing or destructive elements which are just as much a part of nature's law, and which cause a decided injury to health.

In the heating and ventilating of any room, the chief point of consideration is, how to warm a room and, at the same time, maintain a proper and uniform purity of air. This leads us to inquire:

(*a*) How to keep to a minimum the consumption of oxygen by lights, breathing, etc.

(*b*) How to get rid of all organic matter from the lungs, or from



other sources, which, in the form of decayable particles, contaminates, or is ready to contaminate, the air.

(*c*) How to prevent or get rid of dust and organic particles, which, if not putrescent, in a mechanical way interfere with the quality of the air.

(*d*) How to secure such moisture of the indoor air as is favorable to health and comfort.

As the outside air is, as a rule, purer than any inside air, the first question is, how to introduce this so as to avoid draught.

In order to make this a more single and simple question, we assume that the air will be heated after it has come into the room.

To such rooms fresh, unheated air must come in from without, and must come in at a slowness of velocity such as will not be so perceptible as to cause draught. This feeling of draught depends in part on the velocity of introduction, and, in part, on other conditions. "The warmth of the moving air influences the sensation of the persons exposed to it. At a temperature of 55° or 60°, a rate of 1½ feet per second (or about 1 mile per hour) is not perceived; a rate of 2 and 2½ feet per second (1.4 and 1.7 miles per hour) is imperceptible to some persons; 3 feet per second (2 miles per hour, nearly,) is perceptible to most; a rate of 3½ feet is perceived by all persons; any greater speed than this will give the sensation of draught, especially if the entering air be of a different temperature or moist. If the air be about 70° Fahr., a rather greater velocity is not perceived, while if it be still higher (80° or 90° Fahr.), the movement becomes again more perceptible. This is also the case with the temperature below 40° Fahr.

Our power of introducing air into a room without draught depends upon the size of the room, the number of persons to be supplied with air, the temperature of the air in the room and of that being introduced, the relative temperature of outside and inner and the mode of introduction. In a small room it is more difficult to have the air distributed before reaching the person, and so he may feel a draught. Where there are numbers of persons the air must be introduced more rapidly unless there is adaptation of size of room and modes of introduction thereto. We have already noted variations made by temperature and moisture. If the air comes in through some direct inlet, and nearly all at one or two points more, draught is likely to occur. Smallness of opening may give direction to the current, as where a hole

in a pane of glass directs a current upon some exposed part of a person near by, and causes a draught which a wide-open window would not. As a rule, we are not so likely to have draughts when the air is introduced at various points in small quantities instead of at two or three points in large quantities. We also do much to prevent the sensation of draught if we introduce it above the heads of persons occupying the room, and in such wise as to secure for it a a slight ascent. Thus, if the lower sash is raised and a tight-fitting strip of board is placed under it, the only inlet will be near the middle of the window, between the lower and the upper sash. The upper part of the lower sash serves to give to the air as it enters and gains a little heat, a slight upward motion. The direct current of the air is intercepted. It is also true that if a wire gauze is put in under a sash, or at the upper part, it cuts the air so as to diminish draught.

Another plan is so to introduce the fresh air from outside as that it shall become heated in the room, but before diffusion through it. Thus the draught is intercepted, and at the same time a proper temperature is imparted. One plan for doing this is illustrated in the *Galton* grate, where cold air from without is let in around the rear of the grate, and, being warmed, becomes diffused from the sides of the grate into the room. Another plan is, where a stove is surrounded by a metal case, or "jacketed," so that cold air is let in around the stove and, being heated, ascends above the jacket and is diffused in the room. School Circular XXVIII. (No. 2), page 10, illustrates this method. In each of these cases the air for the draught of the stove or grate is derived from the rooms, and so, to a degree, ventilates the room, while the air that moves about the stove, or grate, inside of the jacket, and so ascends and is diffused through the room, is fresh outside air.

For heating the air already within the room directly, we have the fire-place, the stove, steam or hot-air pipes and radiators. Of these, the fire-place and stove have directly to do with ventilation, as well as heating. We therefore speak of these here, leaving the others for after consideration.

### THE FIRE-PLACE.

What even an ordinary stove will do thus to ventilate a room, in the process of heating, is well stated by Prof. Curtman, M.D., of St. Louis:



"Using an ordinary stove, and selecting as fuel anthracite, which contains about 98 per cent. of pure carbon, we find that for every pound of fuel burned, two and two-thirds pounds of oxygen, measuring about thirty-two cubic feet, are consumed. This corresponds to nearly 160 cubic feet of air. As much air escapes through the chimney unburnt, we need not wonder that Regnault's experiments led him to nearly double that amount, and assume that 312 cubic feet of air are required for every pound of anthracite burnt in a stove.

"A school-room twenty by thirty feet in extent, and twelve feet high, contains 7,200 cubic feet of air, weighing about 540 pounds. If during a cold winter day 300 pounds of coal are burnt in the stoves of this room, there will be (according to Regnault) 93,600 cubic feet of air, weighing over 7,000 pounds, passing through the stove into the chimney. In other words, by the mere automatic ventilation produced by the burning of the fuel, the room, containing 7,200 cubic feet of air, must be emptied and refilled thirteen times in a day; but as the period of active firing does not usually occupy more than nine hours (from 7 A. M. to 4 P. M.), the air is emptied and replaced about once in every forty minutes during school hours. Within these forty minutes, fifty children would inspire about 600 cubic feet of air, from which they would remove about six cubic feet of oxygen. The rate of ventilation in such a room, produced automatically by an ordinary stove consuming 300 pounds of coal, is therefore more than sufficient for even a greater number of occupants, and in warmer days, when only one-fourth of the fuel is consumed, ventilation will still be active enough for all purposes."

This, of course, would not be true, to the full extent, if the stove is air-tight, except at the point where air for draught is let in. But with this frequent aid, and with the fact that the stove door is often open, or the space not tight where the pipe enters the chimney, it does ventilate much. It is still truer of the open wood or grate fire, which is a great ventilator, and only a moderate heater. The objections to this method of heating are sometimes overstated, since, although too much heat is evolved at one point, and draughts made to the fire-place, which cause coolness at distant points, the air does not become stagnant in such rooms so soon as in those heated by pipes or radiators without artificial ventilation. An open fire, for slight heating and for great ventilating purposes, is often very useful in those forms of heating where hot-air or steam pipes, or radiators are used.

In houses which have no method of heating the air until it comes into the respective rooms, it is generally considered sufficient to rely for the supply of air to be warmed upon natural inlets, such as

crevices, windows, doors, the walls, etc., and all the more since the very warming of the air after it gets into the room is a mode of exhaust by which air is drawn into the room for the purpose of supplying the fire and to fill the vacuum which would otherwise be made. If the room is very nearly air-tight, and cold air is to be introduced for warming, the best plan would be "to admit the cold air through a number of minute holes spread over a large space in or near the ceiling." Thus air could be admitted at low velocity, which would gradually diffuse itself, and its entrance would be so high and so divided as not to cause draught. Where the air of a room is thus to be heated by heat-producing apparatus in the room, the heating is accomplished in all the three methods of radiation, conduction and convection.

*Radiation* is the giving off of rays of heat from a heated surface. The rays diverge in straight lines from every part of a heated surface, and from minute depths below the surface of hot bodies. The radiation may be increased by increase of the surface and by the nature of the surface. Radiation takes place in vacant space, that is, in space containing no form of matter which we can weigh, as well as in the midst of certain media called diathermanous. Air, glass and other bodies which may also in general freely allow light to pass through them, are examples of such bodies. In this form of diffusion the diathermanous matter is not heated, at least if it be perfectly diathermanous.

*Conduction.*—When heat is communicated from molecule to molecule of a body, while the molecules retain their relative places, the process is called conduction. This process is illustrated in the action of most solid bodies, especially the metals, when one portion of such bodies is raised in temperature above the other portions, by being brought in contact with a hot body. When one end of a poker is thrust into the fire, the temperature at the end is raised by the fire and the process of conduction is at once set up. The conducting power of different substances is very different. Thus, that of copper is 89.92, while that of iron is 37.43, and of zinc 36.30.

*Convection.*—In general when liquids are heated, the portions first heated become thereby expanded and so rendered specifically lighter than the remaining portions. Owing to the almost perfect freedom of motion among the particles of such bodies, the expanded portions are displaced upwards, while the heavier particles sink down to take



their places, and in turn to become heated and to rise in like manner. This process of heat diffusion is called convection.

If the heat for warming the air is to be generated in the room, it is very important that there shall be perfect combustion to an extent not to allow any gas to enter the room from the stove. This presupposes an adequate supply of air and a good draught of the smoke-pipe or chimney. Where the draught would be complete, the turning of dampers or the opening of the stove door even, while putting in the coal, may cause the presence of gas in the inbreathed air. A great deal of trouble with stoves and furnaces comes from imperfect draught of chimneys or from too small a supply of air to the coal. Supposing that a proper supply of fresh air is in some way reaching the room, and that the heating apparatus in the room is heating it, a question arises as to the *dryness of the air*. "One effect of heat upon air is to raise its point of saturation. One cubic foot of air, say at thirty-two degrees, is capable of containing a certain amount of moisture and no more. If we raise it, say to a heat near that of the human body it is capable of containing much more, and consequently absorbs moisture from every thing that contains any. The heating of the air does not dry it in the sense of extracting moisture from it; it only increases its capacity of containing water, thereby rendering it more absorbent or thirsty." Air suddenly heated thus appropriates to itself moisture that should be left for our use. We can somewhat limit the air from appropriating too much of the surrounding moisture if we provide for it an additional source of supply by warm water or an evaporating pan. Different states of atmosphere require different quantities. Professor Brackett clearly states the guiding principles in our sixth report, 1882, pp. 123–126. The nearest approximation stated, is that under usual circumstances, in rooms having stoves, the evaporation of half a pound of water an hour gives a moderately dry and healthy atmosphere. In the seventh report, 1883, pp. 21–26, a still further summary will be found. A sponge moistened from time to time, and kept hanging in front of a register, is often a source of comfort, because it aids partly as a filter to retain dust and is a source of moisture. Vessels of porous clay placed upon the register have also been used as a means of adding moisture. Another point bearing on modes of heating, is that made by Hood:

"There are always suspended in the air myriads of particles of animal and vegetable matter; but these almost unheeded atoms

possess a high philosophical importance, however they may generally be disregarded. Many of these particles are easily decomposed by heat, and are then resolved into the various gases, either in their elementary or mixed state. Hence many of the methods of producing artificial heat are materially affected, as regards their wholesomeness, by the fact of their being able or not able to decompose or chemically alter these floating particles of matter. To this cause is mainly attributable the unpleasant smell produced by several modes of warming buildings, by highly-heated metallic surfaces; and we have already seen that the hygrometric and electric condition of the air is also altered by the same means. All the different descriptions of hot-air stoves are more or less liable to these objections; as also the high-pressure system of hot-water apparatus, and still more the cockle or hot-air furnaces. Dr. Nott's stoves, and also the Russian and German stoves, are subject to this inconvenience; and asphyxia is frequently produced in Russia by the use of these stoves. The cockle or hot-air furnace is particularly liable to these objections; for not only will it act powerfully in decomposing the floating particles of extraneous matter contained in the air, resolving them into sulphureted, phosphureted, and carbureted hydrogen, with various compounds of nitrogen and carbon, but it will likewise decompose a portion of the vapor contained in the air, absorbing the oxygen and liberating the hydrogen.

"Carbonic oxide is generated by all stoves which are constructed so as to burn with a very slow draught; and Dr. Arnott's stove has been found peculiarly liable to produce this deleterious gas, which escapes into the room through the ventilator in the ash-pit, and is extremely unwholesome in small close rooms. The carbureted hydrogen is abundantly produced by the gas stoves, in consequence of a portion of the gas escaping unburned from the stove; and this unburned gas, when combined with the large quantity of vapor which is produced by the combustion of carbureted hydrogen, as already described, renders these stoves peculiarly unwholesome. All these causes of deterioration of the air affect different persons in very different degrees; but wherever the causes exist, the result will necessarily be derangement of the animal system, however robust the persons may be who are exposed to their influence; but, of course, the sensations will be soonest experienced by the delicate and the valetudinarian."

The next question that arises is, how are we to provide outlet for the contaminated air of a room, so that fresh air is readily enough drawn in to mingle with the heated room air and keep it at a convenient standard of purity?

Too much importance has generally been attached to the fact that heated air, including carbonic acid, rises. Carbonic acid gas given off



from the lungs is rather more than thirty-seven per cent. heavier than the oxygen which is consumed. Also it is forgotten that the law of diffusion of gases is not governed by the specific gravity or temperature; that the mixing of air depends upon several circumstances, and that air laden with organic particles, even if warm, tends to cool as it reaches walls, and to flow down their surfaces and settle or find exit near the floor. The warmth of air from the lungs does not long counterbalance these facts. Where it is the air of the room that is being warmed by radiators, or coils, or pipes running about the lower part of the room, or by stoves or fire-places, the heat is produced chiefly in the lower part of the room and thus gets a force of ascension, while if there be no artificial means of ingress of fresh air, it will mostly come in at a level not higher than the doors of the room. The lower half of the room is thus the mixing chamber of the pure and impure air. The question whether we should trust for removal of impure air to the crevices, windows and doors by which pure air is drawn in, or to openings near the ceiling, will depend very much on the general tightness of the room and on the degree of heat maintained within it. A person skilled in the heating and ventilation of dwelling-houses would be much more able to tell how to do with a particular room than to give a general rule applicable to all living rooms. As a rule, an open fire-place in such a room, or a means by which air can enter, at the same height, a warmed flue of not less than five inches square, would be of service in the ventilation; also one or more similar openings into a warm flue a few inches from the ceiling, or, if there is a chandelier, a similar vent-pipe just above it, would aid in securing purity of air. These suggestions are based on the practical fact found to be true, that in such a room, or in a building thus dependent on natural ventilation and upon the heating of air after it is introduced, it is found that some days at some temperatures and with varying numbers in the house or room, the foul air flows out in greater quantity at the upper openings and in other cases at the lower. It is not very difficult to indicate the causes of the variations, but it is not always easy to adjust all the varying influences.

Next, we come to consider heating and ventilation in their relations, where the air that is to be used in a room for breathing purposes is brought to a proper temperature before its entrance. In very hot weather, this would presuppose the entrance of pure air from without into a cooling chamber. In other cases, it presupposes the

entrance of pure air from without into a heating chamber, where it can be raised to a temperature, which will be agreeable for its introduction into the building or room. The questions here are, how shall it be economically heated, so as not to add to, or, perhaps, so as to deprive it of all dust and other organic particles? How shall it be made to be not too thirsty for moisture (see p. 71), and how shall such uniformity of temperature be maintained as is desirable?

For the first-named purposes, various devices are used, from the elaborate filtering of the air, by revolving shafts of bagging and its spraying, as in the Houses of Parliament, to the simpler uses of sponge or cotton-batting filters and evaporating jars, as illustrated in various private houses. Also, as there is some difference in various forms of heating apparatus, as to the heat they cause and the degree to which they parch or dry the air, these are considered in determining preferences.

The modes of heating the outside air may be by stoves, as in the furnace or portable heater, or by steam or hot water or hot air passing over coils, or other radiating surfaces, in order to retain or multiply the heat; the object of all these being at the best economy of fuel, to provide a store-house of warm air, ready-made for introduction into rooms that need to be supplied with a good quality of pure, warmed air, for breathing purposes. Of all these, the one most difficult to manage satisfactorily is the furnace, as usually located in basements or cellars. First of all, the make of the furnace is too often such as to allow of escape of gas through its various joinings. The nearer it comes to being hermetically sealed at every joint, except where the air for draught is admitted, the better. The door or other place where coal is put in, often seems to diffuse gas and dust through the cellar air. While the door is open, combustion is very imperfect, and as the chilled coal comes in contact with the fire, gases are poured forth, to mingle with the air that goes into the apartments. If a large quantity of coal can be quickly put in, as in the gas-burning stove, it is much better. There should also be other ways of moderating the heat than by throwing open the furnace door. While filling is going on, all draughts should be turned on.

*Second.* The furnace is often too small for the result sought therefrom. The furnace is, therefore, raised to such a high heat as to loosen its joints, so that through these, and through defective spots in the castings, or even through thin wrought-iron, carbonic oxide and



sulphurous acid and other gases pour forth. The air also becomes superheated, or burned to a degree that no evaporating jar can compensate for. Persons breathing such air not only have it deprived of oxygen, but provided with various foul gases, and too thirsty for moisture. As a result, there is not merely a feeling of discomfort, by reason of the absence of some of the essential qualities of air, but dullness and headache, and irritation of the bronchi, from the carbonic oxide and sulphurous compounds, and an interference with the insensible perspiration. The furnace should be of such size that the air can be brought into apartments at a temperature not ever over 120°.

*Third.* The next error is as to the source of air-supply to the furnace. If this is directly from the cellar, it is not only mixed with the gases from the furnace itself, but with all foulness of air derived from anything in or about the cellar which can furnish gases or the organic particles of decay. Even if the cellar is well kept, its warmth, and the demand made on its air, starts currents of air toward it from adjacent ground, cesspools, broken joints of sewers, etc., so that these become unsuspected feeders. The air should, as a rule, be introduced from without through a pipe that, if underground in part, will not receive air from too near the ground, or near to any possible source of foul air, and that will not receive it from any such source along its pipe. The case, or jacket, around the furnace must be so tight-fitting that within it will only come the air that arrives through the air-box, leaving the outer air of the basement for the draught and combustion. It should be capable of some distribution and regulation, as winds, direction, and even concentration of the blast at one point, make important differences. Some encouraging attempts have been made to jacket furnaces so that thus the air shall be spread about the whole area of the furnace, and thus be directed through the pipes or registers. This aids, too, in mixing cool and hot air before it enters rooms. We need to study, in the setting and surrounding of the furnace, how this mixture can be best secured. The jacket plan is, thus far, the nearest approach thereto. If this mixture is properly secured, and the furnace of right capacity, and its radiating surface large in proportion to the size of the fire-box, we shall be generally able to regulate the warmth without closing the register and thus shutting off the supply of fresh warmed air.

Even where there is an outer air-supply, frequently a mingled supply or the chief supply, is drawn from the cellar; and so the cold-air

box is, in part, a deceit. This is prevented only by completely shutting out the furnace from the cellar by its cold case or jacket. Sometimes, in order for draught for the furnace, there should be another opening to the air connecting with the draught.

*Fourth.* Furnaces should be set with special reference to securing good draught, with flues as direct and smooth and vertical as possible, so as to avoid friction and secure an even current. In order for this, it is often better to have two furnaces rather than to choose a single point from which there has to be a winding distribution of hot-air pipes. The first requisite of a fire is, that it have a good supply of air for the draught. If not, combustion is imperfect. This means that, instead of the ultimate products of combustion, carried off by the pipes and chimney, there will be carbon oxide, unburnt carbon and hydrocarbons, poor in hydrogen, to mingle with the inbreathed air. The use of dampers and the shutting off of draught, while necessary, must be so regulated as not to give to the air these products of imperfect combustion. The hearth, or bottom of the furnace, must admit of free contact of the air with the fire. If there is too great draught, this prevents perfect oxidation, and entails loss of heat rather than foul air. Fire-place fires are expensive, because much air rushes out besides that which has aided in combustion, and because there is not presented a broad surface for the giving out of heat by radiation or by contact.

### BOILER HEATING.

Leaving out the technical but important items as to plant, setting and expense, it can be said as to any form of heating dependent on a boiler, whether it be by hot air, hot water or steam, it is not difficult to introduce outside air by a fan or otherwise into a properly constructed room, where, by passing over and around adequate boilers, coils, radiators, etc., it may be brought up to and kept at a temperature fit to be let into rooms where people are to breathe and live. This mode is called indirect heating, as distinct from that method by which air is heated, as in the case of stoves or fire-places in a room, or from coil-pipes or radiators, which, being heated by heat produced outside of the room, nevertheless heats only the air in the rooms as it there passes over them. This latter we shall note more fully hereafter.

Having determined that air for breathing can be excellently prepared before it is introduced into a room, the question of importance is, how to introduce it so as to secure from it an equable temperature, a proper admixture and such removal as is desirable after it has mixed with the air in the room and become charged with impurities.



"Until a few years since, it was taken as a matter of course, that, because heated air has a tendency to ascend, the aperture for its escape should be near the ceiling, and that the admission of the cold air should, on the contrary, be near the floor. This principle has been generally adopted in practice, with the disagreeable consequence of a cold draught along the floor. This notion concerning the ventilating currents is evidently due to a misconception concerning the motion of the heated air. The latter has, of itself, no tendency to ascend; but it rises, because, having increased in volume under the expanding influence of heat, it is pushed up by the denser surrounding air. Now, it is obvious, that the denser fluid will exert the same force upon the less dense wherever its inlet aperture may be situate. Consequently, a better position for this aperture is near the ceiling, because, when so situate, the incoming air gets diffused in the atmosphere of the room before reaching the persons in it. It is also equally obvious, that the heated air will be forced as freely out at the bottom of the room as at the top, if we only provide that it shall escape into *the atmosphere* at a height not below that at which the cold air enters. (See article Ventilation, Spon's Dic. of Engineering, page 3,024.)

It is also to be remembered that the greater specific gravity of the carbonic acid, as soon as cooled, and the presence of organic matter from the breath and from the person, as well as the tendency of air to cling to surfaces, tend to overcome ascent, so that, in many instances, the direction is changed.

Hence, General Morin and Huxley and various others maintain that the introduction of fresh air shall be near the ceiling, so as to avoid unpleasant currents, and that the discharge openings should be near the floor. Others claim that currents thus descend on the head, and that of the two, currents at the feet are more endurable.

But does the same principle apply in the case we are considering, where the air that is to be introduced is already warmed to a temperature more or less above that of the room?

It cannot, in this case, be urged as so important for the purpose of preventing currents and draughts, but there are other reasons that

seem to approve it in many rooms, and especially since the removal of the foul air at the bottom is desirable. Prof. Huxley puts it thus:

"If there is little or no interference with outside currents, the air within the building may readily be made to move in a body from above downward, and the rapidity of its movement can be easily regulated. It may be objected to this downward movement, that the natural tendency of impurities is upward with the course of the warmer air, and that, by being made to take a downward direction, they are brought back again to be re-inhaled. If it were true that the impurities as such immediately rose to the ceiling and escaped from the apartment, the objection would hold; but this is not the case. On the contrary, it is known that the carbonic acid and other gaseous impurities are equally diffused, and the weight of the organic substances and other suspended matters leads to the inference that they would gravitate toward the floor, particularly when rising currents of warm air are excluded, as they should be, by introducing it at the top of the room. In no other way can so steady and equable a movement be obtained as by introducing the warm air at the top, and removing it below; and apart from any theoretical considerations, it is found to yield excellent practical results."

This view, however, while in the main correct, does not decide that, with proper adjustment of inside arrangements and the introduction of warmed air, it may not be equally proper, in other cases, to introduce the air from below. Such a view of the best method has been stated by D. B. Dick, thus:

"Before we can arrive at a definite conclusion, we must consider what becomes of the cold air that will find its way in, in spite of our efforts to keep it out. Little streams of it will flow in under the doors, trickle down the face of the outside walls, and especially from the windows, also from all the chinks that ought to be air-tight, but are not. But, wherever they come from, they will all settle in a layer on the floor. The thermometer proves this, while our cold feet corroborate its evidence, and even the cat shows its knowledge of the fact by getting up on a chair to get out of it, or deserting her soft rug on the floor to sleep on the bare top of the kitchen table. Having found out where the cold air is, we must now ascertain what becomes of the heat evolved by the occupants of the room and lights. Assuming the desired temperature of the room to be as high as 70°, the temperature of the human body being 98°, and that of a flame very much higher, it is plain that these emanations, being given off at a higher temperature than that of the room, will ascend toward the ceiling. Lastly, we have to inquire what becomes of the watery vapor, laden with organic impurities, which is given off along with



the heat. Now, we know that the warmer air is the greater in its capacity for moisture. We also know that the air at the ceiling will be warmer than at the floor; therefore it will suck up this vapor away from the cooler air below. Now, with all these facts before us, there seems to be no possible doubt about the right positions of the inlets and outlet. The warm air, being admitted at the floor, will warm some of the cold air there, losing some of its own heat in doing so; then in its ascent to the ceiling it will carry with it the vitiated air and the watery vapor, with its organic impurities, and if the outlet is there at the ceiling it will sweep them both out of the room without giving them a chance to cool and fall down again among the pure air. We see also that, as the warm air begins to rise as soon as it enters the room, the more it is subdivided into a number of separate inlets the better, because it will ascend by the most direct course to the outlet, and, therefore, a number of small streams will move the general body of air in the room more effectually than one large one, and be less likely merely to pass through it. Although it is desirable that there should be a number of *separate inlets*, it is better to have only one outlet, because, if the suction should be greater in one than the other, it might draw against it, and then the flow of air would be from one outlet to the other, instead of from the inlets to the outlets."

As in many other cases, it is easy to announce the principle and easy after, for the architect and sanitary engineer to determine in any given house or room the method best adapted. But to give a rule or dicta, inflexible and applicable to all cases, is not so possible. So much depends on variations, most of which in this case are controllable, but some of which are difficult of control, that we must not too readily conclude that we can apply just the same method in each case.

Although the introduction of the fresh air above has often been successfully adopted, yet such success as that of the Grand Opera House at Vienna, and the Fifth Avenue Presbyterian Church of New York, show how the method of introduction of warmed pure air from below is successful. It is also admitted to be more economical. More depends upon the locality and number of the entering points, than upon proximity to floor or ceiling.

We abbreviate from the outline of Dr. Billings, the more recent views on this subject, and such as have been found to answer the tests made by instruments of precision and by practical experience:

"*First.* The register must be in such a position, and of such a size, that the requisite amount of air can be introduced through it without causing currents of air of such velocity as will cause discomfort to

the occupants of the room. The only difficulty in this respect, occurs in rooms occupied by a number of persons, such as assembly and school rooms, churches, theaters, hospitals, etc. Under such circumstances it is sometimes very difficult to so locate the FRESH-AIR registers that the currents therefrom will not be unpleasantly perceptible if they are rapid, and it then becomes necessary to make these registers of such an area that the velocity of the inflowing air need not exceed one and a half feet per second to secure the introduction of an amount sufficient for both warming and ventilation. When the registers are so situated that the currents from them will produce no discomfort they may be made smaller. For example, if it be determined to introduce the FRESH AIR directly through a perforated floor in an assembly room, the total area of openings should be at least one hundred square inches for each occupant, while the area of registers openings need not be more than forty square inches for each occupant if they are placed near the ceiling.

"*Second.* Taking it for granted that the FRESH AIR is to be warmed in cold weather before it is brought into the room, its registers must not be placed below the *foul-air* registers, unless the former are scattered all over the floor of the room. The reason for this is, that direct currents between the inflow and outflow registers are easily established when the latter are above the former, and in such case little change is effected in the great mass of the air in the room.

"*Third.* Flues of proper size cannot usually be placed in thin walls, such as ordinary interior partitions. A flue measuring less than five inches in its smallest diameter is of little use. Fortunately, in ordinary dwelling-houses, where this difficulty of thin partition walls is greatest, the precise location of FRESH and *foul-air* flues is of minor importance so long as the precaution advised in the preceding section be observed.

"*Fourth.* FRESH-AIR registers should not be placed in a floor so as to be flush with its surface, because dust and dirt will fall into the flues and be returned, to a certain extent, in the column of ascending air. Such registers are also a fruitful source of loss of small articles. It is always possible to continue the flue upward into a step or seat, and then place the register in the side of this.

"There is less objection to placing *foul-air* registers in the floor; but even this should be avoided, unless the openings are covered by some article of furniture, as, for instance, in a hospital ward, where a good position for the *foul-air* registers is in the floor beneath each bed; and even then the register should not be flush with the floor, but rise an inch or two above its surface.

"*Fifth.* In dwelling-houses and buildings of moderate size it is economical to centralize the heating apparatus as much as possible, keeping the FRESH-AIR flues in inner walls; but it is not easy by this method to secure sufficient warmth in the vicinity of windows, especially on the side most exposed to the winter winds.



"On the other hand, hot-air flues should not be placed in outer walls, unless these are thick and substantial, and even then it will be good economy to make the flue of terra cotta or galvanized iron, so set as to leave an air space of an inch or two on the outer side. For rooms on the floor immediately above the radiators, it is not necessary to place flues in the walls in order to bring the registers under or near the windows, which is their best place so far as heating is concerned. *Foul-air* flues should not be placed in outer walls, unless they are to be carried downward and to have some means of aspiration connected with them.

"*Sixth.* General Morin, and the majority of modern French engineers, advise that the place of introduction of fresh air shall be near the ceiling, in order to avoid unpleasant currents, while the discharge openings, on the contrary, should be near the floor. The introduction of warm air near the ceiling, in order to prevent disagreeable currents, is not absolutely essential, for such currents can be avoided, as above explained, by making the registers of proper size; and to secure comfort in cold weather, it is necessary, on this plan, that the air shall be introduced at a temperature several degrees higher than is required if it be admitted at a lower level.

"The proper position of the *foul-air* registers depends on the purpose of the room and on the season. During cold weather, in the majority of cases they should be near the level of the floor, to secure a satisfactory distribution of the air with the least expense. In large assembly halls, however, and especially where it is desired to provide for respiration, air as pure as possible, instead of *foul air* diluted to a certain standard, the discharge openings should be above.

"*Seventh.* In order to secure a thorough distribution of the incoming air, it is usually recommended that the discharge openings should be in the side of the room opposite to that in which the FRESH-AIR openings are placed, and as far as possible from them.

"In all dwelling-houses, however, and in rooms not having windows on opposite sides nor containing a sufficient number of occupants to exercise any special influence on the temperature, good ventilation will be secured by placing the fresh warm-air openings on an inner wall, and the discharge openings in the same wall at the same or a lower level. This is the arrangement in most dwellings heated by indirect radiation, the FRESH-AIR register being in the side of the chimney near the floor, and the *foul air* passing out through perforated fireboards on the same level a few feet away. The result is the establishment of a circulation from the FRESH-AIR opening upward and along the ceiling to the outer walls and windows, thence down the wall to the floor, and along the floor to the discharge.

"But when we come to deal with rooms having a large floor area in proportion to the height, and containing fifty or more persons, whose heat production is a factor that must be taken into consideration, there is some danger by this method that there will be an unsat-

isfactory distribution of the FRESH AIR when the temperature of the external air is not below 50° F."

The directions already given, as to filtering and moistening of air, will suffice, when this is necessary.

In comparing the methods of producing warm, fresh air outside of a room or house, there are various preferences. Those by steam or hot water or hot air, circulating in pipes as arranged outside the room, have various added appliances for securing heat and the flow of the air so as to be brought in contact with surfaces, ready to be distributed through openings, into the room. It is claimed that such heat is much more agreeable than that provided when hot air is produced by flowing along metallic heated surfaces, such as furnaces, stoves, etc.

Where the heated pipes or radiators are in the room, as in direct radiation, although the air heated is that of the room, none of the oxygen of the air is consumed in the process of heating, and such a mode of heating often gives quite a comfortable air for inbreathing. It is not the design of this article to establish the preference for this or that kind of method, so much as to plainly show what the different methods are, what are some of their advantages, as also what the errors or dangers are which are most likely to occur, and how they are to be diminished or avoided. Questions of expense, adaptations, etc., must be considered, and the method adopted be adapted to the locality and to the purpose sought. It must be said, in general, that the most perfect modes of heating and ventilation are expensive and, therefore, will not be chosen by those who are not impressed by the argument that the *best of air* for inbreathing is cheap, in the long reckoning, since invalidity and sickness are dear as well as uncomfortable.

### HEATING AND VENTILATION OF SCHOOLS.

The principles already stated apply, with but little modification, to school-houses. Because the number assembled is often large, and because the scholars are not able to change position, if there is too much draught at one point and too much heat at another, there is every reason why pure air, sufficiently warm, should be so introduced as to secure an even temperature in all parts of the room, and such modes of escape of foul air be provided as shall keep the air-mixture uniform and sufficiently pure. The plans heretofore suggested apply,



but, as the number is large, every advantage should be taken of opportunities that favor the purification of the air.

As changes in classes and recesses give a chance for additional natural ventilation by means of doors and windows, these should be opened, if need be, at times when the pupils will not be exposed to draughts, or when there may be calisthenics. Yet, where there is a system of indirect heating, so that warm air is brought into the room, all these natural methods are apt to be an interference, and must be carefully regulated. As radiators or pipes in a room heat the air of a room without bringing in any heated fresh air, this system is the most hazardous unless accompanied with artificial methods of ventilation, and unless there is oversight by those who know how to adjust the heating and ventilation to each other. Janitors of schools, and of all assembly buildings, should be as particular to give thorough airing and flushing to rooms just after they have been occupied as they are to do it just before they begin to heat them for occupancy. It is this prompt cleansing and airing just after occupancy, and before any organic material has undergone change, that is most effective. Stoves, and registers admitting hot air, are, generally, not so well adapted to school and assembly-rooms as are other methods, by which the heat, at the time of production or entrance, is distributed through the room. While each school-building needs to be examined by some one acquainted with the laws of heating and ventilation and their practical application, the teacher or trustee who will carefully consider the principles herewith explained, will not fail in his own experience to gain some hints for his guidance. No system has yet been devised so perfect or automatic as not to require oversight, and much must depend on the judgment and regulation of those having charge of the building or the school. Further facts as to heating and ventilation will be found by references to the following articles: The Home and the School in their Relations to Health, pp. 42–85, First Report; p. 138, Second Report; pp. 20, 26 and 41, Seventh Report, and Circular XXVIII. of this Board.

# ABSTRACTS FROM THE PAPERS AND DISCUSSIONS OF THE NEW JERSEY SANITARY ASSOCIATION.

BY D. C. ENGLISH, M.D.

## NEW JERSEY SANITARY ASSOCIATION—SESSION OF 1884.

The tenth annual meeting of the New Jersey Sanitary Association convened in the Assembly Chamber of the State House, Trenton, on Thursday, December 4th, 1884, at 3:30 o'clock P.M.

Dr. J. W. Pinkham, of Montclair, read the first paper, on "The Sub-Surface Irrigation System of Sewage Disposal, as Illustrated in New Jersey."

Dr. Pinkham referred to other names by which this system is known, as the "Waring System," "Sub-Surface Irrigation System," and "Interrupted Downward Filtration System." (*See* p. 60, Seventh Report.)

After describing what the system is, he points out that it is necessary for the success of the system that the ground employed should be drained, either naturally or artificially, so that absorption will take place promptly, and that there should be a flush tank discharging its contents through an automatically-acting siphon. There should be such relation between the size of this flush tank and the soakage area that the whole system of pipes will be filled at one discharge of the tank, and such relation between the whole amount of sewage to be disposed of and the soakage area employed, that the liquid from one discharge of the tank will have become absorbed by the soil into which it is distributed before a second discharge. Then the nature of the soil must be taken into consideration. A clayey soil may be too retentive, and a soil composed mostly of sand may be too loose for the perfect working of this system; but as the area required is small, it would cost but little to add sufficient sand to the former and sufficient clay to the latter to render it suitable.

After referring to the absorption of the organic matter into the soil near the surface, and the change which it undergoes in coming in contact with the air and condensed oxygen contained in the porous soil, and that thus treated the organic matter is as much destroyed as if it were burnt, and the resultant products are as harmless as the products of wood and coal, Dr. Pinkham observes:

Theoretically this system is perfect, but the question, "Will it work?" is legitimate. The best answer to this question is the answer to the question, "Has it worked?" It has been tried for several years. It is important to know, not what a system will do under skillful management, but what will it do under the somewhat negligent management which it is likely to receive. To ascertain the opinions of those who had tried this system he had addressed circulars to about sixty persons who, for various lengths of time, had employed it, asking ten pertinent questions calculated to demonstrate whether it had been successful or not. Answers are given in the paper from about fifty to these several questions.

The Doctor, in closing his paper, makes the following summary of conclusions, which he thinks fairly deducible from the testimony thus given:

1. In Orange, Montclair, Caldwell and Dunellen, N. J., Goshen, N. Y., and Bryn Mawr, Pa., this system, constructed under the superintendence of Messrs. G. P. Olcott and James C. Bayles, of Orange, and Mr. James Owen, of Montclair, has, after, in many cases, prolonged trial, proved a success.

2. The first cost for a family and house of average size is about two hundred dollars.

3. The cost of annual maintenance is about ten dollars for such a house.

4. The ground selected should be free from shade and may be either lawn or garden.

5. By means of this system all liquid sewage from the smallest dwelling-house or the largest institution may be effectually disposed of without nuisance and without peril to health.

6. This system should take the place of cesspools in all suburban and country places which have sufficient ground for the distribution of pipes.

The paper was then discussed.



George P. Olcott, C.E., of Orange, said he had this small pipe system in use at his own home. Described its use at Dunellen. When the land was flat an artificial grade is necessary of 18 inches fall, and siphons used of from 11 inches up. Had seen some cases where it worked well without siphons, by allowing the liquid to dribble from the second tank, but in winter there would be danger of freezing. The best system has two tanks—the drainage led off from the second tank by lateral pipes of glazed tile, one foot long, with joints broken so as not to come too close together. Stoppage and disarrangement of this system, owing to carelessness in the house by servants, often occurs. He had seen a croquet ball taken from the house pipes. The solid matter which settles in first tank should be taken out and carted away at least every two months. He had adopted a plan of putting in two systems of lateral drainage pipes with a switch, and instructed the family to use each system alternately for about two weeks at a time. The soil over one system dries out while the other is in use. This system can be safely recommended where there is proper fall.

J. T. Hilton, C.E., Paterson, desired to know if some plan could be found to obviate obstructions.

Mr. Olcott replied that the caps could be taken off and frequent examinations made.

Rev. William Harris, Princeton, spoke of the disposition of house sewage along the sea shore. While often sewage in the soil is harmless, when it polluted the water it became a very serious matter. Can this system be used in the light, sandy soil along the sea shore? If sewage was run backward into the creeks, they soon become polluted and sources of disease. He had thought it might do to make a soil by ramming clay under the pipes, that would so far retard the drainage that the grass might take it up and prevent its affecting the water. He thought this a most important subject, in view of the possible invasion of cholera.

Mr. J. C. Pumpelly, Morristown, believed that great expense would have to be incurred to get the filtration necessary to take up the sewage.

Dr. E. M. Hunt, Trenton, thought this system not applicable where ready access was to be had to rivers or sewers. A strong argument against its general adoption is, that while it has been prominently before the public for the last nine or ten years, it had not been accepted as a substitute, but only as a modifying suggestion in other systems. It

did well in many places, but it was not, in his opinion, a perfect substitute for other systems.

Dr. Pinkham thought that the slow-progress argument had but little weight against the evidences of decided success recited in his paper.

James Owen, C.E., believed that the whole question of disposition of sewage from isolated houses was one that required as much care and watchfulness outside the house as inside.

Mr. Olcott thought there had been considerable progress made in the introduction of this system, when the adoption of it had increased in a few years from one to sixty.

Dr. T. W. Harvey, Orange, had the system in use in connection with his laundry. When put in at first the pipes were laid on hard pan. The result was the drainage from the pipes flowed over the surface of the ground. Then more pipes were put in to increase the discharge, and the hard pan was broken up. The system now works well.

Upon motion the general subject of sewage was then taken up for discussion.

Dr. Hunt spoke of the various and widely diverse opinions in regard to the disposal of sewage at the sea shore, which was now a very important matter to an immense number of people. The ocean, while handy and inviting as a receptacle, is liable to return it by the inflow of the tide. The same objection exists against leading it into our rivers, and he believed the time was rapidly coming when some rivers so used will reach a degree of pollution which will prevent the use of their waters for any domestic purposes. He believed that chemical processes are being found out whereby sewage can be satisfactorily disposed of. A plan was now being tried, with much success, whereby the sludge was solidified and so readily removed.

Mr. Owen was much interested because he lived in a town where they were debarred from a river exit for their sewage by the necessity of not polluting the Passaic. They must have some disposition of it otherwise than by the river. Some plan of solidifying at a reasonable cost seemed the most practical.

Mr. Pumpelly spoke of the trouble at Sheepshead Bay, which had been remedied by the Waring system.

Dr. Hunt was opposed to cities committing themselves to the purchase of patents. While we have engineers and chemists who are



able to give us relief, let us not put ourselves into the hands of companies who desire to sell their patents.

Dr. Henry Mitchell spoke of the difficulties met with at Asbury Park. Peculiarly situated as they were, the question of casting the sewage into the sea was an unsolved one, but now, after four years' trial, it was thought to be a success. All their sewage is strained by grates before passing into the street sewers, which lead to the sea. All the solid matter is collected into two pits, which are ventilated by stand-pipes extending about seventy-five feet above the surface. There is no odor whatever on the beach. Discoloration is seen on the shore at the sewer-pipe outlet, but only for a short distance out.

A member asked if it was true that the lake between Asbury Park and Ocean Grove had become so foul that they had been compelled to fill up a portion.

Dr. Mitchell replied, no; the lake was never in better condition than since the Board of Health took charge, and the negro settlement was cleared out from its head two years ago.

Uriah White, of Asbury Park, agreed with Dr. Mitchell, saying when the water is out of the lake, on account of an exceptionally low tide, you can smell the muck, but this has only occurred about once in three or four years. There is no sickness whatever on account of the lake.

E. G. Harrison, C. E., Key East, wanted to know the result of the small pipe system. In sewage we will have to follow nature. What we take from the soil we must put back, or else we violate the laws of nature. The Asbury Park system may now apparently work all right, but he had doubts of permanent good from any system which violated nature.

Hon. James Bishop described at length the system at Pullman, Illinois, whereby all sewage is collected in a receiving tank, whence it is pumped to a farm five miles distant, and there used for fertilizing purposes. This system is worked upon business principles, and, it was claimed, yielded a profit of six per cent. It is only about seven hours from the time the sewage leaves the house until it is distributed on the farm.

Dr. I. N. Quimby, Jersey City, had found very little sickness around the mouth of the large Jersey City sewer, which discharged on the flats. He is opposed to emptying sewage into streams, and thought there ought to be some decided expression of opinion which

will prevent cities from having sewage discharged into streams which may have to be used for domestic purposes.

Dr. D. Benjamin, Camden, desired to know what diseases were produced by bad smells. If a river is polluted, don't drink the water. "That is where the foolishness of the thing is, in using the polluted water." "There is in the city of Camden, owing to the arrangement of the water-supply, a continuous stream often flowing for about four or five hours each day between the bowels of typhoid fever patients in the hospitals and private houses and the mouths of the people."

Dr. Franklin Gauntt, of Burlington, delivered the annual address. Subject—"Preservation of Health by the Preservation of Water from Contamination." It was an able and interesting address, containing accounts of some interesting cases that had come under his own observation of water contamination.

The next subject presented was "Collective Methods of Water Supply of Towns and Cities."

Dr. E. M. Hunt, after expressing his regret that Col. J. W. Adams, C.E., of Brooklyn, who had been expected to read a paper on the subject, could not be present, spoke on the subject at the request of the Executive Council. He said that research goes to show that disease is, to a very great extent, the result of water contamination. When Prof. Murchison asserted that typhoid fever was generally the result of bad water, many were disposed to doubt him. That assertion has not only been proven, but also that typhoid microphytes are also conveyed through milk which has been contaminated in adulteration with bad water. Epidemics of scarlatina and diphtheria were also the result of contaminated water. He dwelt upon the importance of this subject, more so now than ever before, because the risks of contamination of pure water are increasing by its increased use in towns and cities, and because the sources of pollution are increasing through sewers, factories, heaps of refuse, &c. He dwelt on the evidences of evil results we have in general injury to health and specific contamination, as typhoid fever, cholera, &c. On the question of what to do, we have to decide in each case what constitutes the pollution. Water may be malodorous or unpleasant to the taste, and yet not be unhealthy. Again, water may be very clear and appear, on slight chemical examination, pure, and at the same time be very unhealthy. So we must



use all kinds of evidence, logical or natural, chemical, biological, clinical evidence, and evidence of general observation. The question how to prevent pollution or guard the water-supply, is the most important. There should be no wells in closely-built cities, and the whole matter of source, supply and distribution of water needed to be vigilantly looked after. He would emphasize the point, do not choose private corporations to introduce the water into our towns and cities, giving them full power. The Doctor closed with some practical remarks on the water-supply in connection with sewerage, referring, in illustration, to Philadelphia, Trenton, Newark, Salem, Gloucester, and the counties of Passaic, Essex and Hudson.

L. B. Ward, C.E., of Jersey City, spoke of the necessity of agitating the question of water-supply, as there are already 600,000 of the people of New Jersey living in towns and cities of over 5,000 population. He called attention to the fact that this State is wonderfully supplied with facilities for the best kind of water-supply for all its people, and yet we have localities suffering from a poor supply. He gave an interesting explanation of a large map, which was displayed, prepared by the New Jersey Water-Supply Commission, and which is described as a Contour Map of the Northern Division of the Passaic River Basin, including the Ramapo and Pequannock Water-Sheds; also, the district east of First Mountain, proposed to be supplied from these sources by a system of gravitation works and storage reservoirs. This supply is calculated to be capable of furnishing 480,000 persons, or 42 per cent. of the population of the State, with water.

In answer to a question of Dr. Benjamin, Mr. Ward stated that this water-shed has an area of 350 square miles, and can furnish 250,000,000 gallons per day, or 100 gallons for two and a half millions of people, which is about double the population of New Jersey. The area embraced by this source of supply takes in Hudson, Essex and Union counties, with the cities of Paterson and Passaic, making in all about 450,000 population.

Dr. Benjamin, of Camden, thought the Water-Supply Commission had done a grand work—very creditable to our State. This map shows how well this subject of water-supply can be managed, and how water-sheds can be utilized. We have here a correct and scientific method of supply. He thought there was the greatest necessity for the protection of the source of water-supply, and that the State should severely punish those who compel the people to use contaminated water.

Dr. Quimby, of Jersey City, also spoke of the need of legislation on this important matter, and thought the State should have control of these sources of water-supply.

Prof. A. R. Leeds, of Hoboken, doubted the practicability of special legislation for the protection of the sources of water-supply, and believed we had a remedy at common law. He cited a recent decision that the pollution of any stream used as a source of water-supply by any person, is a nuisance, and the person so polluting such stream is liable to prosecution. He thought it a very important decision.

The next subject was then announced by the President—"Experiments in Milk and Kerosene Testing, and in Analysis."

Prof. A. R. Leeds said he would confine his experiments and remarks to kerosene.

He spoke of the many accidents, of the tardiness of public opinion in securing protection to the people using kerosene from the cupidity of the seller, but at last we had been able to obtain laws upon this subject. He explained what was meant by the terms "standard," "flashing" and "burning" points, &c. Standard kerosene should not give off vapor at a less heat than 100° Fahrenheit. He then made several very interesting and instructive experiments, among others a specimen of dangerous oil which flashed at 91° instead of 100°.

Dr. William K. Newton, of Paterson, then took up the subject of the "Inspection of Milk," and described the methods used for determining its quality. The first examinations of the milk were by the sight, taste, smell, and by rubbing between the fingers to test the body. He then tried the several specimens before him with the lactometer. No pure milk falls below 1.029 at 60° Fahrenheit. He had tested 600 specimens and examined 6,500 cans of commercial milk during the last five years, and never found any pure below 1.029. Under the law of 1882 this test was sufficient, and the Inspector could destroy the milk. The law had now been altered so that the milk should be analyzed by one of the State chemists who knew nothing of its origin. No pure milk has less than three per cent. of fat. The first specimen examined had specific gravity of 1.031, and five and a half per cent. of fat, and so pure and very rich. He then explained the several different instruments for testing, which were present, and read the notes from 112 analyses of milk made in this State.



Dr. Quimby asked if the fat could be introduced into inferior milk.

Dr. Newton replied that it could be, but it was not likely the dealer would put in a more costly adulterant after reducing his milk.

The present milk law was not a health law, but a commercial measure for the buyer's protection. Adulteration by chalk is a myth, because the chalk would not stay in solution. Soda and salicylic acid have been used for adulteration, and in one instance he found boracic acid, but the ordinary method of adulteration is to add water. He recited several instances of the pollution of milk from adding polluted water; one case where 120 cases of typhoid fever came from one cow-yard, where the cow-yard, pig-pen and privy were all on higher ground than the well which supplied the cows with water, and the discharges of typhoid fever cases were thrown into the privy and percolated through with other pollution into the well. Polluted milk is much more dangerous than polluted water.

The next subject was "Practical Teaching of Hygiene in Our Public Schools," by Prof. George H. Barton, Superintendent of Public Instruction, Jersey City.

The discussion on this paper was then opened by Prof. J. Madison Watson, of Elizabeth. He said that probably of all the questions that enter into our system of education there is not one of more importance than this. The crowded condition of our schools was of itself unhealthful, and therefore a practical knowledge of hygiene should be possessed by the teacher himself, that he may be able to avert trouble from this cause if for no other reason. A practical and theoretical knowledge of physiology and hygiene should be an essential part of the teacher's qualifications. No graduate of a normal school should be permitted to teach without a knowledge of these branches. Nine-tenths of the teachers in the United States are ignorant upon the subject of hygiene. He thought that there should be examinations of pupils as to their physical condition as well as mental attainments. While deprecating a too strict military discipline, he would still have a salutary observance of rules. Children cannot be orderly where there is not good health. Ventilation is of great importance. Exercise should be systematized and made regular; fitful exercise is injurious. The rush of the old-fashioned recess is injurious. Teachers in arranging their pupils for classification, should consider physical as well as mental strength. We should have our

legal committee procure legislation, making physical training (calisthenics) an essential part of our school system. Buildings that do not conform to the essentials of good hygienic school-rooms, should be abandoned, and in any district where these conditions are not complied with the public money should be withheld.

Superintendent J. A. Dix, of Elizabeth, thought that teachers generally felt the importance of the best hygienic condition in their schools. The trouble is more with those who have the control of the teachers. The trouble is with trustees and boards of education, and if money is to be expended in this direction it had better be appropriated for a normal school to educate these trustees and boards up to a knowledge of their duties.

State Supt. Apgar spoke of the importance of good ventilation. He thought the great difficulty was in carelessness and indifference more than lack of knowledge; the schools are no worse than our bed-rooms and public buildings generally. He thought there ought to be a rigid supervision of the hygienic condition of our schools by officers whose duties should require them to examine and report. Physical exercise, he believed, was very important. He visited one school where between five and six hundred young women, from fourteen to eighteen years of age, were attending, of whom not more than five per cent. had a good physique or were well developed, but had narrow chests and pale, pinched features. In another school fifty children were writing, most of them with their eyes about two inches, instead of twelve, from the paper.

Dr. Benjamin believed that the difficulty was with the school boards. Who is to exercise this strict supervision and enforce this accountability when the ward boss selects whom he pleases to run the schools, and puts them in or out of position as he pleases? We have the machinery for supervision in the State Superintendent and other superintendents. Children will not, of themselves, assume unnatural or uncomfortable positions. In school-rooms they are generally, however, seated with their faces towards the light, and they have to get down with their eyes close to their books or their writing, and shade their eyes with their brows, in order to see at all. In one room where I found the children with their faces to the light, I turned the desks all around and the result was that they all at once worked with their eyes three or four inches further away from their books. The light should fall on the page, and not on the pupil's face. In reference to



ventilation, it was not good policy to open windows for ventilation, because it made streaks of cold air in the room without purifying the whole atmosphere. The best plan is to bring the cold air in high up and have it heated by steam pipes and sent over the room warm.

Supt. Apgar did not want the impression to go forth that the school children in this State, as a general thing, faced the light. This had been remedied.

Prof. Watson said he had listened with great interest to the remarks of the State Superintendent, but he had not told us what to do with regard to hygienic and physical training.

Dr. Hunt said the subject before us is the teaching of hygiene in the public schools. We want to remember that the school children are to earn their living with their bodies, and that anything that tends to the devitalization of the child's body is an evil. The schools should be the teachers of the homes on hygiene. We need something to enforce practical instruction. We want normal school teachers taught that hygiene must have the same importance in the curriculum that is given to any other branch of study. I hope this Association will put itself upon record as insisting upon the knowledge and practical teaching of hygiene in the public schools. Let teachers, like physicians, come up and acknowledge their ignorance and manifest their willingness to learn.

Prof. H. B. Pierce, of New Brunswick.—If we send our legal committee to the Legislature for legislation on this subject, it will be told to go to the State Board of Health. Let teachers and parents and trustees be educated up to the importance of the teaching and practice of hygiene in the public schools, and there will be no trouble in getting all the legislation we want through the State Board of Health.

Rev. Mr. A. E. Ballard spoke in favor of the proper construction of school-buildings. It would not be a difficult matter to have the law compel the construction of school-buildings upon proper hygienic principles.

Rev. Mr. William Harris, of Princeton, believed that nine-tenths of the difficulty came from the cost and the want of sufficient appropriations. There is no system of heating and ventilation that does not cost in its introduction and all the way through. The Legislature must appropriate for the coal bill if they are asked to help in the matter.

The next subject in order was, "What should be done by Legislation or Municipal Regulation for Tenements and their Occupants, to Secure Proper Sanitary Condition?"

E. W. Harrison, C.E., of Jersey City, and Dr. E. H. Janes, Inspector of New York city Board of Health, both read excellent papers on the subject.

Dr. Janes' paper was published in full, by permission of the Executive Council, in the Report of the State Board of Health, 1885.

Dr. E. M. Hunt opened the discussion on these papers. He regarded both papers as very important; but did not think tenement population in Trenton could be restricted to the limits mentioned in Dr. Janes' paper. There is need, however, for the regulation of tenement-houses in a great many of our cities. There are many places where there is overcrowding and bad sanitary conditions, and unless something is done there will be plague spots in case of an epidemic. Attention cannot be given too early to procuring legislation in this regard. There was a law in Princeton that no student could board in any house that had not been examined and found to be in a good sanitary condition. He is in favor of rigid sanitary inspection, and held that it is needed just as much in Jersey City, Hoboken and Newark as it is in New York.

Dr. W. K. Newton, of Paterson, had been noting with great interest what is being done for tenement-house life in Great Britain, and particularly in London. The Peabody houses and some others of a similar kind have not benefited the class they were intended to reach, because they have been filled with middle class people, instead of the poor. In New York City the average of population is sixteen persons and a fraction to a house. In Brooklyn eleven and a half, in Newark seven, Jersey City eight, and in Camden five. There should be a law to prevent overcrowding. Paterson is the only city that has passed a tenement-house law and enforced it.

Prof. J. M. Watson offered the following resolution, which was adopted:

*Resolved*, That a special committee of three be appointed to take such action as may be deemed best to secure proper hygienic training in the public schools of the State, and to secure the essential instruction of prospective teachers.

"The Duty of the State and Local Authorities as to Cholera, and the Modes of its Prevention," was then discussed.



Dr. H. R. Baldwin, of New Brunswick, who had been appointed to open the discussion, presented seventeen propositions, which formed the basis of his remarks, and which were as follows:

1. Cholera is an infectious disease, having its origin in India, and existing in this country only as it has been imported.
2. Whilst cholera has broken out on shipboard in mid-ocean, it is only upon western-bound vessels that this has occurred.
3. The mode of importation may be directly by the individual—by baggage or other stuffs which may contain the germ—and which, passing quarantine, may become active after railroad transit of thousands of miles upon exposure to the requisite conditions.
4. The disease may spread through the atmosphere as an agent—through infected water or food, or from the dejecta of those affected.
5. That cholera appeared upon the Quarantine Station at Tompkinsville, Staten Island, once or twice during the year 1854 or 1855, and was so isolated that no other cases occurred. It was also at four several importations arrested at the lower quarantine during the year 1873.
6. That physicians in attendance upon cholera hospitals have frequently loose bowels and cramp in the legs whilst in such attendance.
7. That such a mild form of the affection may be capable of transmitting the disease, both through the breath and excretion.
8. That the recurrence of cholera within one or two years in the same localities may be due to the fact that the germ from non-disinfected stools having been deposited in the earth or privies, may have polluted drinking-water, and thus induced the attacks.
9. That in the face of the above propositions, the grand duty is an efficient and comprehensive quarantine.
10. That all local Boards of Health should use all means in their power to abate all filthy localities and sources of filth, so that no lodgment of cholera can be possible.
11. That municipalities and local Boards of Health should strictly watch all suspicious cases of diarrhea, and insist upon isolation, fumigation and disinfection.
12. That in the event of cholera appearing, all stools should be disinfected, all contaminated clothing put into boiling water or disinfected, or, if possible, burnt.
13. That the general use of public water-closets should be discouraged.
14. That scrupulous cleanliness should be the personal habit, and that drinking of water or taking of food, except of known purity, avoided.
15. That the water-supply, of every town not only, but in every household, should be carefully guarded against contamination.
16. That rules for the management of the stricken should be issued

by the State Board of Health, as well as a few short warnings as to how to avoid danger.

17. That moist and wet seasons or conditions are more favorable to spread of cholera than those freer from moisture.

Dr. Benjamin, of Camden, spoke of the impossibility of isolating cholera cases. Controlling cholera was like controlling fire—if it was taken at the start it could be put out. In England it had been demonstrated that sanitary cordons were useless. The only thing we can do is to endeavor, by vigilance, to secure the first cases and deal promptly with them.

Dr. Baldwin asked, if cholera has to run its course, how was it that the epidemic which broke out in New Orleans spread over sixteen States, and not over the rest of them?

Dr. Benjamin—I presume the conditions in the other States were not favorable.

Dr. E. M. Hunt spoke of the condition of feeling on the continent. While there was panic in France, there was the utmost sanitary vigilance in England, and the government felt satisfied that they should not have the cholera there. New Jersey is not likely to escape if the cholera gets into this country. One thing very much against us is the condition of affairs in Hudson county, where they have few facilities for taking care of cases of cholera. The only way to check the spread of cholera was in being ready for it. The historical data in India and elsewhere as quoted proved this. Speaking in reference to the importation of cholera, he was satisfied that there was far more danger from the luggage than from the passengers on board the ship.

Dr. Harvey, of Orange, spoke of the condition of his city; that the local Board of Health would be prepared to meet it if it came. They have power to erect a hospital, employ nurses, and to act at once in case of an emergency. He spoke of the importance of recognizing the first few cases. Prior to the general recognition of the presence of cholera in a city, the death returns will show a great increase of deaths from cholera morbus and diarrhea. The clinical features of such cases are not easily distinguishable from cholera.

Dr. William K. Newton read the instructions prepared for the government of the Sanitary Board of Paterson. He said that Paterson had on hand disinfectants ready for free distribution, and that cholera cases would be isolated in tenement-houses which would be taken for that purpose, or the cases would be isolated where they occurred, and



be provided with nurses and disinfectants. All clothing of deceased persons would be burned by a man already engaged for that purpose. In cases of death, the body would be wrapped in a sheet saturated with a solution of bichloride of mercury and buried.

Rev. Mr. Harris spoke of the unfavorable condition of the cities of Europe, and particularly of Paris. He also referred to the hillside holes in which the poor of Naples lived. He believed that, with fair hygienic care, we need not expect any such trouble as there has been with the epidemic in Europe,

President Gates said that very many were looking to this Association and expecting great things from their deliberations on this subject, and expected them to put the people of the State in the way of being ready to meet the cholera epidemic. Public attention may be concentrated upon the subject without necessarily causing panic. Information should, through our Health Boards, be given the widest possible publicity. Public attention should be called to the necessity of securing and preserving thorough cleanliness and the best possible sanitary condition in and about our homes.

Upon motion the resolutions of the committee were then taken up *seriatim*, and, after some slight amendments, were unanimously adopted, as follows:

WHEREAS, There is reason to apprehend that the cholera epidemic, which has recently made its appearance in Italy and France, may visit this country during the coming summer;

*And whereas,* Past experience has shown beyond question that the best and most effectual mode of dealing with this pestilence, as well as other epidemic diseases, is to prepare for its reception by thorough purification of all houses and premises, a complete removal of all filth or other material which might furnish a nest or breeding-place for such disease, as well as by a prompt recognition and fearless meeting of the epidemic at its first approach, and a thorough stamping out of the infection immediately upon its arrival; therefore,

*Resolved,* That, in the opinion of this Association, it is the imperative duty of the National and State Governments to adopt and enforce the strictest quarantine measures to prevent, if possible, the introduction of cholera into this country.

*Resolved,* That it is the duty of the State and local Boards of Health during the winter and early spring months to place every city, town and township within the State in the most favorable sanitary condition; that no place which might become a nidus or breeding-place for disease should be left uncleansed, and that all citizens should be urged

to co-operate by a thorough and systematic overhauling and disinfection of every part of their premises which might "furnish aid and comfort to the enemy." It is always wiser and more profitable to prevent disease than to be obliged to employ remedies for its cure; and time, labor and money promptly and judiciously expended in precautionary measures may save thousands of dollars and many valuable lives, when such measures would be too late to be of service.

*Resolved*, That we urge upon the State authorities the importance of such additional legislation as may be necessary to protect the health and lives of the people of our State, and the passage of such laws as may be required to hold health officers to strict account for the faithful performance of their duties, and also such laws as shall secure to Health Boards sufficient funds to carry out health measures.

*Resolved*, That health officers should have police powers to enter into any house or upon any premises which is believed to be in an unsafe sanitary condition, to collect facts relating thereto, and, under direction of Boards of Health and with proper legal restrictions, should have full powers to summarily abate or cause to be abated any nuisance or cause of disease found within such house or upon such premises, and that such officers should be protected by the State and local authorities in the proper performance of their duties.

*Resolved*, That especial attention should be directed to the purity of water used for domestic purposes; that no water should be so used which is believed to be contaminated in the slightest degree by sewage or house-waste, and that in all cases where there is the least doubt the water should be boiled previously to its being used and cooled before drinking. It is believed that cholera is much more frequently introduced into the system by the fluids swallowed than by the air breathed. The addition of alcohol in any form does not render impure or unboiled water harmless.

*Resolved*, That in case cholera should find its way into our State, notwithstanding all efforts to prevent it, every case should be completely isolated and quarantined; all dejections from the sufferer should be thoroughly disinfected *before* being disposed of by burial; all clothing in contact with the patient should be destroyed by fire, and every precaution taken to prevent the spread of the disease. The passages from the cholera patient should be received in vessels or upon cloths, which have been previously prepared, and which should contain enough disinfecting material to effectually destroy the cholera germ immediately upon its leaving the body.

*Resolved*, That experience has shown that a large majority of persons suffering from cholera have been previously afflicted, for a period of from a few hours to several days, with a diarrhea, which may be slight or severe, but which is almost invariably painless, and that, in the event of an invasion of cholera, every person so afflicted with painless diarrhea, or other disorder of the stomach or intestines, should immediately consult a physician, without waiting for the serious symptoms to develop themselves. In a large majority of cases, cholera can be easily and successfully treated, if attended to properly and without delay, in its earliest stages.



## NEW JERSEY SANITARY ASSOCIATION—SESSION OF 1885.

The eleventh annual meeting of the New Jersey Sanitary Association was held in the Assembly Chamber, at the State House, Trenton, November 19th and 20th, 1885, the President, Robert Wescott, M.D., of Elizabeth, being in the chair.

Drs. Elmer, Shepherd and Warman, were the local committee.

Dr. Elmer, in behalf of the committee, made a neat address of welcome. He said that the meeting held in the House of Assembly was suggestive of the interest that the Legislature should take in the Association's work. It should pass laws to carry into effect the wise counsel given by the sanitarians.

President Wescott responded for the Association, whose appreciation of the cordial welcome extended he expressed. He said that the principal object of the Association was to maintain and improve the public health. He trusted that the good people of Trenton, as those of the State at large, would be benefited by these meetings, and that they, in common with the people of the State, would do all they could to further the interests of the Association.

A paper was then read on "House Drainage Requirements in Sanitary Codes," prepared by J. C. Bayles, M.E., of Orange. The latter being unable to be present, the paper was read by Dr. English, the Secretary of the Association. The paper insisted that what are generally called sanitary codes are apt to attempt to cover too much ground instead of being accurate and technical in their requirement. While they read very well on paper, they are too seldom fully enforced. We have an example of this in the New York plumbing specifications, as to which the inspectors are too careless in enforcement. Shrewd plumbers and architects well know how to cover up whatever they do not wish to be seen. Mr. Bayles contends that all pipes in buildings should be of iron, notwithstanding plausible reasons that are given for the use of earthen pipe, showing that in permanent structures the iron is less liable to get out of order. He chooses pipes of four-inch caliber, weighing three pounds to the foot, and laid with a fall not less than a quarter of an inch to a foot under

buildings. He claims that there should be no traps whatever in *main courses* of house sewer pipes, and even would dispense with the outside trap, his reason being that thus the flush is more effective and the ventilation better. To his mind, the risk from outside sewer gas, without traps, is not so great as of inside sewer gas with traps, which interfere both with flush and ventilation. In putting down the pipes, he would always allow two or three inches for wall settling, by spaces around the pipes where they pass through walls, and would have all joints fitted, filled and caulked with lead in the best manner. The code proposed is a simple one, and it is the general belief that it is to be commended to the attention of all city Boards of Health.

[The paper has been published in full in the *Iron Age*, of New York City.]

Mr. Bayles' paper was discussed by James Owen, C.E.; Mr. Bassett, Engineer of the Newark Board of Health; J. C. Pumpelly, of Morristown; Dr. Hunt, Dr. Newton and others.

The following points were brought out in this discussion;

The public should be educated to desire the best work, rather than the cheapest in plumbing; iron pipes, instead of earthen ones, should be used and with as few joints as possible; the dangers to health being not only from the house pipes but from the gas of sewers entering the house, secure traps should be insisted on; the trap should be outside the house; requirements in plumbing codes should embrace all important points; the plumber too often does his work from the monetary point of view; the Durham system had worked admirably in Morristown; the great difficulty of siphonage in traps was referred to and the Putnam trap, which is said to prevent it, was exhibited and explained; all plumbing requires constant inspection, especially where there is a running trap; Dr. Newton had never seen a tile drain properly laid, and so he insisted on iron pipe from the house to the sewer. There was an agreement with Mr. Bayles as to the necessity of not having traps on the main house lines but only under fixtures. Most, however, believed that sewers as a rule were not yet so perfectly ventilated as to make it safe to dispense with the outside trap between the house and the outside system of pipes.

Dr. Henry Mitchell, of Asbury Park, then read an able paper on "Methods of Sanitary Inspection of Houses and Premises and the Remedies for the Evils Disclosed."

He said that the title of the paper indicated one of the first steps to



be taken by local Boards of Health in their effort to secure healthful conditions. The time is not far distant when in this country the regular visits of the Sanitary Inspector will be welcomed and demanded by every intelligent physician. Dr. Mitchell described the accomplishments which a Sanitary Inspector should possess, and said that it was now a pressing duty to train men for this calling, for few persons are available for this occupation as a regular pursuit—such service not being yet sufficiently appreciated by city councils, etc., to receive the compensation it deserves, and therefore the men who are competent are unwilling to engage in the work, for they are generally already profitably employed. The experience during the past year of the district agents of the State Board of Health shows that the greatest weakness of local Boards of Health lies in the dearth of good Inspectors. The Legislature has provided authority for the expenditure necessary for the employment of Inspectors, but few local Boards yet realize the usefulness of these officers, and their judicious selection is perhaps scarcely to be expected under present methods. If the State Board of Health was given supervision over the appointment of all local Inspectors, having the right to reject any who were found to be incompetent, perhaps a step in advance would be taken.

Dr. Mitchell went into an elaborate description of methods of sanitary inspection, and afterwards the subject was discussed by Drs. Newton, Hunt and Davis, Civil Engineers Lowthorp, Wallace and Owen and others. The following were the main points of the discussion:

Health officers should be chosen by the State Board, as a competent health officer is rarely met with, the appointments being far too often made on political or personal preference rather than because of qualification for the position; the office of Sanitary Inspector is one of the greatest importance, and yet but few of the Inspectors are perfectly competent; the Newark plan was indorsed, where Inspectors are appointed after competitive examination: the cellars need more attention than any other part of the house; privies should not be allowed in basements without the greatest care in construction and constant inspection; we should also be careful in the use of cellar air in the heating apparatus of our houses; refrigerator waste discharges connected with the drain to sewers should never be allowed; the water used for drinking from wells should be carefully examined, and such

examination should be more thorough than the ordinary chemical examination, where sickness gives any occasion for suspicion.

In the evening the President delivered the annual address.

His subject was "Duties of Physicians as Sanitarians." It was an excellent presentation of the whole subject. After admitting that physicians are naturally drawn most into an inquiry as to the treatment of departures from health, the speaker showed why it had become an essential part even of practice that they should know the exciting and promoting causes of disease. Indeed it is now thus recognized by liberal-minded and well-educated members of the profession. Daily and in a practical way the physician can teach, and he should preach the gospel of cleanliness upon all proper occasions and he should not only practice what he preaches, but, if he has the courage of his convictions, he should endeavor to see that others do no wrong in this direction. He can show that cleanliness of person and surroundings is not only essential to physical health but is a very important factor in morals. He can show that neglect of sanitary laws frequently leads to neglect of moral laws; that perverted physical health often lays the foundation for mental and moral perversion; that filthy habitations and surroundings are antagonistic to purity of life; that human beings are largely creatures of habit and especially in childhood are imitative animals; and that people born, developed and in a certain way educated in squalor are almost certain to furnish by far the largest proportion of recruits for the criminal classes of society. He can show that while a few exceptional individuals rise out of and above such surroundings, a large majority never advance a step in the social scale, while many sink to the lowest depths of vice and crime. He can show the vast loss to the individual, to the family, to the community and to the State, in dollars and cents, caused by unnecessary sickness and death consequent upon unsanitary conditions. The death-rate in every part of the nation could certainly be reduced by efficient national, State and local sanitary supervision.

In the English official reports we find that such a system reduced the annual death-rate in England from 22.6 in 1872 to 18.9 in 1881, and that this reduction was not spasmodic nor due to exceptional causes, but was steadily continued year after year, and the reduction gradually accomplished during the ten years. In other words, 3.7 persons in every thousand were saved from death each year during the term mentioned, who would most certainly have died had it not



been for this careful sanitary oversight. While it is not claimed that the English system is perfect, this statement shows what has been accomplished there, and no reason exists why equal results may not be attained here. Coming nearer home, we can obtain useful information from the annual reports of New Jersey. No one who knows how much has been done and how much there still remains to do, will hesitate to testify to the great value of the work, and to urge upon every citizen the importance of a cordial support and assistance of the gentlemen composing the State and local Boards of Health. Taking our figures from the State reports for five years, from 1879 to 1883, inclusive, we find that 29,843 persons died in this State from causes which might have been avoided. Nor do we include consumption in this list, from which there were 15,077 deaths, because, while it is largely a foul-air disease, it is not yet recognized as being so often avoidable. This shows us that an average of 5,968 persons died in this State from preventable disease each year during that period, a large number of whom might have been living to-day if we had the proper laws and means to establish a sanitary oversight at all equal to that now in practical operation in England.

In estimating the loss to the State in consequence of unnecessary deaths, we must take into account the following items, viz.:

1. A sick person's productive capacity ceases during illness and convalescence, while those who die are permanently lost as producing members of the community.

2. For every one who dies, a large number are ill who recover. This is an important item, and the data are not as complete as could be desired, but we can obtain enough information for our purpose by seeking for it. The Registrar-General of England says: "We shall probably be well within the mark if we assume that for every fatal case of illness there are four or five cases which end in recovery. This is about the proportion in enteric fever, which is a more fatal disease than the average of diseases." It is evident that the Registrar-General is "well within the mark" here, and includes only serious cases of illness, which confine the patients to their beds for considerable time. And this view is confirmed by Dr. Sutherland, who said, in an address delivered at Glasgow, that he found by examining the reports of the Registrar-General for twenty years that the proportion of deaths to the number ill was in typhoid ten to one, and in typhus and diphtheria six to one, while the average illness of those who died

was in typhoid twenty days, typhus fourteen days, and diphtheria ten days; and the average illness of those who recovered was, in typhoid ninety days, typhus and diphtheria thirty days, thus showing that the direct loss of time during the illness of those who recovered was about three times as great as in the case of those who died. Upon this subject Dr. Playfair, a most careful and conscientious observer, says: "For one unnecessary death there are twenty-eight cases of unnecessary sickness, and in London there are yearly 10,000 untimely deaths, and 250,000 cases of unnecessary sickness." The statistics of friendly societies and insurance tables of England show similar results, while in this country those most competent to judge seem inclined to consider the calculation not far out of the way. It is safe to estimate that for one fatal case of illness there are four or five dangerously ill who recover, and from fifteen to twenty who are afflicted with comparatively slight ailments.

3. Every sick person during illness and convalescence requires the care of others as nurses, etc., thus preventing one or more persons from attending to the ordinary duties of life to a greater or less extent.

4. In case of death the time of a large number of persons is occupied with the final disposition of one who has permanently ceased to be a producing member of the community.

5. The productive powers of many persons are entirely suspended or partially obstructed by invalidism, more or less chronic, which is frequently so severe as to occupy the time and attention of others.

6. Illness and invalidism sometimes drag down individuals to such an extent as to render them incapable of caring for themselves, and they become charges upon relatives or friends, or upon the State as paupers or criminals, and, in some cases, as occupants of insane asylums.

7. It is generally admitted, by all who are familiar with social statistics, that every active individual of mature age and in good health is worth to the State, as a producer, $1,000.

After alluding to the many means for preventing the spread of contagions, the doctor says:

It is proper to call especial attention to one point which is sometimes carelessly guarded, and that is the make-believe disinfection that is frequently permitted. I refer to that sort of disinfection that does not disinfect; to that kind of protective display which is worse than useless, as it gives a false sense of security which is most dangerous.



Some time since I had occasion to speak to a physician in reference to the necessity of thorough disinfection in a case of scarlet fever, not only as important for the protection of others, but also as being beneficial to the patient, who was certainly injured by continued breathing of a poisoned atmosphere. I was assured it had all been attended to. When I had inquired in what way, I was informed that chloride of lime had been provided. Upon further inquiry I found that one pound of chloride of lime had done duty as a sort of apologetic disinfectant for nearly a week, and the box was not yet quite empty. What sort of child's play was that; and how could anybody be benefited or protected by such methods? And yet that physician stands well in the profession, and is a gentleman for whom, in other matters, I have much respect. Why if the germs of that disease were visible entities, and could appreciate a joke, we should be more likely to find that they had injured themselves laughing at such futile efforts for their suppression than as having been seriously affected by anything that well-meaning gentleman had done to destroy them.

In urging that the people must co-operate, the speaker added:

To do this effectually and intelligently they must be educated at least in the elementary principles affecting private and public sanitation, and, as previously stated, in this way the family physician can accomplish most useful results. When speaking on this subject Lord Derby, of England, said: "No sanitary improvements worth the name will be effective, whatever acts you pass, or whatever power you confer upon public officers, unless you create an intelligent interest in the matter among the people at large. The State may issue directions, municipal authorities may execute to the best of their power, inspectors may travel about, medical authorities may draw up reports, but you cannot make a population cleanly or healthy against their will, or without their intelligent co-operation."

Since Lord Derby expressed himself thus in England, the people there have advanced rapidly in sanitary education, and the results have been a very decided diminution in the rate of mortality. In this country our people are just fairly awakening to the importance of preventive methods, and the necessity of encouragement and co-operation in all reasonable efforts for improvement. Medical men should be—nay, they *must* be—amongst the leaders in this movement. The time is not far distant when it will be considered a disgrace to a physician not to be as thoroughly conversant with, and actively

interested in all matters essential to the prevention of disease as to its proper treatment. The people are rising to a higher plane in regard to their every-day life and its surroundings. They are beginning to expect, and in time they will demand, from those whose opportunities have enabled them to observe and study the conditions of their fellow-men, that they shall be among the leaders in this movement for the amelioration of the ills of life; and the time is not far distant when not only physicians but also law-makers and interpreters of the laws will understand (and they already begin to realize the fact) that the people require not only punishment of crime and cure of disease, but also, and primarily, the prevention of crime and disease. And they will insist on protection, not only of property and life from violence, but also all possible protection from the unseen, but none the less dangerous, causes of disease and death.

Great reforms have seldom paid in a money way or in popular appreciation in the beginning. They usually start slowly, hesitatingly, and advance with great difficulty. But if the reform is genuine and really needed, it goes moving onward, constantly increasing in volume and force. And this is the case with sanitary reform. It is not a new movement by any means, but it has, within the past few years, been making rapid advancement in this country, and its success means the prevention of a large percentage of unnecessary suffering and mortality, the prolongation of human life; making that life more useful, more active, more vigorous, more worth living. As each citizen helps to form the mass of people constituting the State, so by improving the individual we benefit the State in all its relations. Make individuals healthier, happier, cleaner, better in any way, physically, mentally or morally, and you inevitably elevate the State, and by beginning at the bottom raise the whole social structure to a higher, nobler, better standard. And it is safe to say that any movement which has such an object in view should receive, and will receive, the indorsement and hearty co-operation of every thinking, right feeling man and woman in the community.

[This address has been published in pamphlet form, at the request of the officers of the Association].

Speaker Armstrong, of the Assembly, being present, was invited to sit as a corresponding member.



Prof. James M. Green, of Long Branch, then presented the report of the committee on "School-House Inspection and Teaching of School Hygiene." Prof. Green prefaced the report with a suitable allusion to the death of Prof. George H. Barton, a member of the committee.

The following are extracts from the report:

It is a just cause for congratulation here, that the sentiment to which this Association is pledged—intelligent care for the health of the people—is spreading, and is reaching the guardians of the children. Everywhere there are signs of awakening. Our State Teachers' Association has taken up the subject, Monmouth County's Teachers' Institute has devoted a period to it, and institutes elsewhere are falling in line. "The morning cometh."

The first part of our subject we shall interpret to mean the securing of the proper sanitary conditions in our school-rooms.

Two of the greatest evils to be overcome, in the advancement of our cause, is the selection of improper sites for school-buildings, and the adoption of improper plans for said buildings.

It is not uncommon to find the rural school-building on a vacant piece of meadow-land, or on the springy ground at the foot of a hill, under the shade of the overhanging trees, with no system of drainage. The remedy lies in a proper supervision of the selection of a building site, and of the plans for a building. This supervision should be exercised by the State Superintendent of Public Instruction, aided by the County Superintendents.

There are, on an average, thirty new school-houses built per year; therefore, the task of supervising their structure, and the selection of their sites, would not be heavy.

The lot accepted, the plans for the building should be submitted to the office of the State Superintendent for inspection, either by the Superintendent or a competent architect under his direction, with reference to ornamentation; height of ceiling; cubic feet of air capacity provided per pupil; number, size and location of windows; placing of seats and blackboards with regard to the admission of light; location of heating apparatus; ventilators, both for pure and impure air; closets; wardrobes; the various grades, with reference to climbing stairs, etc.

The above conditions complied with, the proper care of the school-room is made easy.

A *sine qua non* to the proper care of a school-room is a proper

knowledge of sanitary conditions. This knowledge must be possessed by the teacher.

A circular containing the necessary criteria for the proper care of a school-room should be prepared by our State Board of Health, or some other competent authority, and become the property of every teacher in the State, and thereafter a knowledge of such criteria should be a requisite for any certificate of license to teach. I prefer a circular to a text-book. The text-books are good for theories, but experience shows that too often these theories lie dormant in the mind of their possessor. Besides it is not general information that is needed. That is abroad. What we want is explicit instruction and direction. For instance: on entering the school-room the teacher should not wait for the air to become impure before providing for its change, but he should see that provision is made for a constant ingress of at least thirty cubic feet of air per minute per pupil, and for the egress of a like amount. He should not place over-confidence in the artificial means of ventilation provided, but should supplement it with the windows and doors. Drafts should be avoided; in order to accomplish this it is necessary to study the air currents in the room. They should be tested by holding the handkerchief or a lighted candle near the floor, then the ceiling, at various parts of the room, also at the mouths of the various pure and foul-air ducts, to see if they are doing the desired work at that particular time. The thermometer should be consulted at the close of each period to see that the temperature of the room varies but little from 68° Fahr. The thermometer should be hung in different parts of the room, or, what is better, two or three thermometers should be used to see that the temperature of the room at the level of the pupils is even.

These, and various other detailed data as this, once fully in the hands of the teachers, and there is no class of persons on earth more conscientious or faithful than they would be in putting it to its best use. Add to this a proper knowledge of sanitary conditions on the part of the doctors who enter our homes and are consulted by our people and we would have a veritable sanitary millennium.

The way to teach school hygiene is to teach it. By this we mean, teach it as you would teach anything else. Enunciate the theory, then reduce it to practice.

We are not here to discourse on methods of teaching, but we will venture the assertion that any knowledge brought to the attention of



the pupil that is not required to be practiced till it becomes a very part of himself, is of little value. I am of the opinion that just here is the error in the teaching of physiology and hygiene in some of our higher institutions of learning. The information is rushed to the attention of the student in such quantities that his mental impressions are either not reproducible or lie in the chambers of the mind in such confused masses as never to come forth in systematic form.

The pupils should be taught the efficacy of cleanliness, and this should be supplemented by a wash-basin, brush, comb, towel, door-mats, blacking-brush. Lessons should be given on the teeth and their proper care, the eyes and how to use them, the lungs and their proper care. Under this heading should be taught the importance of ventilation in every way the subject can be made impressive.

Lessons should be given on the proper position in sitting or standing or walking. These lessons should be supplemented by calisthenics, such as marching and performing certain movements that call in play the different muscles, meanwhile naming these muscles. The games should be supervised. Behind the sports of the recess should be the directing though unseen hand of the teacher, suggesting amusements that, while they do not violate cleanliness or gentility, do stimulate to activity. Lessons should be given on the use and abuse of the digestive organs, how to eat, what to eat, and what not to eat.

Some of the circulars issued by the State Board of Health have been used as texts with excellent results in some of the classes of our schools. Much more than we have space to express can be done in this line. The text-book on physiology and hygiene has its place in our schools, usually found in our higher classes, but we wish to emphasize the fact that the kind of lessons to which we have referred should reach every pupil in the school, from the highest to the lowest.

In closing this report we wish to add that the key to the practice of sanitary measures lies in the dissemination of knowledge on the subject. The people will hasten to their practice, for the reward, like life, is sweet. In this dissemination of knowledge every available means should be used. The Board of Health is doing a good work. The circulars it is sending out, and the questions it is asking the teachers and the people, will set them to thinking. But there is no more available means for hastening this work than the use of the schools by the authorities in the manner above indicated. In this way all new buildings will be best cared for, and the simpler principles of sanitation

will come to be understood by every teacher in the State and taught to all the children in the schools, and the children will tell their parents.

The discussion of the report was opened by Prof. J. Madison Watson, of Elizabeth. He referred to the good work done by the State Board of Health in sending out blanks for reports in reference to the sanitary condition of the schools, and also to the State Superintendent for the interest he has taken in the matter. The site of lots for schools is very important. We ought to have model school buildings to answer perfect sanitary conditions. They should be constructed so that plenty of light is secured, blackboards and desks should be in good position for light, the ventilation should be as perfect as possible. In reference to the teaching of hygiene, anatomy and physiology he said they should be taught, but not as a mere theory. They should be taught practically, as well as giving the scholars drill and suitable exercises or physical training. He would also teach the effects of intoxicants, as the most practical of temperance methods, as well as a question of dietetics.

Hon. E. O. Chapman, State Superintendent, spoke of the necessity of sanitary inspection of our school-houses and premises. He had been astonished that parents would permit their children to be subjected to bad hygienic influences in some of our schools, such as they would not tolerate in their houses. There was too much of that conservatism which argues that what was good enough for our fathers and for us, is good enough for the children to-day. He was glad of the decided progress that has been made during the past few years. Our buildings are much better than formerly, especially in their sanitary conditions, and the public are slowly becoming more interested in these matters. Our teachers are being taught the laws of health. Every pupil in our Normal School is now to receive one year's instruction in the laws of health, so as to give them to understand how to care for the health of the children who will be placed under their care. The State Department should probably have more supervision of the schools in our cities; especially should the building sites and buildings be approved by the State Department. In correcting bad sanitary conditions he had noticed one thing, that the sending out of the blanks for reports had done much good; in some instances the evil was corrected before the report was sent in. An expert examination, he thought, should be made of all our school-houses.



Mr. T. H. McCann, C.E., of Hoboken, spoke of the importance of the thorough inspection of schools, especially in our cities, because they were more crowded than in the country and small towns. The need was in many places the greater because of the incompetence of trustees or boards in matters pertaining to sanitation.

Prof. Green said that many teachers were thoroughly instructed in the theory of physiology and of hygiene, but what they needed was a clear detailed circular from our State Board of Health, giving hints as to the practical ways of applying the knowledge they have acquired from books, also how to ventilate the school-room. Then we need authority in supervision that will compel incompetent local trustees or boards to comply with hygienic or sanitary laws or requirements.

James Owen, C.E., heartily indorsed supervision, by the State Department of Education, in the construction of school-houses. He thought the subject of ventilation one on which we are in great need of information.

Prof. Watson thought that the local Inspector should inspect the school building once a month, and he thought we should have laws requiring the inspection of private as well as of public schools.

Dr. I. P. Davis thought the people had too much confidence in the sanitary skill of the teachers, and, consequently, did not, as they should, investigate as to the sanitary surroundings of the schools their children attended.

Dr. Newton said that Paterson was short of school accommodation for at least 1,000 of her children. They had but $15,000 to spend for buildings, and so had to economize in their construction. The money consideration became thus more important than sanitary requirements with the school authorities, and so you will hear it said "Let us cut out the ventilation, that will save so much." He thought in teaching hygiene we needed, more than anything else, a good text-book on personal care of health. One of the best books he had seen was "Parkes' Personal Care of Health."

C. P. Bassett, C.E., did not think that the people were alive to the importance of this subject. In reference to ventilation, professional advice from competent experts is needed. He gave some amusing incidents of ill-advised attempts in ventilating school-houses.

At the opening of the morning session F. C. Lowthorp occupied a few minutes in speaking on the use of earth-closets instead of ordinary

water-closets. He showed a plan of such a closet, and alluded to the satisfactory use of them for several years past.

Dr. Joseph H. Raymond, of Brooklyn, delivered an interesting address on "The Collection and Removal of Garbage, and the Final Disposition to be made of it."

The speaker said that unless it was disposed of it would find its way to cellars, back yards or vacant lots. As to the method of its disposition, the subject was divided under four heads:

1. Removal to sea and its deposit there.
2. Removal by land or water and fed to animals.
3. Removal to a proper place and burned.
4. Disposition of the garbage within the house of the individual.

We must adopt one of the four plans, or a combination of them. The action taken will depend upon the kind of a town or place it is—whether a seaport or inland town—and also upon the amount of the appropriation for the purpose.

In speaking of the removal from the house, Dr. Raymond said that the nuisances connected with the retention of garbage are due to the sort of receptacle used. He thought that the only proper vessel for such use is a galvanized iron pail, furnished with a tight cover. It is a matter of importance whether a proper vessel is provided or not. With ordinary vessels we have within a very few hours after the collection of the garbage, offensive odors. This is especially the case in the summer season. The iron pails can be kept anywhere in the house, being perfectly tight. The removal must be by either the municipality itself or by a contractor. The work of the latter is not at all satisfactory. He has no idea of the sanitary difficulties in the way. It never occurs to him that he has an interest in the public health. He looks, perhaps, strictly to the performance of the terms of his contract, but he exercises no discretion, and there is much about his proceedings to find fault with. It is essential that the municipality should do the work, and that a proper method be devised for doing it. Dr. Raymond referred to the excellent plan in vogue in Boston, where the men are carefully selected. Then they are kept in their positions, and look upon it as a life business, some having been employed twenty or thirty years. Of course politics did not, and should not, enter into the matter of appointments.

Having the right men, the question to consider next is the outfit or plant. The speaker said his own preference was the employment of



barrels placed on wagons. The wagon plan without barrels is expensive. Such vehicles are made of seasoned material, and perfectly tight, and cost about $250 apiece. The barrel plan is inexpensive. Ordinary kerosene oil barrels will answer. They can be purchased and rendered serviceable for about $2.50 each, and six or eight of them will do the work of a cart. The barrel system has many advantages over the other. If a wagon leaks, the trouble cannot be remedied until the wagon has arrived at its destination. If barrels are used and they leak, the garbage can be instantly transferred to other barrels. In filling wagons the bulk of the waste is exposed; in filling barrels but little need be exposed, and the nuisance ordinarily created is reduced to a minimum. And still another advantage of the barrel plan is, that they can be readily handled. Referring to the method of removing garbage by sea, Dr. Raymond said the greatest difficulty has been to keep garbage intact on the vessel until the dumping ground was reached. The garbage, owing to the shallowness of the boats, drops into the water and floats back upon the shores. New York, Brooklyn and Boston have now deep boats, and the trouble in question has ceased. This form of boat, known as the "Barney boat," dumps from the bottom.

The plan of removing garbage by boats, cars or wagons, to a place where it can be fed to animals, has this advantage—that there is a return in money for the garbage, which assists in paying for the expense of its collection. This system obtains in Boston, where they get enough money to pay about one-half the expense. Farmers buy the refuse and feed it to animals. Dr. Raymond explained that he did not mean ruminating animals. Such animals so fed have white meat, which looks very nice, but it is watery and innutritious. Pigs alone should be fed garbage. It makes excellent pork. The speaker said he believed that a city having the proper facilities could, by this plan, in a few years manage to derive a sufficiently large revenue to pay the whole expense of collecting the garbage.

The speaker, referring to the plan of cremating the garbage by cities, said that no machine to carry out this idea had yet been invented. The great cities of the country were waiting for such a machine.

Under the head of "Disposition of the Garbage within the House by Burning," Dr. Raymond said that this was the custom at his own home, and in those of many others. Potato peelings, &c., are thrown into the range and quickly consumed. The question is, whether it is

a practical thing for cities and towns without strict official supervision. As in Brooklyn he knew of at least a thousand persons who cremated their garbage, he concluded that it was a feasible plan for cities.

Several members availed themselves of the opportunity to ask questions, and in reply Dr. Raymond stated:

There are patent garbage burners, some of which are very good, [specifying some of them.] In reference to mixing of garbage with ashes there is no satisfactory methods for removal. They are too apt to deposit it on vacant lots. In reference to bones and entrails of fowls, he always burned them as other garbage. Watermelon and other rinds are difficult to get rid of, but the garbage burner placed over the fire is the best he knew of. The floating back on the surface of the water of garbage thrown into the sea, had formerly been much complained of in New York and Brooklyn, but since the Barney dumping boat had been used there had been very little complaint.

Dr. Raymond's remarks provoked a very interesting discussion of the whole subject, in which Drs. Godfrey, Davis, Quimby, Hunt and Benjamin, as well as Rev. Mr. Ballard and Engineers Owen and Bassett, took part.

Dr. E. L. B. Godfrey, of Camden, who opened the discussion on the address, thought that Dr. Raymond's address had been so able and exhaustive that he need say but little. He thought that the great trouble in our State was that the removal of garbage was done more from the financial than the sanitary point of view. Tight garbage cans should be used and the garbage so collected should be removed in summer every day or two, at other times once or twice a week. He regarded the deposit of garbage on vacant lots as exceedingly reprehensible, on account of the disease arising in the neighborhood where it was so deposited. Burning, in his opinion, was the only true and safe way of finally disposing of garbage.

Dr. Hunt thought that Dr. Raymond had admirably presented the subject. He thought there should be some method of preventing the mixing of garbage and ashes. The authorities should refuse to remove it when so mixed. He spoke of the method of burning, as he had seen it in operation abroad. In Glasgow, especially, it was entirely successful, being first assorted; bottles, rubbers, &c., are first taken out, the remainder burned in their crematories.

Dr. Benjamin asked, what objection can there be to the use of garbage for fertilizing purposes? The assorters are exposed to the deleterious influences of garbage, and yet did not seem to suffer seriously from the exposure. He had seen bad effects of cattle feeding on garbage; it had occasioned disease through the milk-supply.



Rev. Mr. Ballard said they had tried in Ocean Grove the plan of having farmers remove the garbage, but it was carelessly done. They came for it when it suited their convenience. He knew of one case where 200 pigs died as the result of feeding on garbage.

Dr. Davis spoke of his experience in feeding pigs on the garbage of his house. He thus got rid of the garbage and pigs seemed to thrive upon it.

Dr. Raymond strongly advised that garbage in cities should be removed three times a week regularly, the year round, if kept in safely-covered vessels. It keeps up the system of regularity in removal.

The reports of the State and local Boards of Health were next received.

Dr. Hunt, speaking for the State Board, said that the last year was one of the most successful in its history. Great progress had been made in sanitary science and legislation, and the powers of the Boards had been extended to such a degree that under them many reforms are being effected. In cases where the powers of Boards to abate nuisances, etc., have been questioned, the courts have rendered decisions in their favor. These decisions have done much to create public sentiment in favor of the work. He briefly alluded to the methods of work pursued by the State Board, and illustrated instances where great good had been accomplished. He praised particularly the inspection law, which authorizes the appointment of Sanitary Inspectors in all towns of over 2,000 inhabitants. Many Inspectors have already been appointed and are doing good work. The Board has felt the importance of the inspection of schools, houses and premises, and blanks, with instructions as to methods of inspection, issued by the Board, had already done much good. He spoke also of progress made in the prevention of disease, and also in the arrest of its spread.

Dr. Benjamin, of Camden, reported decided improvement in the efficiency of their Board of Health, recently re-organized under the State laws. Improvement in the water-supply is greatly needed. Garbage is better cared for. The appointment of the present Sanitary Inspector was a good one, and promises good results.

Mr. Williams, Cape May City, reported progress in the rules and measures adopted. The burning of garbage had not worked well with them; opposition has been aroused by the stench arising from the burning. Hence the question as to the disposal of garbage was with them an important one. The piggeries where it had been used had become a nuisance, and so they had to go.

Dr. McCrea, Inspector for Cape May county, reported every district in the county has now a Board of Health.

Dr. Wallace, of Newark, reported very decided progress in that city; several ordinances have been passed which have made important changes, and their enforcement promises great improvement in the sanitary condition of Newark. The death-rate was 26.21, which was exceedingly high, and demonstrated the need of an efficient Board of Health. He spoke of the tenement-houses and the large number of persons crowded in some of them.

Dr. Hunt called attention to the fact that the last census was the best ever taken in New Jersey, giving not only the population, but also the number of houses in the cities, and the number of persons living in the houses.

Mr. James Owen, C.E., Inspector of Essex county, reported every locality in Essex, but one township, has now an efficient Board of Health, and there had been great improvement in the sanitary condition of the county.

Dr. Saltonstall, Inspector of Hudson county, reported progress during the year, and that, in spite of obstacles that had been thrown in their way. Garbage and ashes were mixed, the removal of which had been left to more or less careless contractors. He had been compelled to secure an indictment by the Grand Jury against Jersey City for the defective sewers which deposited a large amount of sewage on the meadows. In Hoboken there is no Health Board, and they refuse to have one, but they have a Health Committee. The objection is that they have no money. He had suggested a crematory in the county for garbage, but the objection again was, no money. The water-supply from the Passaic and Hackensack rivers is plentiful, but, as to its purity, was not what it should be. They need very much a system of filtration. He thought that power should be vested in our Boards to determine as to the safety of foundations upon which buildings are to be erected. The death-rate of Jersey City is about twenty-three, which was larger than it should be.



Dr. Quimby thought the sewers of Jersey City were not large enough. That the Passaic water was fairly good.

Dr. C. B. Brush, C.E., of Hoboken, said the death-rate has fallen 6 in 1,000 since the introduction of the Hackensack river water.

Dr. Saltonstall insisted on the great need of filtration, even if the purity of the water was open to question.

It being about time to adjourn for the noon recess, the calling of the counties was suspended. The following resolution, offered by the Hon. E. O. Chapman, was unanimously adopted:

*Resolved*, That the Committee on Legislation be instructed to consider the advisability of a statute which will place the potable waters of the State under the care and protection of a State Board of Commissioners, and, if the committee deem it advisable, that they be requested to prepare and present to the Legislature a bill for that purpose.

Dr. Mitchell offered the following:

*Resolved*, That a committee of three be appointed to prepare for presentation to the Legislature a bill which shall provide for the safe construction of dwellings and especially of house drainage. Also to prepare and present a supplement to Chapter LXXX., Laws of 1885, respecting the cutting and sale of ice in cities and towns, to cause the provisions of said act to apply to all parts of the State.

This resolution and all other matters pertaining to legislation were referred with power to the Standing Committee on Legislation to be appointed by the Chair.

The President then introduced Prof. Rudolph Hering, C. and S.E., of Philadelphia, who read a very able and instructive paper, which is to be found in the present report. It was followed by a paper by the State Geologist, George H. Cook, of New Brunswick, on the "Value of Bored Wells for Domestic Use in Different Parts of New Jersey." [The paper will be found in full in the report of the State Geologist for this year.]

Prof. Charles McMillan, C.E., of Princeton, opened the discussion on Prof. Hering's paper. After expressing the opinion that the thoroughness of the paper left little for him to add, he said that when we speak of ventilating sewers the public should be taught that it is not the gases themselves that are so destructive to health and life, but

the germs or active agents which they carry. He also spoke on the subject of siphonage in traps, calling attention to one of the difficulties we meet with in manufacturers compelling the introduction of expensive traps when cheaper ones answer as well and in some cases much better.

Civil Engineer Brush and Dr. Hunt continued the discussion.

Civil Engineers L. B. Ward, James Owen and C. P. Bassett spoke on Prof. Cook's paper.

The following resolution was offered by Dr. Quimby:

*Resolved,* That the scourge of small pox in Canada is a sad result of the too-prevalent neglect of vaccination through ignorance or prejudice; therefore, we urge upon parents, physicians and school boards strenuous efforts to secure a more general system of vaccination.

Adopted.

Resolutions of condolence were adopted as to the death of the Rev. William Harris, of Princeton, and of Prof. George H. Barton, of Jersey City, both of whom were active members of the Association.

The Association elected Prof. James M. Green, of Long Branch, as its president, and various other officers.

Upon motion the annual meeting adjourned *sine die*, the general expression of the members being that it was the best of the series of meetings that the Association had held.

# REPORT AS TO JAILS, PENITENTIARIES AND PRISONS, ALMSHOUSES AND ASYLUMS.

BY THE SECRETARY.

By section first of the act to be found Chapter CLXV., Laws of 1882, it was made a part of the service of the Board to visit charitable and penal institutions with the especial object of inquiring into their sanitary condition, and that of their inmates. With this class of our population, such an inquiry is almost inseparable from some inquiry into institutional methods and the management, since upon these their sanitary condition is chiefly dependent. On behalf of the State, there needs to be greater recognition of how large a class of population is included in these various institutions, and of how great an influence these exercise upon health, upon social conditions and upon our general prosperity. Besides the constant expenses of general sickness and ill health, we have witnessed at least three epidemics, owing to local conditions, one in an asylum, one in an almshouse and one in a reform school, which have cost in the aggregate about forty thousand dollars. This, however, is but a small item in the aggregate of expenditure. The average number in the asylums of the State is about two thousand inmates. "The local governments of our State provide for the support of not less than sixteen thousand in and out of door paupers, exclusive of indigent insane and vagrants or tramps." The cost of maintenance is over $443,000.

The entire cost to the State of maintenance of dependents in asylums and of paupers, is stated by the able report of the Bureau of Statistics and Industries (1883) as not less than $783,000. If we add to this the cost of buildings and the dependent families often represented, the aggregate is in the millions. One to about every seventy of the population thus dependent is an item needing very careful inquiry. All the more because of this number so many are

found to be suffering from avoidable ill health or to have been subjected to unsanitary conditions.

If we turn to the jails and penitentiaries we find the returns for the same year to be of over fourteen thousand inmates. Although many of these are recommitments, and so there are not so many persons, yet this large number gives an approximate idea of the actual count. Indeed the fact that there is such constant and frequent rotation between the jail or penitentiary and the outer world, makes the sanitary and social relations of this jail population fraught with still more weighty import for the people at large. The same may be said to some degree of the State Prison with its over eight hundred additional inmates. The report above referred to puts the total yearly cost of crime at $1,150,000, not including buildings. After a careful examination of these figures, and after a comparative study of those of some other States, we are within the bounds of caution when we place our whole number of dependent and penal population as represented in State and county institutions at over thirty thousand, or one to about every forty of our population. The yearly expense of maintenance is about $1,943,000. This includes none of the large incidental outside expenses, and so includes none of the expenses of courts and trials, and of the cities and counties in protecting the people against the criminal classes. There is millions in it. These are expenses that cannot be reckoned by any usual per capita. In the economies of the State, and all that relates to political economy and social and industrial welfare, this multitude has never been studied with that particularity and that consideration of public health and welfare which is demanded. Strange that so vital a concern should be so often regarded as only a respectable philanthropy.

Upon this Board first devolved the duty of some inquiry into this population in the interests of health, and of society.

The Bureau of Labor and Statistics was naturally drawn to the study by its intimate bearing on the labor and industrial interests of the State. From time to time citizens interested and well-informed in public affairs, have felt the gravity of the situation, and have, through pen and press, urged to greater attention on the part of the State. A Council of Charities and Correction has been formed in response to some awakened public interest. But it has not yet been able to operate to a degree sufficient to inaugurate a comprehensive system of improvement, prevention or relief. The statesman, not less



than the political economist, the sanitarian and the philanthropist must see that it is very wise for us to grapple with a problem which has so perplexed older countries, and which is already having too many sad or perilous solutions in our own State. Our asylums will continue to be overcrowded and to appeal for enlargement, unless, on the one hand, we can diminish the causes of mental imperfection, and on the other provide for a class of the afflicted without the appointments of a hospital, and of wards for treatment and restraint, and more fully substitute in their stead the healthful discipline of systematic employment.

Our almshouses will continue to fill, and entail upon us organized pauperism, unless there is an entire change in classification and discipline, and unless the pauper children are so separated and placed as to be trained out of this kind of dependency, instead of into it, and unless conditions of health are more fully studied and arranged for.

Our jails will continue to furnish material for disorder, disease and crime, more than they contribute to restraint, so long as they are made the rendezvous for promiscuous congregations of criminals of all grades and ages, together with disorderly or suspected persons, drunkards, tramps, vagrants, temporarily insane persons and witnesses. If to any the peril to the public health seems small, it is only so because the peril to public morals, to public thrift, and to public order is greater.

In visits to institutions we have been able to correct many defects, both such as were structural and such as had to do with the personnel of the inmates.

In our State institutions the facilities for sanitary care as to food, clothing, bathing, etc., are, in general, complete, and the discipline exact. The same may be said as to two or three of the county asylums; but in the others and in our county and town and city almshouses, there is, too frequently, a want of that system which secures clean bodies, clean outer as well as laundried clothing, and of that method of work and of classification which is essential to health. Often a bath-tub is not to be found, or its appointments are too incomplete to invite to its use. The overseer, while recognizing that clean floors, clean beds and good food are expected, as to all other matters seeks to commend himself by his economy. With no systematized oversight it so happens that here and there an overseer shows special tact for his work, and that the wife brings to bear her good training

in all the details of family care. While there are some such delightful exhibitions of correctness, it is not the rule, especially in the more crowded institutions. If one wishes to see what a bad system can do, he has only to visit the promiscuous crowds of the Hudson county almshouse, where children of all ages are being trained into pauperism, and those in charge are helpless to prevent it. On the other hand, the Newark City Home, at Verona, shows what can be done in relief. The entire pauper system of the various townships, cities and counties needs such regulation and restructure by legislative enactment, and such oversight from constituted authorities as would generally mitigate many of the evils which now exist. As to sanitary matters, it ought to be said that in some of the county houses many important improvements, as suggested by this Board, have been made. The sanitary condition of the State Prison is well guarded, and, with the exception of one building, is satisfactory.

## OUR JAILS.

It must be said of the entire jail system of the State, that it is favorable to disease and crime. In this respect it is no worse than that of some of the other States. The language of Mr. A. C. Wright, of the State Board of Charities and Reform of Wisconsin, is too applicable in this State:

"It is a shame to the civilization of the country that we still persist in putting so many prisoners into utterly unhealthy places. It is hard enough for persons accustomed to outdoor life to stay all the time indoors in enforced idleness, without having the air poisoned with noxious stenches, foul breath and dampness. Our jails are not much better in this respect than the English jails of Howard's time.

"If proper sanitary arrangements are needed for the physical health of prisoners, a proper classification is needed for the moral well-being of many of them. When prisoners are herded together without distinction of age or character, the jails become schools of crime and vice. The hardened offenders teach the young and comparatively innocent, or those arrested for the first time, lessons in the art of preying upon society, and of breaking jail, or of otherwise escaping punishment. Here in the long and weary hours of imprisonment many a tale of past adventure in crime is rehearsed, many a plan is laid for future crime, many a jail friendship is made which will hereafter ripen into comradeship in crime, and many a plan of escape is concocted. The young are taught that 'the world owes them a living,' and that it is not crime, but being caught in it, which is to be dreaded.



"Visiting a jail, you are liable to find mingled indiscriminately together (1) professional criminals waiting trial for state prison offenses; (2) non-professionals, who have committed some crime under temptation, but who do not live by crime; (3) innocent persons accused of crime; (4) insane persons; (5) persons sentenced to jail for petty offenses; (6) dirty tramps, sentenced as vagrants, or given lodging in the jail as a tramp hotel; (7) persons held as witnesses. In some counties the only place for a person who is sick and without money or friends is the jail. Boys are put in with men. All these persons are thrown together in enforced idleness. Their only labor in most jails is doing a few chores under the oversight of the jailer. Their only recreation consists in handling a greasy pack of cards, in telling low stories, or in looking at pictures with which the cell walls are often decorated. They rarely have any considerable amount or variety of reading matter.

"With few exceptions, prisoners sentenced to the county jail generally spend their time telling stories and playing cards. The easiest way for a lazy fellow to pass the winter is to steal something of small value, have a spree upon the proceeds, and then go to jail, where he is supported in idleness at the expense of the county. It is obvious that this is very poor economy, as well as an encouragement to petty crime to that part of the community who do not care for the name of being in jail. Such people ought not to be supported in idleness at the expense of the honest and industrious part of the community, and even if their work is not of very much value in itself, it is well worth while to keep them at work for its moral effect on themselves and others. Tramps especially flock to those jails where they are fed in idleness and shun the jails where they are treated to the labor test.

"The first thing a sheriff or jailer should do in taking possession of a jail should be to have a thorough house-cleaning, to get rid of all dirt and exterminate all vermin. He should have a house-cleaning as often as once a month thereafter, in addition to the daily sweeping and mopping. The beds should be filled with clean straw, which should be renewed frequently. Clean blankets should be given to each new prisoner, and they should be washed frequently. Clean white sheets and pillow-cases should be provided each week. The privy is usually the worst nuisance in the jail, which can be smelled at all seasons of the year, but especially in summer. No vault-privy ought to be allowed in a jail, and no sewerage unless properly flushed, as well as connected with running water. No cesspit should be connected with a jail. Unless the sewerage can be kept in good condition all the year round, it is better to use close-covered buckets emptied twice a day under guard."

There are but few of the inmates that have not the time and that could not profitably spend a half hour each day in bathing and the securement of personal cleanliness.

The discipline of a jail should be as complete as that of a prison. General assemblage is even more hazardous and more demoralizing here than in a prison. There are more reasons for separate confinement in jails than in prisons. It is admitted that on the first reception of arrested persons, and for short sentences, this is the desirable method. Where they are kept in corridors, it should be under military discipline, and without conversation.

There is no reason why tramps, drunken persons and those arrested for usual disorders, should be sent to the county jail.

If, by the provision of proper police stations, our jails could be delivered from these, it would at once simplify the management as to the rest. Prisoners could be placed with no more than two in a cell. Boys could always be separated. Persons detained as witnesses could have their own apartment. Labor could be systematized. Under such classification and discipline there would be less seeking of the jail for its social charms, and the ultimate expense to the counties would be lessened.

The report made by A. S. Meyrick to the Legislature of 1882, as our delegate to the National Conference of Charities and Correction, ought to be read yearly, by all interested in the care of population, and until some of the changes advocated in it are made.

The ordinary jail must at present be fitly described as a place of rendezvous for drunkards, tramps and vagrants of all ages and both sexes, to which are added a few deranged persons, and persons detained as witnesses, and a few who will be found to receive sentence to a penitentiary or a prison. Ill health, vice and crime are here aided.

In our jails every rule which, in prisons and in penitentiaries, has been found necessary for the discipline, punishment and possible reformation of criminals, is ignored. Instead of separate confinement or enforced silence or disciplinary work, the association is so promiscuous and so demoralizing as to have led Keeper Laverty, of the State Prison, after his long experience as sheriff and with jails, to speak of the "social charms of the jail."

By recurring again to the facts and statistics of the Labor Bureau, we find several facts to show how the health and welfare of the people at large is constantly affected by that of the unsettled jail population.



In an analysis of jail statistics from October 31st, 1882, to November 1st, 1883, we find the number in jails was 12,651, and the number in penitentiaries (Essex and Hudson counties) 1,967.

In the list of principal crimes and minor causes of imprisonment, we find some particulars are given (Bureau of Labor and Statistics, Sixth Report, p. 359,) as to 7,245. Of these, 3,097 were in jail for being drunk, drunk and disorderly, and disorderly. In addition, 1,156 were there as tramps and vagrants, and 116 for breach of peace, which also is included in minor offenses, since assault, battery, etc., has a separate list. Abandonment, desertion of family and non-support number 44. Out of the 7,245 as to whom particulars are given, this shows 4,413 who do not belong to the class requiring all the bolts and bars of criminals. These make up a vagrant population which really often seeks the prison as a boarding-house and a place of congenial companionship.

Of the 7,245, only 1,046 were sent to the penitentiary, which means that they are kept for a period of from three to eighteen months, none being kept over the latter time; 479 go to State prison, of whom, on an average, over one-half are detained less than two years. Of the rest, 137 go to reform schools and six to asylums (*Ib.* Table p. 364).

At a single glance we get the information that the jails, as now used, are but *partially* places for the detention of criminals, and that, on an average, each jail sends forth upon the public its entire population in much less than one year. For the table on page 364 (*Ib.*) shows that 8,270 receive some form of sentence, of which 1,259 are for five days or less, 5,315 between five days and one month, 793 between one and two months, 655 between two and three months, 122 between three and four months, 18 between four and five months, 112 between five and twelve months, and but 86 over a year.

Of the 486 sent to the penitentiaries, only 180 are for over six months, and of these only 11 over one year. Thus the jail population forms a special army of extra-hazardous population, only being kept apart from the general public at odd times, during which too many receive special training for crime or dependency.

This brief statement of facts as to one year, a comparison with statistics in some other States and the testimony of other observers, we believe fully shows what is the usual average as to brevity of sentence and as to the number of vagrants and drunkards that make up the usual jail population. A still further analysis shows that about one-fourth have their first commitment. These at least ought

to be placed somewhere where cleanliness, orderly habits and moral influence ought to be attempted, since in foreign jails it is found that not a few of such are led to reform. These sad conditions are not found in the English and Scotch jails, most of which we have found similar to our prisons and under close discipline.

We need to be fully impressed with the fact that the jail population of the State is not a separate population. It is a horde of extra-hazardous population which, in numbers not far from 10,000 a year, is sent forth to prey upon the other citizens of the State in various spendthrift forms, such as crime, disorder, drunkenness, ill habits and dependency. A tramp lodged in Camden County Almshouse cost that county over $20,000. The expense to Camden city for small causes last year was over $6,000. The haunts where the jail population congregate are the haunts of disease, no less than of vice. But what we most complain of is that the jails themselves train their inmates in habits that tend to physical, mental and moral degeneration.

As at present used, however desirous the wardens and sheriffs may be to conduct the jail properly, they are helpless to do so. Lack of sanitary accommodations, the herding of the inmates in the corridors, and the want of discipline as to clothing, bathing, laundry, etc., as well as the social arrangements, tend to make our jails a constant menace to the public health, public morals and public order.

Nor are we at all original in asserting this. We have never talked with a warden or sheriff or jail overseer of any large jail who has not deplored the promiscuous use made of our jails, and argued the impossibility, under present methods, of securing proper cleanliness, separation and order. We have never known an attendant physician who has not felt that there is risk to the public health from such methods. We have talked with some of the judges of our courts, and do not know of one but that recognizes the ordinary crowded county jail as an evil to public health and morals, and as a school of crime. Within three years one of the judges of the Supreme Court adjourned the court because of the sanitary condition of the jail beneath the court-room, which, in his judgment, endangered the health of court and jury. We believe the time has come when our Legislature should pass a law to prevent our jails from being the common receptacles for all vagrancy, and secure them to be kept as places that shall not increase our physical or social risks.



Besides our personal visits to institutions, it is now made the duty of local Boards to visit, once a year, any public institution within their jurisdiction and examine into its sanitary condition. The effect of all such inquiry is to correct evils and to induce more exact attention to health matters. The Secretary has, the past year, made personal examination of several of the jails, almshouses, and public institutions of the State. We have found the managers of institutions ready to receive all suggestions made, and to act upon them, except where there is hesitancy on account of expense. The facts in evidence have, in many instances, led to important structural and administrative alterations. This Board will continue to co-operate with the State and local authorities in all that pertains to the health of premises, of buildings, and those committed to these institutions, as well as to such other concerns as incidentally have the most intimate relations to sanitary welfare. Reference for other facts and statements may be had to former reports of the Board, and especially to articles to be found in the Fourth (1880), the Sixth (1882), and Seventh (1883) Reports. But all will be only commendable patch-work until the law makes some radical change as to our jails, almshouses and smaller asylums, and thus seeks not only to improve these, but to diminish their influence in causing dependency and crime.

# PREVALENT DISEASES AND SPECIAL EPIDEMICS IN NEW JERSEY,

FROM JUNE, 1877, TO JUNE, 1885.

BY DAVID WARMAN, M.D.

"The sanitary reformer is not to wait for the advent of epidemical or preventable diseases. It is rather when a country is free from such that he can best work in removing or mitigating all those causes which act against the health of man."—*Stokes on State Medicine.*

Diseases, that is to say, ordinary diseases, those not arising from individual or constitutional causes, are usually divided into two classes—epidemic and endemic. The latter comprises those met with constantly in certain countries or localities; as, for instance, malarial diseases in the alluvial districts of temperate climates. Epidemics, on the other hand, are those peculiar affections which, springing up suddenly in some particular spot, spread over a certain portion of the habitable globe, and then disappear altogether.

After an interval of longer or shorter duration, they re-appear, prevail for a given period, and then subside, but only to repeat the same series of phenomena again and again, sometimes for centuries.

The object of the present paper is to place on record a short history of the epidemics, endemics and all preventable diseases that have occurred in the State of New Jersey for the last seven years, as compiled from the reports of the State Board of Health and the transactions of the State Medical Society, commencing with May, 1878, and ending May, 1885.

These accounts are very full from every portion of the State, but, owing to the long period of time covered by them, must necessarily comprise only a brief summary.

We have classified all the facts recorded as to any one county

together, so that whatever of importance has been stated as to communicable or preventable diseases for each year and in each county may be seen at a glance for the entire years. By referring to the tables of each year, as to the diseases in that county, comparisons can be made. These show how the same disease is more fatal at one period than another, and how great variations there are for the whole number of years in different localities. Where, for any one year, there has been nothing of special interest reported, no record is here repeated, but the tables in each report show the actual deaths.

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## ATLANTIC COUNTY.

### FOR THE YEAR ENDING JUNE, 1881.

The report for this year commences with the following words:

There is a strong sentiment prevailing in the direction of preventing disease by the institution of rigid sanitary inspection, and the establishment of "Boards of Health with increased if not ample executive power."

An epidemic of small-pox in the spring, embracing thirty cases, of which nine were fatal. Vaccination is believed to be an absolute protection, and the neglect of revaccination is regarded as the only cause of the presence of the disease. Rotheln prevailed in a mild form; also whooping-cough.

### FOR THE YEAR ENDING JUNE, 1883.

No epidemics except influenza, which seems to have been widespread. Only a few cases of typhoid fever were noticed.

In the village of Buena Vista a number of cases of diphtheria occurred. In a few localities measles and scarlet fever, of a mild form, prevailed.

### FOR THE YEAR ENDING JUNE, 1884.

A severe epidemic of dysentery visited Hammonton, New Germany and Elwood. Measles also prevailed epidemically. Rotheln was quite prevalent at Atlantic City during autumn and early winter. Hamilton township reports a large number of cases of typho-malarial fever. These were quite typical cases of typhoid fever, and several died—supposed to have been caused by impure water and the unusually low state of the streams, &c.

### FOR THE YEAR ENDING JUNE, 1885.

Measles, whooping-cough, scarlet fever and diphtheria were observed; also a few cases of genuine typhoid fever. The three diseases to which our attention has been attracted for the past year are malarial fever, diphtheria and typhoid fever.



## BERGEN COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

There is reported a mild form of scarlet fever during the months of May and June, as prevalent in Fort Lee, Englewood and Schraalenburgh.

Hackensack reports the prevalence of a mild form of diphtheria and scarlet fever.

In Tenafly an epidemic of gastro-enteric dysentery began in July. It extended to Englewood, and in the latter place and districts adjacent, during August and the fall months, dysentery of an asthenic type, with great depression of the nervous system, prevailed. All grades of society were affected to some degree, but it was more severe and fatal among the laboring classes. Some of the principal exciting causes were bad water in the dry season, and malaria consequent upon bad drainage. In families where the greatest number of fatal cases occurred, the diet was salt bacon and salted shad, but principally bacon of inferior quality and poorly cooked. It was, upon examination, found to contain trichina spiralis. Many cases assumed a typhoid type, and were, from the commencement, beyond the aid of medicine.

A mild epidemic of measles and whooping-cough prevailed at Closter; also measles and scarlet fever, and a few cases of diphtheria. Malarial fevers and influenza have been very prevalent all over the county.

### FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed as extensively as heretofore. An epidemic of influenza raged extensively throughout the county. Malignant scarlet fever prevailed at Schraalenburgh.

### FOR THE YEAR ENDING JUNE, 1880.

Nearly all grades of fevers have existed throughout the year, but chiefly intermittents. Measles and whooping-cough, and, in some localities, mumps, have abounded; in one district the two former ceasing because of lack of subjects.

### FOR THE YEAR ENDING JUNE, 1881.

Almost universal prevalence of measles during the months of May and June, followed by whooping-cough. In Union township malarial diseases are attributed to the lowness of the water and its poor quality. The same complaint is made at Saddle River and Midland townships.

At Palisades mild epidemics of measles and roseola, also an epidemic of dysentery, which seemed to be the outcome of malarial conditions.

### FOR THE YEAR ENDING JUNE, 1882.

Periodical fevers of all types prevailed throughout the year, and nearly all other diseases showed a marked tendency to periodicity. In some localities these fevers assumed a typhoid character; of scarlet fever but few cases occurred.

Follicular tonsilitis prevailed in and around Englewood in epidemic form. One case of small-pox is reported at Rutherford Park.

FOR THE YEAR ENDING JUNE, 1883.

The malarial fever was about as prevalent as usual. A large number of cases of typhoid fever are reported. Scarlet fever and diphtheria was quite prevalent—the disease, however, of mild type.

Malarial fevers always present during summer and autumn; but during the last few years it has been observed that they have been gradually decreasing, while fevers of a typhoid and typho-malarial character are taking their place. Scarlet fever and diphtheria have been occasionally met with. An epidemic of measles, with a peculiar eczematous eruption behind the ears, prevailed. Influenza and follicular sore throat were epidemic. The latter was conspicuous by its contagious character. Typho-malarial fever continued to an alarming extent at Englewood. This epidemic is stated to have originated from the use of impure water, with defective plumbing, during the season in which malaria is most prominent.

FOR THE YEAR ENDING JUNE, 1884.

There has been a marked decrease of malarial diseases during the year. Typhoid fevers were infrequent, and mild in character. Influenza prevailed less extensively during the winter months than usual. Diphtheria and scarlet fever were met with in several localities.

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## BURLINGTON COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

In Bordentown obstinate intermittent fever prevailed. In Burlington city malarial fever, which was so common ten years since, is now a rare disease. Its disappearance is attributed to the drainage of the surrounding low ground, and the filling up of the small ponds. In Moorestown diphtheria was epidemic, while a few cases appeared in surrounding neighborhoods. In Mount Holly scarlet fever, diphtheria and roseola have all prevailed in a marked form, but to a limited extent. The first case of diphtheria was clearly traceable to infection, having been conveyed by a child who had come from the house of a diptheritic patient to a Sunday-school, one mile distant.

FOR THE YEAR ENDING JUNE, 1879.

In Medford there was a severe epidemic of influenza, diphtheria and scarlet fever, not general in any place, but it has prevailed in most parts of the county. In one locality it assumed an aggravated form, and the reporter was disposed to charge the attacks to the use of filthy well-water in one case, and in others to the proximity of the dwelling to privy-vaults, pig-styes and cow-pens.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fever, which has not appeared for two years, again returned in August and September, caused, in the opinion of the reporter, by luxuriant vegetable growth. The only epidemics reported are those of mumps and pseudo diphtheritis—in Mount Holly.



FOR THE YEAR ENDING JUNE, 1881.

The report notices malarial fever as ubiquitous. Roseola has prevailed extensively. Scarlet fever has appeared occasionally of mild form. There have been a few cases of typhoid fever in some localities. The reporter from the county says: "The people are awakening to the importance of having their premises cleanly, and of arranging apparatus by which they can more effectually carry off refuse; thereby promoting the welfare of the public health—the community having learned to prize that boon more than riches."

FOR THE YEAR ENDING JUNE, 1882.

Periodic fevers were the principal fevers. Typhoid fever was less prevalent than usual.

FOR THE YEAR ENDING JUNE, 1883.

An epidemic of influenza began in May and ended in June. An epidemic of rotheln also occurred. The reporter says: "Diphtheria we have always with us, but never as an epidemic."

FOR THE YEAR ENDING JUNE, 1884.

The fevers were of the intermittent and continued forms. Typical typhoid was rarely observed. Mumps appeared epidemically throughout the county. Measles and whooping-cough occurred in many towns. Scarlet fever was rare and mild; only a few cases reported.

Diphtheria was met with at Mount Holly and Moorestown. At the former place it displayed a malignant character. Its origin was attributed to defective drainage. One case of confluent small-pox is reported.

FOR THE YEAR ENDING JUNE, 1885.

Much less of malarial fevers than is common, with only an occasional occurrence of typhoid fever. Scarlet fever appeared in Burlington in August, and again in the spring. Twenty-five per cent. of the cases proved fatal. Dr. Hall mentions as many as twenty-five cases of diphtheria in his practice. Measles, whooping-cough and influenza were observed in various localities during the winter. The only epidemic mentioned is that of ulcerated tonsilitis in the city of Burlington, which was very severe and lasted for three months.

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## CAMDEN COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Periodical fevers were common in Camden city during the first half of the year, and in some parts almost epidemic. In many localities the origin could be traced to excavations in unfavorable places.

In Haddonfield the only disease to employ the chief attention of medical men was the "never-failing though often-varying malarial fever."

Diphtheria was very prevalent throughout the city of Camden, with a large per-

centage of deaths. In Haddonfield an epidemic of diphtheria broke out, but was confined to an academy in the place. Twenty of forty-five scholars took the disease; two only died. In August diphtheria suddenly made its appearance in Atsion, a small village in the interior of the county. The contagion spread throughout the town. One fourth of the cases were of a malignant form.

Scarlatina of a mild type reported from various parts of the county.

FOR THE YEAR ENDING JUNE, 1879.

A tendency to periodic forms of disease. There has been a large increase of typhoid fever, with less of those of the intermittent and remittent form. Influenza visited the county in epidemic form. In Blackwoodtown intermittent and remittent fevers were endemic and some typhoid.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers have prevailed to an unusual extent in the upper part of the county, and in the city of Camden.

In the almshouse at Blackwoodtown the invasion was attributed to the excavations in moist ground, preparatory to new buildings for the institution. An endemic of typho-malarial fever is noticed as occurring in a circumscribed limit, with a mortality of eighteen per cent., supposed to have its origin in the use of putrescent manures from the slaughter-houses of Philadelphia. An epidemic of influenza is reported in Camden city, which lasted nearly all winter.

Measles and mumps have been endemic in Haddonfield, the latter occurring mostly among men, with frequent metastasis. Four cases of small-pox are reported—one in Delaware township, which occurred in a laborers' boarding-house, and three in Stockton township. They were all promptly attended to, houses fumigated, and vaccination performed. There was no further spread of the disease.

FOR THE YEAR ENDING JUNE, 1881.

Intermittent and remittent fevers have prevailed at all seasons of the year, with unusual severity. Every month of the year witnessed cases of diphtheria, except July and August. There has been more scarlet fever than usual, and some cases malignant and fatal. There was an extensive epidemic of rotheln. Measles, mumps and whooping cough have been prevalent, and a continual annual increase is apparent of typhoid fever. Small-pox prevailed to an alarming extent, there being in all 688 cases, and 134 deaths. An epidemic of typhus fever occurred in the county almshouse and hospital at Blackwoodtown, attributed to overcrowding, poor ventilation, &c.

FOR THE YEAR ENDING JUNE, 1882.

Periodical fevers have prevailed to a larger extent than ever before in all parts of the county. Typhoid fever has continued to harass the city of Camden. A peculiar epidemic of catarrh was also prevalent in the city of Camden, and in Winslow. Dr. Smith, of Gloucester City, reports numerous cases of diphtheria.

The report from Camden says, no epidemic but mumps. In Camden city typhoid fever prevailed to an unusual extent, but diphtheria and small-pox were almost absent. Scarlet fever prevailed as usual. Influenza was more prevalent than last year. Malarial fever not as frequent. In Gloucester City malarial fever prevailed throughout the year, while only a few cases of diphtheria were seen. There were more cases than usual of scarlet fever and measles. In Blackwoodtown scarlet fever, whooping-cough and mumps prevailed. Two cases of small-pox occurred.



FOR THE YEAR ENDING JUNE, 1883.

Malaria has been ever present. Typhoid fever, so general in former years, has been less frequent. Scarlet fever and diphtheria has been frequently met with, but of a mild form. Measles prevailed in some localities. There was a single case of small-pox in Stockton township.

FOR THE YEAR ENDING JUNE, 1884.

Malarial fevers prevalent all the year round, but much more easily brought under control than formerly. Typhoid fever has been less frequent. The average amount of scarlet fever, diphtheria and measles came under observation. In the autumn malignant diphtheria broke out in a school in Camden. The cause was attributed to drinking-water for the use of the children, which was obtained from a well located within fifteen feet of two large cesspools. A mortality of fifty per cent. closes the story of criminal neglect.

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## CAPE MAY COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Diphtheria is reported as one of the constant diseases since 1860; never passing a month without giving evidence of its presence, but generally confined to localities so circumscribed as to forfeit its epidemic character.

FOR THE YEAR ENDING JUNE, 1879.

Diphtheria still continues endemic.

FOR THE YEAR ENDING JUNE, 1880.

In the autumnal season the annual visitation of malarial fevers was not delayed. Whooping-cough amounted to an epidemic. Typhoid and typho-malarial fevers were quite prevalent during the winter; and some influenza.

FOR THE YEAR ENDING JUNE, 1881.

Malarial fevers have been too common during part of the year. Measles, whooping-cough and rotheln were prevalent, but not fatal.

FOR THE YEAR ENDING JUNE, 1882.

There has been a general immunity from epidemics of every kind. A few scattered cases of scarlet fever, diphtheria, chicken-pox, whooping-cough and mumps have occasionally appeared.

FOR THE YEAR ENDING JUNE, 1885.

The district is almost exempt from malarial diseases. Only a single case of diphtheria is reported to have occurred. Typhoid fever rarely seen. An epidemic of measles prevailed at Tuckahoe.

## CUMBERLAND COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

Measles, diphtheria, scarlet fever and typhoid fever. Measles prevailed epidemically in Bridgeton through the early part of winter; also through Deerfield and Hopewell townships. Vineland reports measles and diphtheria as prevailing epidemically, and suggests that local moisture in a stagnant form bears a close relation to the propagation of diphtheria.

The most striking feature in the medical history of the county, was the appearance of an epidemic of typhoid fever in a neighborhood lying between Fairton and Cedarville, a mile and a half in extent. A swamp had existed there which had been imperfectly drained, and during rainy seasons had encroached upon the surrounding farm lands. The land-owners decided to repair the existing partial drains, and thus gain to themselves much fertile lands. The rank vegetation left behind the completed drainage, was allowed to decay at leisure and became the recognized cause of the disease.

### FOR THE YEAR ENDING JUNE, 1879.

Influenza was the predominant affection during the winter months. It was epidemic throughout the whole section. Fevers have appeared, but in a limited degree. Intermittents, though occasionally observed, are rare in this district, as there is little malaria. In Vineland and Millville there are none in the technical sense of the term. There is a little scarlatina in a mild form. In some localities diphtheria has prevailed to a considerable degree.

### FOR THE YEAR ENDING JUNE, 1880.

In Bridgeton diphtheria and scarlet fever nearly approached an epidemic form. The latter disease has appeared in nearly every town in the county.

An epidemic of ulcerative sore throat is noticed as occurring in Fairton among the children of the primary department of the public school. The windows of the apartment opened toward the uncleanly and neglected water-closets, which were recognized as the cause of the disease. About thirty cases, all severe, with one death.

### FOR THE YEAR ENDING JUNE, 1881.

A greater amount of sickness of an epidemic and contagious character than for several years past. Diphtheria, scarlet fever, measles, mumps and whooping-cough prevailed extensively throughout the entire year. Malarial fevers have appeared occasionally. During the autumn and winter there was typhoid fever. Rotheln affected about one-third of the population.

### FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers prevailed to a considerable extent, and most other diseases showed a marked tendency to periodicity. In the opinion of the reporter the lowness of the streams and mill-ponds from the deficient rain-fall, with their surfaces stagnant and their borders exposed to the hot rays of the summer's sun, developed the requisite conditions for the production of the malarial poison. In Bridgeton city, diphtheria prevailed to an alarming extent. About thirty-two deaths occurred.



### FOR THE YEAR ENDING JUNE, 1883.

This entire district was pervaded by an epidemic of influenza. Diphtheria was observed only in Fairfield and Maurice River, and scarlet fever scarcely anywhere except Millville. Measles has prevailed extensively. Cases of periodical fevers were less numerous, and the same may be said of typhoid fever. Chicken-pox was epidemic.

### FOR THE YEAR ENDING JUNE, 1884.

Measles and mumps were the only noticeable epidemics. Typhoid fever moderate and about the same as previous years.

### FOR THE YEAR ENDING JUNE, 1885.

A remarkable freedom from epidemics of all kinds, save one, of membranous laryngitis, in the villages of Fairton and Cedarville. The mortality was as high as eighty per cent. Dr. Bateman attributes its origin to local causes. Fevers were unfrequent, and only an occasional case of typhoid fever was observed.

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## ESSEX COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

Malarial diseases have prevailed to a greater extent than has been known for a long period. Of the contagious and infectious diseases, measles alone have abounded. Influenza appears to have been prevalent in some parts of the county.

### FOR THE YEAR ENDING JUNE, 1879.

Malarial diseases have been more frequent than for several years. Influenza has been prevalent. Of the contagious diseases, measles have been the most common.

### FOR THE YEAR ENDING JUNE, 1880.

Malarial affections have been less frequent than in the last few years. An observer in Caldwell remarks upon four cases of follicular tonsilitis in a family of six children. The four sick ones drank of the water of a cistern in close contact with the leaky kitchen drain-pipe; the two healthy ones preferred to drink water from a well in the yard.

### FOR THE YEAR ENDING JUNE, 1881.

An increase of malarial fevers within its entire boundary. During the autumn and winter diphtheria held a conspicuous place on the mortuary records. Rotheln began in Newark during the winter and spread throughout the county. Small-pox existed in Newark and Orange to some extent, with only two deaths.

### FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers have prevailed as usual. Typhoid fever has been somewhat on the increase. Diphtheria and measles have prevailed to a moderate degree. Cases of

scarlet fever have been more numerous, and the death-rate decidedly higher than usual. Small-pox, which created so much alarm last year, has prevailed to nearly the same extent this year.

FOR THE YEAR ENDING JUNE, 1883.

An epidemic of measles and mumps. Scarlet fever has prevailed to a somewhat greater extent than usual, in Newark and Orange, but outside of these cities the cases have been few. Malarial disorders have prevailed as usual, although more severe and obstinate forms have been less common.

FOR THE YEAR ENDING JUNE, 1884.

Typhoid fever was of rare occurrence. Measles ran mildly through the families whose children attended the district school in the northern part of Montclair. There was much whooping cough in various parts. In Orange and Newark, diphtheria occurred during the winter, of marked malignancy, originating from local causes. The decrease of malarial diseases has been remarkable.

FOR THE YEAR ENDING JUNE, 1885.

Diphtheria, scarlet fever, measles and mumps have, chiefly, prevailed. Diphtheria and scarlet fever were endemic in Newark. The entire number of cases of diphtheria was 227, and deaths 65; 178 cases of scarlet fever, with 20 deaths. Much less malaria prevailed.

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## GLOUCESTER COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

No epidemic of a serious nature, though local epidemics, such as scarlet fever, measles, and whooping-cough, have occurred.

During the autumn there was a general malarial tendency to disease. There was a widespread epidemic of influenza, with numerous cases of bronchitis and pneumonia. The following diseases are reported as having been endemic, viz : Tonsilitis, mumps, measles, scarlet fever, and typho-malarial fever. Four cases of small-pox occurred in the township of Mantua. Prompt attention prevented the spread of the disease.

FOR THE YEAR ENDING JUNE, 1880.

Tonsilitis was reported as prevalent in Williamstown and Paulsboro. Measles and scarlet fever and typhoid fever in Williamstown and Mantua.

FOR THE YEAR ENDING JUNE, 1881.

Malarial fever is reported only at Swedesboro; Paulsboro and Mantua, small-pox and rotheln; typhoid fever and measles at Clayton.

FOR THE YEAR ENDING JUNE, 1882.

Eleven cases of small-pox at Glassboro, and it was found necessary to build a hospital. No deaths occurred from the disease. Isolation and vaccination prevented its



spread. The principal diseases reported are consumption and malaria. Both are very prevalent, and alarmingly on the increase. Glass blowing is thought to cause the consumption.

FOR THE YEAR ENDING JUNE, 1883.

Cases of malarial fever, although prevailing to a considerable extent, have not been so numerous as last year. What cases of typhoid fever have come under notice have been traceable to stagnant pools of water and incomplete drainage.

FOR THE YEAR ENDING JUNE, 1884.

No malignant epidemics have appeared anywhere. Mumps, measles and scarlet fever were occasionally observed. Malaria was present in every season throughout the year. Only a few cases of typhoid fever reported.

FOR THE YEAR ENDING JUNE, 1885.

Malaria has exerted its pernicious influence as ever before, and is felt in all the maladies that come under the physician's attention. No epidemics have prevailed of a malignant character, though local endemics, mild in their nature, have been exceedingly common. Only isolated cases of typhoid fever were observed anywhere in the district. Whooping-cough and chicken-pox prevailed extensively in the entire county.

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## HUDSON COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

There has been a predominance of malarial diseases. Epidemics have been absent, or of a very limited duration.

Diphtheria, which is never absent, has not presented any notable epidemic form.

FOR THE YEAR ENDING JUNE, 1879.

Scarlet fever has been the only epidemic. The death-rate from diphtheria has been lower than in any of the previous five years. Diseases of the air passages have been widespread, especially influenza.

FOR THE YEAR ENDING JUNE, 1880.

Vernal and autumnal influenza, supposed to be due to miasm, has been prevalent. Small-pox and varioloid were somewhat troublesome, but did not become epidemic till December. The number of cases of the former being about four hundred, with a death-rate of thirty-three per cent. Diphtheria and scarlet fever are named by the reporter as constant companions. Rotheln has been more abundant than usual.

FOR THE YEAR ENDING JUNE, 1881.

Healthy to a remarkable degree. No epidemics.

FOR THE YEAR ENDING JUNE, 1883.

Malarial fever continued to predominate. In the western part of this county an epidemic of bronchitis has prevailed, especially among children.

FOR THE YEAR ENDING JUNE, 1884.

The year has been remarkable for the general healthfulness of the people. A few cases of diphtheria, measles, scarlet fever and typhoid fever are reported. An outbreak of small-pox took place in Hoboken, in July. Prompt vaccination was enforced by the Health Board, and the disease quickly disappeared.

FOR THE YEAR ENDING JUNE, 1885.

Has been freer from malarial fevers than for several years past. Measles, diphtheria and typhoid fever were each observed less frequently. Scarlet fever was chiefly observed in Jersey City. The only cases of small-pox reported as having occurred in the State were at Union Hill, in April—two in number; one died.

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## HUNTERDON COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Hunterdon county has not experienced any tendency to epidemic or endemic disease, except in Lambertville and vicinity, where scarlatina and diphtheria have been more prevalent than for many years, and in a very severe form on the high ground of West Amwell, east of the city. The majority of all the cases died within three to ten days after invasion.

FOR THE YEAR ENDING JUNE, 1879.

Has been free from epidemics or any general severe disease, excepting only influenza, which has been quite general.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers have prevailed to a considerable extent along the Delaware river. There has been occasionally a case of diphtheria.

FOR THE YEAR ENDING JUNE, 1881.

Has experienced some severe epidemics. Malarial fevers have prevailed in all parts of the county, but especially along the line of the Delaware river. Scarlet fever, in all its forms, was the midwinter epidemic. There was much whooping-cough in the early spring. Measles prevailed extensively in May, June and July.

FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers were endemic during the entire year; even in the severest winter weather cases were seen. Typhoid fever prevailed to a considerable extent, especially in the Delaware valley. Scarlet fever, measles and whooping-cough were epidemic, but mild in form, causing but few deaths.



FOR THE YEAR ENDING JUNE, 1883.

Chicken-pox, mumps and measles have prevailed throughout the year. Scarlet fever and diphtheria were prevalent during the winter. Influenza was especially severe throughout the Redshale valley. Intermittent and remittent fever prevailed as usual in the valley of the Delaware, and the low lands along the South Branch. Of typhoid fever only a few cases were seen.

FOR THE YEAR ENDING JUNE, 1884.

Has experienced mild epidemics in nearly every section. A severe form of scarlet fever in the Musconetcong valley. Measles, whooping-cough and mumps were prevalent. Malarial fevers have been less in number than for years past. Three cases of typhoid fever occurred in one family. The cause was traced to a spring situated near the house: said spring being so located as to receive deleterious substances that emanated from pig-pen, barn-yard, &c. The use of the spring being abandoned, no further trouble ensued in the family.

FOR THE YEAR ENDING JUNE, 1885.

Measles were widespread in Lambertville in the summer, and at the same time a few scattered cases of scarlet fever. Only a few cases of typhoid fever were seen. Influenza and roseola were epidemic, while mumps annoyed many neighborhoods. Malaria is reported as subsiding.

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## MERCER COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

The city of Trenton has been visited with epidemics of diphtheria, scarlet fever, measles and whooping-cough. Diphtheria, quite malignant. Scarlet fever, mild. Measles assumed a severe type, and in some cases proved fatal. Typhoid fever was endemic during the autumn, and was generally traced to either polluted water or bad drainage. In some localities the disease was quite malignant; three or four dying from it in some families in rapid succession. Malarial fever has been more common in the city of Trenton and at Hightstown than for several previous years; associated with hemicrania of a periodical type.

FOR THE YEAR ENDING JUNE, 1879.

Trenton has experienced a large increase of malarial fevers. Influenza was protracted and severe. Diphtheria in a fatal form prevailed in the early part of spring. Erysipelas of the head and face the reporter classes among the epidemics of Trenton. He further says there has been an alarming increase of all zymotic diseases in the city of Trenton for the last ten years, owing entirely to bad sanitary conditions from want of sewerage.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers have prevailed to an extraordinary extent in Hightstown and East Windsor, the locality having been for many years free from anything of the sort. A

great deal of malaria has also prevailed in Ewing township; the direct cause is said to be Keeler's mill pond. Twenty-three families out of twenty-five have suffered more or less all summer—all living on or near this pond. Typhoid fever prevailed at Princeton during the months of April, May, June and July. There occurred in all about forty cases, and eight deaths.

FOR THE YEAR ENDING JUNE, 1881.

A few cases of small-pox, with only two deaths. Active vaccination prevented its spreading. Malaria has been quite prevalent in most portions.

FOR THE YEAR ENDING JUNE, 1882.

Small-pox has existed in portions of the county. In Trenton sixteen cases were reported, with a fatality of thirty-three per cent. Seven cases occurred in Pennington, all of which recovered. In Lawrenceville and Princeton it prevailed to a limited extent. In Trenton and Chambersburg typhoid fever was limited to a few localities. Measles of a malignant character prevailed at Hightstown, accompanied with hæmaturia. Malarial diseases have not been as prevalent as formerly.

FOR THE YEAR ENDING JUNE, 1883.

In Trenton and some of the surrounding towns, small-pox prevailed extensively. Malarial fever abounded. An epidemic of diphtheria, causing a number of deaths, occurred during the winter. Short epidemics of scarlet fever and measles, mostly of a mild type. An endemic of typhoid occurred in Chambersburg.

FOR THE YEAR ENDING JUNE, 1884.

Measles prevailed epidemically in South Trenton and Chambersburg. Diphtheria and scarlet fever occurred in the form of sporadic cases pretty much the entire year. Malarial fevers have been less prevalent. Mumps were general throughout the city of Trenton, complicated with orchitis.

FOR THE YEAR ENDING JUNE, 1885.

A local outbreak of diphtheria occurred near the State Lunatic Asylum. A number of cases were also met with, during the year, in Trenton. Sporadic cases of measles and scarlet fever in Titusville. Whooping-cough prevailed, to some extent, over the county.

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## MIDDLESEX COUNTY.

FOR THE YEAR ENDING JUNE, 1881.

The year has not been marked by any special epidemic influences. Some typhoid fever and a few cases of small-pox occurred in New Brunswick.

FOR THE YEAR ENDING JUNE, 1882.

In New Brunswick there were several cases of typhoid fever, which have been mostly attributed to the use of water taken from pumps. A few cases occurred near sewer basins. In Metuchen and Dunellen cases of diphtheria of marked malignancy



have occurred. Measles have been quite prevalent. Malarial diseases have not prevailed quite so extensively as last year. A few cases of small-pox have occurred. More attention than usual has been given to vaccination in all parts of the county.

FOR THE YEAR ENDING JUNE, 1883.

Epidemic diseases prevailed in different localities during the year. An epidemic of diphtheria of a severe type visited New Brunswick, Metuchen, Woodbridge and Perth Amboy. Scarlet fever has been more prevalent than any other communicable disease. A wide-spread epidemic of measles occurred in the whole of the river district of Raritan and Piscataway townships. Malarial fever has been very abundant throughout the entire year.

FOR THE YEAR ENDING JUNE, 1884.

Epidemics have been mild in character, except one of diphtheria, in New Brunswick. There have been a few cases of scarlet fever and whooping-cough. Malarial fevers have not decreased much.

FOR THE YEAR ENDING JUNE, 1885.

Typhoid fever of quite a severe type occurred in New Brunswick and Woodbridge. Diphtheria was also prevalent in New Brunswick. Measles were widely epidemic. Influenza prevailed everywhere throughout the winter months. Whooping-cough and scarlet fever were quite general also, but both were altogether of a mild character. Malarial fevers were met with to the usual extent.

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## MONMOUTH COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Suffered less by sickness than in former years. Two localities are excepted from this statement. At Point Pleasant diphtheria appeared in October, and was endemic for six weeks. The cases were mostly malignant, and proved fatal in three or four days. Of forty cases fifty per cent. died. One physician lost ten out of fifteen cases. Dr. Laird, who reports the epidemic, notices the following striking fact: "The first case occurred during a revival in the Methodist Church. I warned the clergyman of the danger of exposing the Sunday-school children to this corpse. Notwithstanding, the coffin was opened in the church, and a procession of the school marched around and viewed the corpse. In a few days I had plenty of patients."

Query—Did the corpse inoculate the school? Every case was within a half mile of this church.

In Keyport, along the shores of the bay, between the town of South Amboy and for a distance of three miles in the interior, malarial fevers have prevailed to a greater extent than ever before. In the same district scarlet fever occurred, followed in many cases by grave sequelae.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers are still quite prevalent here. Measles and mumps epidemic in many parts of the county.

FOR THE YEAR ENDING JUNE, 1881.

Scarlet fever is reported at Asbury Park as epidemic during a portion of the summer. Wide-spread malarial fever at Eatontown and vicinity, attributed to the impeded course of Mill Brook by willows, rubbish, &c. The reporter remarks, "If we would keep our coast clear of malarial invasion, we must preserve the natural drainage, and add artificial drainage to make up for the changes which population introduces." Reports come from several of the townships "That the water has been very low in the wells and many of them are dry. Malarial fever has made its appearance where it was never known before, and is supposed to be caused by the impure state of the water." Red Bank reports the first appearance of malarial fever in this section of the county.

FOR THE YEAR ENDING JUNE, 1882.

Scarlet fever and rotheln, of a mild form, are reported. Small-pox prevailed at Keyport and Freehold. At the latter place it occurred in the center of the town. Proper quarantine of the whole block was instituted and the disease was confined to the house in which it first originated. The report from Freehold gives interesting details in which vaccination prevented the small-pox in two children who were vaccinated two days after the father had broken out therewith. They contracted the disease, but had a mild form of varioloid.

FOR THE YEAR ENDING JUNE, 1883.

A remarkable epidemic of diphtheria and scarlet fever frequently inter-current in the neighborhood of Keyport. Typhoid fever at Asbury Park; nine cases, mild in character; only one death. Upper Freehold reports an extensive epidemic of measles, and a few cases of typhoid fever. Malaria in a few localities, but not so frequent as formerly.

FOR THE YEAR ENDING JUNE, 1884.

Free from epidemics. No contagious diseases have prevailed except measles. Typhoid fever was common in different parts of the county during the autumn.

FOR THE YEAR ENDING JUNE, 1885.

An epidemic of measles ranged over many parts of the county, particularly through Matawan, Ocean Beach and Freehold, attended by a high degree of mortality.

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## MORRIS COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

In Boonton there has been an increased amount of malarial diseases among a portion of the people, who, for want of their usual employment in the iron mills, have engaged in ditching on the farms. The same condition has obtained in Chester and Dover.

In Parsippany intermittents were followed by an epidemic of dysentery of a decided malarial type.



In Pompton malarial fever has been the prevailing disease, followed with diarrhea of an intermittent character.

All diseases in the county are reported as assuming more or less of a periodic type. Influenza was epidemic. Diphtheria and scarlatina prevailed to a considerable extent in all parts of the county. Isolated cases of typhoid fever and rubeola have been met with.

FOR THE YEAR ENDING JUNE, 1879.

An increase in the number and severity of malarial disorders. The localities near the larger streams, ponds, canals and low meadows have suffered most. The county has been free from epidemics of scarlet fever and diphtheria. All the minor contagious diseases have been epidemic—measles, whooping-cough, mumps, chicken-pox, and in some places all prevailing at the same time.

FOR THE YEAR ENDING JUNE, 1881.

The prevailing disease has been malarial fever, chiefly of the intermittent type. Among the contagious diseases which prevailed are the following: Whooping-cough, scarlet fever, diphtheria and chicken-pox. Ten cases of puerperal fever occurred in the practice of one physician at Parsippany, which he believed was due to contagion. Morristown and vicinity were visited by a mild epidemic of conjunctivitis.

FOR THE YEAR ENDING JUNE, 1882.

The report states that the usual amount of malarial disease occurred during the year; also a few cases of scattered typhoid were observed through the county. At Middle Valley there were a number of cases. Four of these cases occurred simultaneously among people engaged in the removal and renovation of an old house. It was thought that the upturning and exposure of soil saturated for years by kitchen slops and waste was the cause of the disease in this instance.

Scarlet fever of a malignant type, frequently complicated with diphtheria, prevailed at Bloomingdale, Dover and Mine Hill. Rotheln was epidemic, as well as chicken-pox and whooping-cough.

FOR THE YEAR ENDING JUNE, 1883.

Freer from malarial fevers than for years. Influenza of a severe character has been epidemic at Morristown, Chester, Dover, Parsippany and Middle Valley. Scarlet fever and mumps were epidemic at German Valley and Parsippany.

Of typhoid fever only a few cases were met with outside of Bloomingdale.

FOR THE YEAR ENDING JUNE, 1884.

Scarlet fever and diphtheria were met with to a limited extent. Measles and whooping-cough were epidemic in Bloomingdale. Malaria not so frequent.

FOR THE YEAR ENDING JUNE, 1885.

A diminished tendency to malarial fevers. Scarlet fever was encountered in every part of the county. Measles and mumps were epidemic in Boonton and Morristown. Three malignant cases of diphtheria reported from Boonton, brought from Newark, and all died. This dreaded disease was nowhere epidemic in the county.

## OCEAN COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

No epidemic has been met with except diphtheria in two limited localities, in one of which it was very malignant, and confined to a small section of county, in and about Point Pleasant. The other was of scarlet fever, confined to the small village of Waretown, on Barnegat Bay.

### FOR THE YEAR ENDING JUNE, 1881.

Diphtheria made its appearance in May, about the time when the burning of charcoal ceased. The reporter remarks, "That it seems to be a fact that while the coaling business is in progress there is very little sickness. It is noticed that as the burning of charcoal commenced in August diphtheria ceased."

### FOR THE YEAR ENDING JUNE, 1882.

Typhoid fever prevailed to an unusual extent during the latter part of summer and throughout the autumn. Malarial fever, from which this county has been heretofore almost wholly free, attacked a considerable number of workmen engaged in the construction of a railroad from Whitings to Point Pleasant. Diphtheria appeared sporadically throughout the fall and early winter. In January an epidemic of influenza raged. One or two cases of small-pox were reported in a remote part of the county.

### FOR THE YEAR ENDING JUNE, 1884.

Less typhoid fever than previous years. A mild epidemic of diphtheria occurred at Cedar Run. Scarlet fever and whooping-cough were uncommon. Mumps were epidemic in some sections and measles everywhere.

### FOR THE YEAR ENDING JUNE, 1885.

Measles prevailed with great severity, and influenza with sore throats of different kinds were quite common. Diphtheria appeared in a few scattered instances. Typhoid fever was also frequently seen.

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## PASSAIC COUNTY.

### FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed to an unusual extent throughout the year, and have shown themselves on the mountains, where they have never been experienced before. Erysipelas of the head and face, during the early spring months, has been endemic. The county has been generally free from epidemics. There have been but few cases of diphtheria. In the south part of Paterson scarlet fever, of a severe type, prevailed, a large number of cases being complicated with diphtheria. Diseases of the air passages, as influenza, were epidemic.



### FOR THE YEAR ENDING JUNE, 1881.

There has been less malarial fever than usual. There were several cases of small-pox in the spring. Vaccination was generally performed and the cases successfully quarantined.

### FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers much less than last year. Dysentery prevailed in Paterson, and was traceable to contaminated well-water. A few cases of small-pox occurred in Passaic City, and measles were epidemic. Scarlet fever assumed the character of an epidemic in Paterson during the winter and spring. Only a few cases of diphtheria are reported from any parts of the county.

### FOR THE YEAR ENDING JUNE, 1883.

Malaria less prevalent than in former years. Scarlet fever was less frequently met with than formerly. Paterson reports an epidemic of small-pox—187 cases in all. A few cases of the same disease are reported from Passaic City.

### FOR THE YEAR ENDING JUNE, 1884.

Less than the usual amount of malarial fevers. Typhoid fever occurred throughout the year. Public wells are believed to be the cause. Measles were epidemic. It was thought there were fewer cases of diphtheria than usual.

### FOR THE YEAR ENDING JUNE, 1885.

Malarial fevers have been less common than in former years. Typhoid fever was less prevalent. The reporter speaks of four cases in one family, in which the disease was obviously caused by impure drinking-water. Diphtheria was not severe. Scarlet fever, measles and whooping-cough of mild type. Influenza very prevalent.

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## SALEM COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

Measles very prevalent in many parts of the county. Scarlet fever prevailed among the colored population in the outskirts of the city of Salem. Diphtheria was prevalent in some localities, and frequently fatal. Intermittent, remittent and typho-malarial fevers prevailed to a moderate degree. The latter disease has become endemic to such parts of the county as border on the Delaware and its tributaries. Genuine typhoid fever is a rare disease in this county.

### FOR THE YEAR ENDING JUNE, 1880.

No epidemic has occurred, nor have endemic diseases appeared, as in former years.

### FOR THE YEAR ENDING JUNE, 1881.

Has enjoyed an unusual immunity from epidemic diseases. There have been mild cases of measles and scarlet fever.

FOR THE YEAR ENDING JUNE, 1882.

An increase of malarial fevers. Scarlet fever and measles quite prevalent; also a few sporadic cases of diphtheria. It was supposed that the increase in malarial fever and the severity of it was in part caused by the remarkable drought which prevailed during the summer and autumn.

FOR THE YEAR ENDING JUNE, 1884.

There was a general decline of malarial fever throughout the county. A considerable number of cases of mumps and measles were met with in every section. Diphtheria and scarlet fever were rare.

FOR THE YEAR ENDING JUNE, 1885.

No epidemics have occurred. A few cases only of scarlet fever. Mumps and measles were casually noticed. Malarial fevers prevailed only to a limited extent.

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## SOMERSET COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Fewer cases of typhoid fever and diphtheria than formerly, with a general prevalence of catarrhal affections, such as influenza.

FOR THE YEAR ENDING JUNE, 1879.

In Raritan an epidemic of diphtheria appeared, of a malignant type. The reporter estimates that there were about one hundred and fifty cases, with a mortality of twenty-five per cent. The disease occurred mostly in children of families employed in a mill, who lived in small tenement-houses, each containing three or four families.

The surface of the ground is flat, without drainage, and all the surroundings were adapted to generate the disease.

FOR THE YEAR ENDING JUNE, 1880.

In former years this county has been distinguished for its freedom from malaria, but is now compelled to regard it more and more as an abiding pest. The same is stated this year as last. It occurs in localities well drained, free from marsh, and without changes in soil. (See the causes of this as developed in the Bound Brook trial.)

FOR THE YEAR ENDING JUNE, 1881.

A bold and decided increase of malaria, and a decline of typhoid fever. An epidemic of measles of a severe form, with sore throat, abounded. At North Plainfield an outbreak of small-pox was circumscribed by vaccination, &c.

FOR THE YEAR ENDING JUNE, 1882.

A decline in malarial fevers, although an increase in the number of cases is reported from Somerville and Raritan. Typhoid fever occurred at Neshanic, severe in form.



All cases were believed to have been caused by a heap of refuse from a fruit-preserving factory. Also a few cases of typhoid were observed in Harlingen, traceable to local causes. Measles prevailed generally throughout the county. Only a few cases of small-pox were under treatment, and vaccination has been very general.

FOR THE YEAR ENDING JUNE, 1883.

Less malarial fevers than in several years preceding. Diphtheria has prevailed to some extent. An epidemic of pleuro-pneumonia visited various parts of the county, and caused the deaths of about twenty per cent. of those attacked.

FOR THE YEAR ENDING JUNE, 1884.

Has been free from diseases of an epidemic form. There have been sporadic cases of diphtheria and typhoid fever.

FOR THE YEAR ENDING JUNE, 1885.

No epidemics and not as much malarial fever as formerly.

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## SUSSEX COUNTY.

FOR THE YEAR ENDING JUNE, 1879.

Slight increase in malarial fevers. Diphtheria has appeared in several localities, but the cases have been generally isolated—some of them very malignant. A number of cases of typhoid fever and scarlatina have been reported, most of which have occurred in the town of Newton.

FOR THE YEAR ENDING JUNE, 1881.

A large amount of intermittent fever, and the malarial influence seemed to characterize other diseases.

FOR THE YEAR ENDING JUNE, 1882.

Malaria has prevailed to a limited extent. The Board of Health investigated the cause of three cases of typhoid fever at a farm-house, and traced the poison to a covered drain leading from the house.

FOR THE YEAR ENDING JUNE, 1883.

Malarial fevers in their various types prevailed to a greater extent than formerly, and made their appearance in sections where it had never been known before.

Measles, complicated with bronchitis, are reported from Vernon only, and scarlet fever prevailed only in Hamburgh.

FOR THE YEAR ENDING JUNE, 1884.

There were no epidemics reported; some malaria in Walpack township.

FOR THE YEAR ENDING JUNE, 1885.

Malarial fever prevailed, although milder in form and to a less extent.

## UNION COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

In Rahway there was a low type of continued fever. In Elizabethport diphtheria and scarlet fever prevailed.

### FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed, and of an extremely obstinate character. Diphtheria and scarlet fever have been endemic, but not as prevalent as last year.

### FOR THE YEAR ENDING JUNE, 1880.

Few cases of malignant scarlet fever. Plainfield reports five cases of small-pox. They were carefully isolated, and not a single case of contagion resulted. Rahway also reports ten cases of small-pox, with four deaths. Malaria, however, claims the largest share of influence, as the chief factor of disease in Union county.

### FOR THE YEAR ENDING JUNE, 1882.

An epidemic of measles at Plainfield, which was unusually severe, and several deaths occurred.

### FOR THE YEAR ENDING JUNE, 1883.

Scarlet fever of a severe type prevalent in Elizabeth and Rahway. Measles and whooping-cough epidemic at Plainfield and Rahway. Of diphtheria only a few scattered cases, and the same is remarked of typhoid fever. Malarial fevers were less frequent than in former years.

### FOR THE YEAR ENDING JUNE, 1884.

No contagious diseases except scarlet fever and measles. A few cases of diphtheria were reported in Cranford township, supposed to be caused by children occupying a new school-house that had been freshly plastered—twenty cases in all; one died. The school-house was vacated for one month, and thoroughly dried.

### FOR THE YEAR ENDING JUNE, 1885.

Enjoyed a year of good health, except in the township of Fanwood, where scarlet fever prevailed epidemically, and of a grave type. Many deaths occurred—probably one-third of all attacked.

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## WARREN COUNTY.

### FOR THE YEAR ENDING JUNE, 1878.

An epidemic of typho-malarial-fever in Stewartville and vicinity, which lasted for four months. Also an unusual prevalence of malarial fever in the Musconetcong valley above Hackettstown, and at the head-waters of the Pequest. The neighborhood of Johnsonsburgh was also badly affected.



### FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed to some extent in different portions of the county, and influenza has been general. Diphtheria, of a malignant form, in the upper part of the county, and scarlatina, with some diphtheria, in Phillipsburg and Knowlton.

### FOR THE YEAR ENDING JUNE, 1880.

Scarlet fever and diphtheria were endemic for a short time in Phillipsburg, in a part of the town with unfavorable sanitary surroundings. Malarial fevers are noticed by the reporter as very prevalent in some of the towns, and in others they have been of average extent.

### FOR THE YEAR ENDING JUNE, 1881.

Malarial fever in the autumn, which, in many cases, proved fatal. Influenza was epidemic in the spring. Measles and diphtheria were quite prevalent in some portions.

### FOR THE YEAR ENDING JUNE, 1882.

The county of Warren has suffered to an unusual degree from periodical and continued fevers, and from diphtheria, in and around Phillipsburg. Scarlet fever, of a malignant form, prevailed in Washington, and several cases of small-pox. At Oxford thirty-five cases of small-pox occurred, and seven deaths. During the fall and winter scarlet fever was also prevalent in this township. There were several deaths from scarlet fever and measles in Belvidere. There were much less malarial fevers than in former years.

### FOR THE YEAR ENDING JUNE, 1883.

Malaria still prevails in all parts of the county, and in some places typho-malarial fever has occurred. Only a few cases of typhoid fever reported. Hackettstown reports a visitation of scarlet fever of an exceptionably fatal type. Frelinghuysen township reports scarlet fever as epidemic, and a few cases of rotheln are noted. In Phillipsburg an epidemic of mumps prevailed, affecting adults as well as children.

### FOR THE YEAR ENDING JUNE, 1884.

Exempt from any distinctly prevalent diseases. Malaria has predominated. Scarlet fever has prevailed in some sections of a mild form. Also whooping-cough and measles.

The Chairman of the Standing Committee, in his review of the State for the year, says: "A summary of the medical history of the year is as follows:

"1. A diminished amount of sickness throughout the State.

"2. Epidemics have not prevailed to any great extent, and of diminished intensity.

"3. Less contagious diseases, except measles, which were unusually prevalent.

"4. Fevers of a malarial character less frequent, and typhoid fever less fatal."

### FOR THE YEAR ENDING JUNE, 1885.

While whooping-cough, measles, and a mild form of scarlet fever have all occurred to a moderate extent, the district has been favored in its freedom from disease of a malignant form.

## CLOSING REMARKS.

Little more than a quarter of a century has elapsed since efforts have been made to improve the sanitary condition of the people. But short as the period has been, much good has been done. Many lives have been saved and much sickness and misery have been averted. Dr. Johnson says: "To preserve health is a moral and religious duty, for health is the basis of all social virtues." Indeed, it is only within the past ten years that sanitary science has made its way, in any important degree, outside of purely professional men and professional literature. There is a growing conviction that the necessity for such knowledge is not restricted to the physician; that it is essential also to the educator, the architect, the engineer, the mother, the nurse, and, indeed, to every one who would enjoy, together with the due development of his physical, intellectual and moral nature, the full boon of life. Happily, men, and women, too, are fast coming to realize the fact that humanity is responsible for much of its own sickness and premature death.

The main causes which shorten and embitter human life, as far as that unhappy result depends on the disturbance of health, are within our own control. There is the closest connection between the knowledge we have acquired of the physical conditions on which the life and health of individuals and communities depend, and our command over those conditions. Every fact we have learned respecting the great laws of nature, on our conformity to which our very existence depends, has taught us that the circumstances which produce excessive sickness and early death are preventable.

The character of pestilence which gave it its great power and terror—"that it walketh in darkness"—is its character no longer. Its veil has fallen and with it its strength. A clear and steady light now marks its course from its commencement to its end; and that light places in equally broad and strong relief its antagonist and conqueror, sanitary science, and through it the prompt adaptation and adoption of preventable means. The spread of epidemic disease is always the direct result of neglecting sanitary laws. There is now no mystery about the Plymouth fever, and many more epidemics we might mention. They are as plain and clear as the death of a man who has been seen to swallow a dose of strychnine. Now that we know the causes, such as overcrowding, for example, we can prevent the accumulation of filth in towns and houses. We can prevent the spread of contagious diseases. The supply of light, air, and pure water, together with several other appliances included in the all-comprehensive word cleanliness, we can secure. To the extent to which it is in our power to do this, it is in our power to prevent disease and epidemics. The human family have now lived together in communities for over six thousand years, and they have not yet learned to make their habitations clean. At last, however, we are beginning to learn the lesson. When we shall have mastered it we shall have conquered epidemics.



Let us, therefore, look hopefully forward for the time to arrive when we can show the ability of sanitary science to vastly reduce mortality from future epidemics.

English sanitarians claim that more lives have been saved in their army in ten years by better observance of sanitary laws than were lost at Waterloo.

The death-rate could certainly be reduced in every part of our nation by efficient national, State and local sanitary supervision. In the English official reports we find that such a system reduced the annual death-rate from 22.6, in 1872, to 18.9, in 1881; and that this reduction was not spasmodic, nor due to exceptional causes, but was steadily continued from year to year, and the reduction gradually accomplished during the ten years. In other words, thirty-seven persons in every thousand were saved from death each year during the period mentioned, who would most certainly have died had it not been for this careful sanitary oversight. This statement shows what has been accomplished there, and no reason exists why as good results may not be attained here. Taking our figures from our own annual reports for five years, from 1879 to 1883 inclusive, we find that 29,843 persons died in this State from causes that might have been avoided. This shows us that an average of 5,968 persons died in this State from preventable diseases each year during that period, many of whom might have been living to-day under a proper sanitary oversight at all equal to that now in practical operation in England. In other words, more than five people in every thousand die annually in this State from avoidable causes.

In closing this report we desire to call special attention to—

*First.* The importance assigned to hygiene and State medicine all over the State of New Jersey. The increasing interest and attention given to it, is an evidence at once of the advanced stage of civilization and of the dense and rapidly-growing population. It also indicates

that long occupancy of the land by successive generations has at length overtaxed the regenerative and self-purifying energies of the earth, and that extraordinary methods have now become necessary.

*Second.* To the fact that preventive medicine has at last attained recognition as the highest aim of the physician's art. It has now more to do than in warding off epidemic visitations of great scourges.

The late Dr. Samuel D. Gross, closed his oration delivered at the dedication of McDowell's Monument, in the following significant words:

"Young men of America: listen to the voice of one who has grown old in his profession, and who will probably never address you again, as he utters a parting word of advice.

"The great question of the day is not this operation or that, not ovariotomy or lithotomy, or a hip-joint amputation, which have reflected so much glory upon American medicine—but preventive medicine, the hygiene of our persons, our dwellings, our streets—in a word, our surroundings, whatever or wherever they may be, whether in city, town, hamlet or country, and the establishment of efficient town and State Boards of Health, through whose agency we shall be more able to prevent the origin and fatal effects of what are known as the zymotic or preventable diseases, which carry so much woe and sorrow into our families, and often sweep like hurricanes over the earth, destroying millions of human lives in an incredibly short time.

"The day has arrived when the people must be roused to a deeper and more earnest sense of the people's welfare, and suitable measures adopted for the protection, as well as for the better development, of their physical, moral and intellectual powers.

"This is the great problem of the day, the question which you, as the representatives of the rising generation of physicians, should urge, in season and out of season, upon the attention of your fellow-citizens, the question which above and beyond all others should engage your most serious thoughts, and elicit your most earnest co-operation.

"When this great object shall be attained; when man shall be able to prevent disease, and to reach, with little or no suffering, his three score years and ten, so graphically described by the Psalmist, then, and not until then, will the world be a paradise."

# LOCAL OUTBREAKS OF TYPHOID FEVER

## AT CAPE MAY COUNTY AND THE MORRIS PLAINS ASYLUM.

## THE SEWER SYSTEM OF THE ASYLUM.

Besides the cases of typhoid fever which have occurred in various parts of the State, there have been two local outbreaks, the history of which it is important to record. Our attention was called to the first in April, 1885, on account of its spread in the small neighborhood of Swainstown, in Cape May county. The following is its brief history, as obtained from Drs. Mecray and Marcy, of Cape May, and as confirmed by my own visit and examination:

The first case occurred on the 11th of September, 1884, in the family of Mr. N., at Holly Beach. The child recovered. The B. family were living in the adjoining house, and frequent visitors to the sick child. Both families used the same surface well, which had been filled up before the visit of a sanitary inspector. Mrs. B. was taken about the 18th of October, and some days after removed to Swainstown, several miles distant, where she died the next day after arrival, from severe intestinal hemorrhage.

There were two other cases at Holly Beach, both of which recovered. Holly Beach is low and quite level, and water, after rains, stands in pools. The springs are near the top of the ground, and you can dip water out of most of the wells. Water in the wells often becomes unfit for use, and persons are changing wells continually. All the privies are simply deposits upon the ground, and so these may easily find their way into the water. Since these cases, a Health Board has gone vigorously to work to correct evils. About ten days after the death of Mrs. B., who had been brought from Holly Beach to Swainstown, her husband was taken sick. He had a severe attack. His attack lasted about four weeks.

"During his sickness a little girl of a neighbor was sent daily to the

house to inquire after him, and always, childlike, went up to the sick-room, remaining from half an hour to two hours. In about nine days the child sickened, and after about two weeks more, died, with some brain complication. This brought it up to about the last of December. It then remained quiescent until some time in February, when a Mr. I. took his little son, about nine or ten years of age, and went with him to Holly Beach, and remained there two days and one night in the immediate vicinity, if not in the house where the first case originated. In about nine days after their return home the child sickened, and ran through a tolerably severe course and recovered. In about a week the mother of the child sickened, and during the third week died. This case occurred in the midst of the cluster of houses visited. Mrs. I. was the daughter of Capt. E. B., and a very intimate friend of the H. family. Of course, the whole B. family were more or less with the sick ones, and the H. family, also. Special sanitary precautions were not used in these two cases, and the cases that you saw, and that were on hand at that time, were infected so that I soon had eight of them, all down at one time. The fever was plainly typhoid, as you saw. Their temperatures ranging from 102° to 104°; part of them (four) had the typhoid eruption; six of them had bad diarrhea; five of them dry, dark tongues; six of them deafness, and a pulse-rate with them all, from ninety-six to one hundred and twenty. Those that had the eruption had some soreness over the right iliac region; six had delirium, more or less. Four have died; one from perforation of bowels, as you know. The Miss H. that suffered the relapse, died from exhaustion, at the end of the sixth week, and the second week of the relapse; the other one, with epistaxis, with hemorrhage from stomach and bowels. The remaining four of them are fairly convalescent. I have no doubt now, but that the outburst that fell to my hands was caused by infection, and for the want of proper use of disinfectants in the case of the child mentioned."

Two other cases have since occurred which can probably be traced to the same source, although one of them was full three weeks after nursing in one of the families.

The Secretary of the State Board made a thorough examination for local causes of the disease at Swainstown. Although the wells were not deep, there seemed to be unusual care as to them. The testimony was decided on the part of physicians and nurses and



families, that there had been no opportunity for the contamination of water. Those who visited, and those who took meals in the house, suffered. Because no access could be had to the original well, the evidence of contamination was incomplete. But the history of all the cases shows how insidiously the disease may creep on from one person to another. There are many who believe it can be directly communicated by air, as well as by water or milk, as also by air settling on or blowing over food kept or eaten in the house.

The disease seemed to limit itself after all details of disinfection were thoroughly applied. It is the frequent experience of health officers to find that in first cases no thorough methods of control over discharges, surroundings, etc., are exercised, or that when disinfection is ordered, it is very imperfectly done. He is the successful physician in limiting typhoid fever, as well as in treating it, who, from the first, takes thorough charge of all details and sees to it that they are rigorously carried out.

To tell people to disinfect will not do. At the first the physician or the sanitary inspector must do it, and then see that the plan is accurately carried out.

### OUTLINE AS TO TYPHOID FEVER IN MORRIS PLAINS ASYLUM.

On the second and third of July, 1885, two persons in the institution were taken sick with what proved to be typhoid fever. Between the ninth and fifteenth of the month, three other cases occurred. Up to the date of September 3d, there were in all seventeen cases and three deaths. The diagnosis of the disease as typhoid fever was verified by a post mortem examination had September 1st. Of the first seven cases, six were attendants, although the number of attendants was small, compared with the eight hundred and sixty inmates. The first cases, and, indeed, all but one of the cases up to September 7th, occurred in the portion of the building north of the center or administrative portion.

The chief things first to be accounted for, are the origin of the disease—the reason of its outbreak and prevalence in one part of the buildings, and of its preference in attack for attendants instead of patients.

It was first of all proper to seek for an outside origin. It is absolutely necessary to do this, if we hold to the view of those who claim

that it never arises *de novo*, but is only fostered and made worse by imperfect insanitary conditions. Also those who believe that it occasionally occurs only from local conditions, recognize that it is frequently derived from antecedent cases, and that inquiry is always to be made for outside sources.

It is in evidence that a case of typhoid fever occurred in the institution November 29th, 1884.

The only connection of this case with those in July, which has been suggested, is that the material passed into the general sewer system and may have gotten into the building because of circumstances hereafter to be described.

It is also in evidence, that the wife of the engineer, who lives in one of the farm buildings several hundred yards from the premises, was taken with typhoid fever June 21st, 1885.

The buildings, water, etc., are so entirely separate that no connection could be established. The milk-supply was the same for the northern as the southern wings of the building. The water-supply was also the same. An examination of the water, while showing it contaminated with some vegetable matter, did not show anything to lead to suspicion of it as a cause of the endemic.

An interview with the only person who was sick, who had at all recently come into the institution, seemed to show that he had had no exposure to sickness of any kind within a few weeks previous to his entrance.

The employe who was taken July 3d, and recovered, had come on duty early in June. He states that a few days after he was in the ward, (2–4,) he noticed odors and spoke to another attendant as to them. This attendant (Mr. Grey) said that he had noticed odors at that time from all the closets under his supervision. It seems to be admitted that occasional odors had occurred before this, and that the exhaust system, on which the closets depended, had been complained of. The steward, Mr. Monroe, states that himself and the engineer, some time in February, had been called over to this part of the building to look after the cause of some odors complained of.

It seems to be agreed that this wing had given more trouble as to its purity of air than any other part of the institution, and that in June it was especially disturbed. Nothing in the character of the patients of the second ward could account for this. The first four patients, July 2d to 13th, were in adjoining rooms, and two of them



in one room. It seems to have been known that in the extremities of the building the action of the exhaust system of ventilation was not entirely satisfactory. Just at this time the general force of the exhaust, pertaining to the north building, was diminished by repairs which were being made, and which made it necessary to reduce the power around the smoke-stack. This would naturally affect the more remote parts of the system more than those adjacent. But why the north wing more than the south? One accounts for it by claiming that the sewer gases were never sufficiently diluted or oxidized to make it proper to trust to anything less than an acutal burning in the inner smoke-stack, and that thus coming out at the top the prevailing southerly winds caused the foul air to settle, and so "not only induced the sickness reported, but has also predisposed scores if not hundreds to similar attacks."

Another explanation is, that the *terminus of the north part of the sewer system* was not sealed as is that of the south part, and that the open pipes which were so near the discharge-tanks or beds of sewage would suck up into the northern wing of the building the air which would not be drawn out to the smoke-stack, but here find its first exit through the water-closets.

When the outside opening was discovered, in July, it was at once boarded up. This was a natural and easy mode of entrance. There is abundant evidence that the odors arising from these successive open cesspools, were the gases and particles of continuous decomposition.

Supposing, as we do, that the sewer system of the institution, and the method of disposal of the sewage outside of the institution, had to do with the prevalent sickness, and that it is now a menace to the health of the institution, it is necessary briefly to describe it.

### DESCRIPTION OF THE SEWERS AND SEWAGE DISPOSAL.

It is the application of the principle of exhaust ventilation, as used for buildings and shafts of mines, to the ventilation of sewers. In its application to buildings and to mines it has generally been found necessary to depend upon some form of revolving and aspirating fan moving with great velocity, in order to maintain a constancy of vacuum. While heat is an exhaust, where it is derived from fires varying different days and at different seasons and with varying winds, it has been found that as thus furnished it cannot be uniformly

depended upon. When such a system comes to be applied to a series of pipes, so vast in extent, with so many variations of size, of angle, and of direction, with such friction of surfaces, with streams of water varying in size, rapidity and temperature moving in other directions, and with the interference which such rushing of cold air into the smoke-stack causes, the problem is a deeply-involved one.

We quote the following memoranda as to it from various skilled authorities:

"The ventilation of soil pipes by 'aspiration' or 'propulsion,' is experimental in its character, unreliable and opposed by most sanitary authorities."—*Maclay & Davis, New York City.*

"Furnaces, blowers, exhaust-fans and other mechanical apparatus for exhausting the air in sewers or forcing fresh air into them, are expedients which suggest themselves to those ignorant of the construction of sewers and the operations going on within them. They have all been tried with extreme care and have failed utterly."—*James C. Bayles.*

"The ventilation of a coal mine by shafts is simple because the air gets down in the way, and only at the time the engineer intends, and because it does not require to be either warmed or cooled. In the fixtures of buildings and the various inlets of air at varying temperatures, the air is constantly entering just in a way to disturb the system, and either to reverse the currents or greatly diminish them."

"It has repeatedly been proposed to utilize the heat of the kitchen chimney for the ventilation of soil pipes by running these from above the highest fixtures into such heated flues. Such practice is not permissible under any circumstances whatever, for there are, at times, down draughts which would force soil-pipe air into the house."—*Gerhard.*

About seven years ago a somewhat similar system was tried at the Massachusetts Asylum for the Insane, at Danvers, Mass.

The conditions of success were: "A slight degree of vacuum, or diminished air pressure throughout the house drain pipes, to be attained by an up-cast shaft connected with the drain at its lower end and kept constantly heated by artificial means, for the purpose of maintaining a constant resultant inward pressure at every opening or leak in the drain system throughout the house, and a constant draft of air through the whole from the remote extremities, which are left open to the air as inlets."



The friction encountered by air in moving through considerable lengths of drain pipe is so great that the nearer inlets will have a far greater capacity for supplying air in proportion to their size than the more remote ones.

This difficulty was so great in the case of the Danvers Asylum, above referred to, where a steam boiler chimney was used as an up-cast shaft, that many of the inlets had to be closed after trial, before the draft was found sufficient at the extremities of the system.

The *Sanitary Engineer* refers to the utter failure of this method of ventilation in another institution, the Rhode Island State Hospital:

"It depended for its aspiration upon the main chimney stack of the establishment, 109 feet high, kept warm by boiler fires which are maintained throughout the year, and which, for more than half the time, perhaps for more than three hundred days in the year, create an inward draft at all the water-closets and lavatory-sinks in the building. Such was the case when the hospital was inspected by the writer, about two months since. But the officers in charge, as well as the trustees, all agree that for some unexplained cause this draft fails entirely in parts of the building on certain days, depending apparently on the direction of the wind. At such times some of the water-closets persist in sending forth into the adjoining wards a most insufferable odor, having no inward draft whatever, but a most decided outward one, showing the whole system to be altogether unreliable and mischievous. Now this building is one of the most favorable that it is possible to imagine for the success of the system. It is isolated, and not under a hill. The lofty chimney stack towers above the highest part of the roof, and is constantly used for steam boiler fires, which are kept up all summer for supplying steam to the kitchen and laundry, as well as for nurses cooking. Moreover, the arrangement of drain pipes was carefully studied and to all appearances faithfully executed.'

Reports of experiments of like nature abroad, where the ventilation of town sewers is assisted by means of connections being made with factory or mill chimney shafts, give very indifferent results.

At Bradford, the one connection in the town is only effectual for about 100 yards; in Carlisle, to a radius of 400 yards; in Cardiff, the effect is limited to the immediate vicinity; in Glasgow, no effect is produced beyond the nearest grate admitting air, etc., etc. While better results are reported from Hartlepool, Reading and Middlesborough, the connections cause no effect at a distance of 100 yards at Southport, and in Greenock one connected as an experiment has been

discontinued, the influence not being felt beyond a distance of 200 yards.

A committee of three members of the Board expressed the opinion that all openings of closets, sinks, urinals, etc., in the building should be trapped, and that the question of whether any part of the exhaust system should be retained, ought to be submitted to a mechanical engineer, who, by accurate data and experiment, can find what its power and reliability is.

Because of the needlessness of rain-water, as at present distributed and applied for flushing purposes, and because of the great complication it adds to methods for ultimate sewage disposal, we recommend that it be separated from its present method of disposal into the sewers.

This Board, while cautious as to recommendations, has made formal suggestions to the Board of Managers, and requested that they be further tested by reference to skilled engineers.

We now pass to consider the method of disposal of sewage, and the reasons why some change must be made. The sewage passes out of the pipes, one on each side of the building, and at their ends is discharged into an open pond or cesspool, twelve feet by thirty feet in extent and four or five feet deep. Of these there are eight or nine so arranged that in each some scum can be raked off from the top and some of the decayable matter be allowed to settle to the bottom, and then the water pass out by a leader or trough a half mile long and be distributed from its sides by means of holes and pegs, the holes being opened or stopped alternately, so as to regulate the places at which the liquid is to be discharged on the ground. We first saw these open ponds at the request of the Morristown Board of Health. They were merely ponds, or open cesspools, from which, in a crude and unpleasant way, floating materials could be raked off and mixed in a poor compost with ashes we saw upon the banks, and also places where some of the heavier and cruder matters would settle, until there was so much nauseous stuff as to require the letting off of the water in order to remove it and mix it with ashes, earth, etc. One of the beds was in this condition when the Secretary first saw it, and he at once expressed his entire want of confidence in any such method of dealing with the sewage of the institution.

Two years after, when the Board was called by the Board of Managers to view it with some claimed improvements, in a letter



addressed to the Managers, Messrs. Brackett, Leeds, Osborne and the Secretary united in saying "it is fortunate that we are all in agreement that the present method is unsatisfactory." We did not, at that time, technically examine the house system, but accepted testimony as to it, but we did examine the system of disposal of sewage and condemn it, and specifically proposed the substitution of another method. We heard nothing of the result until we read as follows in the report of the Managers to the next Legislature: "It was finally decided that, in view of all the facts and circumstances requiring attention, that the principle of broad-surface irrigation, as recommended by the author of the report, together with his method for accomplishing it, be tried," etc. This merely meant that precisely the same method was to be continued, with an extension of these surface troughs. The problem was: given 150,000 gallons per day, with a rain-fall of seventeen gallons a year to every square foot of three acres of roof, to be disposed of whenever supplied by means of some open cesspools for raking and settling, the water (still foul, as chemical examination always showed,) to be distributed over wet, untilled land, near woods. It was as if a thousand barrels had been filled each day with sewage-water drained off from tanks and then set in a row, and the taps pulled on intermediate days, so that the water could flow over wet, low and untilled lands. This is, in no sense, the system usually known as broad-surface irrigation. It has been examined by several skilled Sanitary Engineers, but no one has yet been found to approve it. So far as it was for a time available, the credit must be given to the personal watchfulness and administration of the former Superintendent, and not to the crude construction and distribution.

When we met with the Managers, in 1883, we advised the substitution of a system of chemical precipitation, and suggested a further conference, in order that all details might be perfected. This was rendered unnecessary on the acceptance of the above plan. We still believe a precipitant method possible, but, because of increased ownership of lands and some other considerations, have now recommended the small pipe and flush tank system, by which intermediate irrigation and filtration is applied a few inches below the surface of the ground. In a communication made to the Managers, we have outlined the method of its accomplishment, and advised the employment of some skilled engineer.

# DISTRICT SANITARY INSPECTION.

BY HENRY MITCHELL, M.D., DISTRICT INSPECTOR.

In accordance with "An act to provide for the better care and protection of the public health," approved April 21st, 1885, eight Sanitary Inspectors were appointed by the State Board of Health. The purpose of the Legislature and the object of the State Board of Health in creating these officers, was stated in a circular issued May 15th, 1885, to be as follows:

I. To thus have persons ready at hand who are familiar with the health laws of the State and with the details of their administration, so as to advise with and direct local Boards of Health in their work.

II. To see that proper organization of Health Boards is perfected where it has been omitted, or the plans therefor are not understood.

III. In case of sudden outbreaks of disease, at once to render such assistance as may be indicated or as local Boards may desire.

IV. To secure or aid in the sanitary inspection of schools, almshouses, jails or other places of public assembly or detention.

V. To secure a more general vaccination and a knowledge of the methods of preventing communicable diseases.

VI. To aid local Boards in the enforcement of the laws as to vital statistics, as to adulteration of foods or drinks, as to dangerous kerosene, and as to the contagious diseases of animals, etc.

The past few years have shown that, notwithstanding all needful authority has been delegated to local Health Boards to enable them to successfully protect the public health against preventable dangers, yet many of the benefits obtainable under the statutes are not enjoyed by the public. This fact will not appear surprising when it is remembered that few of the persons who are now serving as members of Health Boards, or acting as health officers, have given the subject any attention until within the last four or five

years, and that only the first principles of the application of the established laws of health are thus far generally understood or practiced.

The District Sanitary Inspectors were expected to co-operate with local Boards, to assist them whenever it seemed desirable in determining what constitute dangers to health, and to point out the appropriate course to be pursued in given cases in applying the remedies provided for in the laws. Moreover, in case a serious and extensive epidemic should prevail in the country, or within the State, the District Inspectors would be the persons mainly depended upon to speedily and intelligently put in operation the methods necessary to effect its control and suppression, and to carry out the directions of the State Board of Health.

As local Boards are at present constituted—none except a few ex-officio members receiving compensation, or having been selected because of their attainments as sanitarians—there is little reason to suppose that they will at once give requisite time to the study of public hygiene. But the experience of the past year shows that they are stimulated and encouraged by occasional visits from a capable officer, who, by advice and example, demonstrates the advantages and illustrates approved methods in the correction of unsanitary conditions. It is only by skilled guidance that those charged with local sanitary administration can make satisfactory progress in executing the laws, and avoid the discouraging entanglements which attend ill-directed efforts to accomplish very desirable ends.

In rural districts the Inspectors have found few instances where any effort is made to anticipate health dangers. Members of the town committees, who, together with the assessor and township physician, compose township Boards of Health, are generally disinclined to expend sufficient money to obtain the services of an Inspector, and until recently the township physician has usually done whatever has been accomplished in the inspection of premises. The act requiring township Boards to appoint Inspectors has been voluntarily conformed to in some cases at the instance of District Inspectors, but these useful and necessary officers are generally employed only for a portion of each year, and their service is thereby rendered less valuable than it would be if they were constantly engaged in their labors. Without a Health Inspector who is always informed in regard to the sanitary conditions on all premises in his district, no



township Board can bring the healthfulness of the territory under its supervision up to its normal standard.

The District Inspectors find that reports of communicable diseases are not generally required outside of incorporated districts, and that suitable care is not taken to prevent the spread of such diseases, many lives being annually sacrificed in consequence of this neglect.

The following review of the reports of the District Inspectors will indicate the scope and nature of their labors:

In Middlesex county local Boards were aided in framing ordinances, classifying nuisances and in suggesting methods of procedure.

In Camden county the Inspector investigated sanitary defects of premises and suggested remedies. Health Boards were formed in ten districts which had hitherto failed to avail themselves of the privileges of the laws.

In Atlantic county an outbreak of typhoid fever was investigated, and the organization of local Boards perfected.

Inspection of a portion of Hudson county shows that some parts of Jersey City are in a deplorable condition. The residents are subjected to the evils resulting from continual neglect in the sanitary oversight. Overcrowding among the poorer classes; filthy accumulations of rags, bones and vegetable matter in yards and cellars; low-lying streets being filled with mixed ashes and garbage; public sewers discharging upon the surface of the ground—all contribute toward keeping up the abnormal death-rate. Thus far no adequate measures have been taken to improve unsanitary conditions in Hudson county.

In Mercer county an inspection of the village of Hightstown shows that local sanitary administration has been inefficient. It is found that in this locality, as in many others throughout the State, the drinking-water obtained from wells is not properly protected. Cesspools and wells are commonly situated too near each other for safety.

A partial inspection of the passenger stations of the railways of the State has been made, and in numerous instances serious faults in the construction of vaults and drains were observed. Appropriate steps were taken to secure improvement of these premises.

In Cape May county the causes of an outbreak of typhoid fever were inquired into. The disease appeared in Holly Beach, and it was judged to be due to polluted drinking-water which was taken from shallow wells.

In Passaic county the local Boards, outside of its two cities, have

shown but little activity in dealing with unhealthful conditions. The city of Passaic has no systematic plan for sanitary work at all commensurate with its size and needs. Sewage is cast into cesspools as a rule, and no very energetic measures are enforced to check the spread of contagious diseases.

In Bergen county the local Boards have not generally awakened to a realization of their responsibilities. In this, as in some other localities, public sentiment has not yet become sufficiently aroused on the subject of health protection, and local Health Boards conform in their operations to the popular indifference.

In Monmouth county an almshouse situated near New Bedford post office, was found to be totally unsuited, in its present condition, to the purpose for which it is used. The ventilation is faulty—the atmosphere of the whole building being foul and unwholesome. No bathing facilities are afforded, and the inmates never bathe except when, in summer, a few of the stronger ones go to a creek in the neighborhood for that purpose.

The organization of four new Boards of Health was secured in this county.

The Neptune township Board of Health has adopted a systematic house-to-house inspection, and their ordinances are promptly and judiciously enforced.

In Eatontown, Keyport, Red Bank, Ocean Beach, Freehold, Manasquan and in other communities in this county, there is pressing necessity for further action on the part of local Boards for the improvement of their districts.

In all sea-side resorts the existing dangers to health were pointed out, and local Boards were urged to promptly apply the remedies.

# SUMMARY OF REPORTS FROM LOCAL BOARDS OF HEALTH.

BY THE SECRETARY.

In October of each year a printed schedule of inquiries is sent to each local Board in the State. The schedule of subjects sent was as follows:

SCHEDULE OF SUBJECTS FOR REPORT.

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

Other subjects may be named under X, Y, Z. The subjects may thus be referred to by the letters.

If the sheet provided is not sufficient, add others, marked with the letters which designate the topic treated.

With it, there is returned to us the name and post office address of each member of the Board, and of the Health Inspector, where there is such an officer.

The circular sent therewith this year is the one marked Circular LVI., in this report. The directions therein given guard against unnecessary minuteness as to subjects fully answered in previous returns and ask for fuller information on others.

The reports, this year, show a large increase of the number of Boards which are in working order and are looking after local sanitary interests. Thanks are especially due to assessors and city clerks for their faithfulness, and for spreading information among the people. Two hundred and thirty-one of these Boards also have medical members, who help much to give intelligent direction to efforts in behalf of the public health. With the records of vital statistics, these reports, and the information that reaches us through correspondence and through medical societies and associations, we are able to secure much valuable information as to the prevalence or arrest of disease.

Medical men, who were once little concerned as to the etiology of disease and as to the modes of its prevalence, are fast accepting it as a part of their privilege, as well as duty, to protect from the spread of disease. We believe that communities and families should be ready to put higher pecuniary valuation upon these services, and oftener consult such of them as are intelligent as to sanitary requisitions. Many of the reports from which no abstracts are made contain valuable data and information, but it is not necessary to transfer to print unless something special is noted. We ask that comparison be instituted with former reports, in order that those interested may see for themselves something of the progress being made. It is only an occasional township which now regards itself so small or so healthy as not to give some consideration to the avoidable causes of disease.

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## ATLANTIC COUNTY.

ATLANTIC CITY. *Report from* M. D. YOUNGMAN, M.D., *Sec'y.*

The water-supply of Atlantic City is furnished by a private company, (Atlantic City Water Works Company, Walter Wood, President.) The source is Absecon creek and a small tributary. They rise and flow through a barren, sparsely-settled country, with no sources of contamination in the way of sewage or refuse from manufactories. The water is remarkably pure and soft; it has a slight discoloration, due to the presence of an iron salt in combination with an organic acid. The principal solid constituents (about three grains per gallon of 231 cubic inches) are chiefly chloride of sodium (salt) and chloride of magnesia. The quantity is ample. The reservoir in Atlantic City, consisting of a stand-pipe, is filled twice daily. It has been found necessary to clean it but once since its erection three years ago, as so little sediment settled. The company are very careful to keep the pipes clean by "blowing off" the hydrants at the dead ends of pipes several times a week. The Board of Health has ordered the discontinuance of the use of lead pipes, and all that were in use have been taken up. It was found that the water being soft and free from those salts which usually encrust the inner surface of lead pipes and thus protect them from the action of the water, there was danger of toxic effects from the use of lead pipes; indeed, several cases occurred. The water is becoming very generally used; those who have not introduced it depend on cisterns.



Atlantic City is now provided with a system of sewerage. Surface drainage is secured, independent of the sewerage system, by a system of underground trunks maintained by the city. The sewerage system is known as the "West System," and is owned by a private company. It comprises a pumping station, with iron and terra-cotta pipes laid below the water-level, the sewage flowing through these to the bottom of a walled well by gravity, and is pumped thence to a filtering station several miles from the city through a line of pipes, where the solid matters are separated and converted into fertilizers. This system was in operation during the past summer and was utilized by all the large hotels and many private cottages and gave entire satisfaction. Whatever fears have been entertained as to its availability here are now dismissed, and while there is involved a question of adaptability to the peculiarities and special demands of the place, which, however, resolves itself into mere matters of detail, there is no doubt of the final complete success of the project. Connection of houses with the sewerage system is not compulsory. All connections are made under supervision of the Health Inspector, and the securing of a permit from him before commencing the work is obligatory. The Board of Health requires the placing of traps at the property line and in all cases a ventilating pipe entering the connecting pipe exterior to the building and extending above the highest point of the building or any higher building within five feet. Those not connected with the sewerage system use water-tight vaults and cesspools, the construction of none others being permitted. They are cleaned by men licensed for the purpose and accountable to the Board of Health. The contents are removed by an odorless excavator and transmitted in sealed dunigans to points

thirty and forty miles away for use as fertilizer. The Board requires permits to be secured for this cleaning, thus keeping it informed as to who does and who does not comply with its requirements. To the faithful performance of these requirements is undoubtedly ascribable the remarkable and gratifying immunity Atlantic City has always enjoyed from epidemic diseases and general illness, particularly when account is taken of the masses of people we have in the spring and more particularly in the summer season.

There are no basements or cellars on the island, and but very few tenement-houses. There are several house-to-house inspections during the year. We have a most efficient Health Officer and an active, interested Board of Health, who realize the importance to Atlantic City of a "clean bill."

Animals are not allowed at large; hogs are not kept within the city limits.

Slaughter-houses are carefully looked after. Bone-boiling and fat-rendering are not allowed in the city, the Board of Health permitting one man, who, in consideration, provides himself with all the modern improvements and appliances, the privilege of collecting all the fat and offal from all sources and rendering them at a point situate at the most extreme limit of the city.

We have no manufactories.

The Board of Health have a city hospital, comfortably furnished and removed some miles from the city, for the reception of cases of infectious and contagious diseases, should necessity arise to quarantine such.

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BUENA VISTA TWP. *Report from* THOMAS CHALMERS, *Secretary.*

Diphtheritic sore throat sometimes occurs in the eastern part of the township, near the swamps of the Great Egg Harbor river, particularly after cranberry-picking.

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EGG HARBOR TOWNSHIP. - *Report from* NATHANIEL DISBROW.

In offering our annual report we would notice that during the past year cholera has attacked both chickens and swine, although not to the extent of last year.

At the almshouse means for the more thorough ventilation of the building have been effected, and fire-escapes have been erected.

The local Board has passed a complete code of health ordinances



and regular meetings of the Board have been held. A Health Inspector has been appointed at a salary of fifty dollars per annum, who reports at each meeting of the Board his doings. The effect has been the abatement of nuisances and the quarantining of all contagious diseases and an unusual exemption from sickness.

The expenses for strictly sanitary purposes, ending with the fiscal year, have been $55. Such, in brief, is our report for the present year.

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HAMILTON TOWNSHIP. - *Report from* D. B. INGERSOLL, M.D.

The refuse and excreta are disposed of in the general way among farmers. The privies in towns and villages are required by the township Board of Health to be properly cleansed and disinfected, as the cases may require.

There has been no prevalent disease among animals during the year. Hog cholera has been more or less severe in all our adjacent townships, yet in but very few instances have we been visited.

The jail is a stone building, containing but ten cells, and this is so crowded in the summer months that the utmost care of its sanitation is necessary to prevent disease. The Sheriff, who is also the warden, uses the utmost care, and thus the jail is kept in as good a condition as the circumstances will permit.

At the organization of the Board of Health for this township, a code of health was adopted and published in our local papers. This had a very salutary effect, and the cause for complaint in every case was removed. The township physician wrote a number of articles on "The Water We Drink," which were published in the local papers in the early part of the summer, which, it is thought, had a good effect in educating on this very important subject. It is our feeling that education in this direction will accomplish much more than stringent laws. Hence, if this subject could be more generally introduced into our public schools, and our children taught the principles, at least, of sanitation, a great good will follow.

We would call the attention of the State Board of Health to the danger to which we all are exposed in the summer months by the many dogs running at large. Scarcely in any township, but that in every little village the streets are full of dogs, and should a rabid dog pass through at night, there could be no estimate of the evils that would follow. The laws on our statute books are inadequate to prevent.

Place it in the hands of the local Boards of Health, with power to act, and the evils will cease. I would suggest a law to prevent them from running at large during certain times.

We have had no cases of typhoid fever this year. Is it because of the general improvement in sanitary matters, and the education of the people in this direction? The same influences—the low pond-water—have been as last year, and last year we had some twenty-five cases. Not a case of diphtheria has occurred in the township during the year, nor has there been an epidemic of any disease since my last report. This gratifying fact does and will encourage our Board of Health to greater activity, for while it has accomplished much, yet there is work still to do.

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WEYMOUTH TOWNSHIP. - *Report from* DR. B. T. ABBOTT.

There has been quite a severe epizootic among the swine, proving almost universally fatal and quite general throughout the township. Perhaps 100 hogs, probably more, have died with the (so-called) "hog cholera," but which reveal, on post-mortem examination, congestion of the brain, lungs and liver. A very few only have recovered, after many weeks of illness. They have all been buried soon after death.

There have been no epidemics prevalent in the township during the past year. A few sporadic cases of scarlatina of a mild form. Some seven or eight cases of typhoid fever during the fall, with but one fatal case.

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## BERGEN COUNTY.

ENGLEWOOD TOWNSHIP. *Report from* DANIEL G. BOGERT, *Sec'y.*

The Drainage Commission has expended nearly sixteen thousand dollars ($16,000) within two years.

All the schools (five in the township) and public buildings in good order. The tri-township poorhouse also in good order. The Englewood Protective Society have fourteen commissioned marshals and a lock-up, with four good cells.

The Board received twenty complaints of nuisances, all of which were abated; also, several nuisances were abated before complained of.



LODI TOWNSHIP. - *Report from* J. VAN BUSSUM, *Secretary.*

There is no public sewerage, or drainage except that attempted by the Riser Drainage Company, on a portion of the meadows. Cellars are usually dry. Malaria is not prevalent.

Refuse and excreta used to aid in supporting domestic animals and in fertilizing the soil.

I know of no evil to health resulting from any of our manufactories.

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PALISADE TOWNSHIP. - *Report from* DR. J. M. SIMPSON.

The health of this township has been remarkably good during the past year. There has been no epidemic of any kind, and malarial diseases, which have been so prevalent in years past, are gradually on the decline, so that during the past year there have been but few diseases that could be traced to a malarial origin.

There have been a number of cases of diphtheria during the months of August and September. In one family eight cases, with two deaths, and in another family three cases. Still there was no communication between the two families, and the cases were clearly traceable to filth and a contaminated water-supply. The families were pretty strictly quarantined, and there was no spread of the disease to other families in their immediate neighborhood.

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UNION TOWNSHIP. - - - GEO. H. CORMACK, *Secretary.*

The prevalent disease for the past year has been whooping-cough, otherwise our township has been in an excellent condition. There have only been one or two complaints to our Board of Health, which were adjusted by parties owning the property.

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## BURLINGTON COUNTY.

BORDENTOWN. - *Report from* DAVID T. WAKER, *Secretary.*

The Board of Health of this city have no general report to make, further than the city is in a good and healthful condition. All nuisances complained of have been attended to at once by the Health Inspector; the same consisting of foul water-closets, defective drainage, etc.

CHESTER TOWNSHIP. - - *Report from* CHARLES JESSUP.

When complaints are made to the Board of Health, they are promptly attended to.

Registration of births, deaths and marriages are, I believe, generally made.

Contagious diseases are carefully quarantined, and children generally vaccinated.

No epidemic of any extent has occurred in this township the past year. Less malarial diseases than usual.

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CHESTERFIELD TOWNSHIP. *Report from* THOMAS W. RIDGWAY.

Water-supply is entirely furnished by wells and cisterns.

The township is well drained, no boggy or marshy places.

Cellars are well drained and generally dry.

No malaria at present in township.

All houses have cellars; no basements; no houses with two tenements in.

Refuse is generally carted out and used on the land.

No contagious disease this year.

Slaughter-house, none.

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CINNAMINSON TOWNSHIP. *Report from* ALEX. MARCY, Jr., *Sec'y.*

One case of varioloid occurred in a family, the children of which had never been vaccinated, but by prompt isolation, vaccination and disinfection its spread was prevented.

Three cases of typhoid fever which occurred in one family were due to polluted well-water, as was easily and practically demonstrated.

Malarial and enteric troubles have been very much less than common.

Our Board of Health maintains its organization, and is ready for any emergency.

At the spring election, when the people were in town meeting assembled, the Board addressed a communication to them, calling their attention to sanitary matters, and giving much practical and sound advice. This was further supplemented by ordinances promulgated and posted throughout the township, and the results were very gratifying.

Several public nuisances were abated by orders from the Board.



EASTHAMPTON TOWNSHIP. - *Report from* BENJ. T. CROZIER.

Smithville is the largest town in the township, situated on the North branch of the Rancocas, between Pemberton and Mount Holly. Population about 250.

The H. B. Smith machine shops and foundry are located here; owning numerous tenement-houses—which are built separately—streets and alleys dividing them. The by-ways and alleys have received strict attention during the past year from our local Board. By the gentlemanly assistance of the managers of the machine works great sanitary reform has been instituted in these places, and pestilence stayed.

There is a good natural drainage throughout the whole township. The cellars are generally dry, with a few exceptions. We have been spared from much sickness, and have had no epidemics during the past year.

The decrease of malarial diseases has been remarkable, and may in some measure be due to the draining and filling in of wet places, secured by preceding Health Boards. It is proper to say that this policy has been continued by the present Board.

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FLORENCE TOWNSHIP. *Report from* CHAS. A BAKER, M.D., *Sec'y.*

Complaints have been made to this Board, of bad drainage, water from cesspools draining into wells, etc. Our course has been to notify the owners to rectify the evil, and we have been snubbed for our pains. We have hesitated to take legal action, the Board being undecided as to the best course to pursue, and there exist several nuisances in our midst which should be corrected.

Cholera morbus prevailed during the summer to an extraordinary extent, together with some dysentery. Malaria is always present, but the past year has been marked by a decided falling off in the number and severity of malarial diseases.

The registration of vital statistics is faithfully carried out by our Assessor, who is painstaking and careful, but it is difficult to impress some of the midwives with the importance of registering births.

There should be a Sanitary Inspector appointed for this township.

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MEDFORD TOWNSHIP. - - *Report from* JAMES K. ASAY.

Slaughter-houses are on the outskirts of the town—are well cleaned. One was in the town, but was ordered moved last spring.

NORTHAMPTON TOWNSHIP. *Report from* DANIEL B. SMITH, *Sec'y.*

The water from the creek is forced to a reservoir in Mount Holly, and then through the town in pipes. The pipes and reservoir are frequently cleaned and flushed. The water is soft and is considered very healthy on account of the cedar taste. A private corporation owns the water-works. I should judge one-third of the houses use the creek water, and the rest rely on wells. The well-water is very good in this section. I have not heard of any cases where the water was unfit for use, with the exception of some wells where the water was hard.

When the creek is swollen on account of rain, the cellars in the houses near the creek, and in the lower part of town, have water in them, but very little complaint is made on account of wet cellars. Malaria, fever and chills are very little known in this vicinity. Our slaughter-houses, with one or two exceptions, are in a passable condition; but I should advise a general looking-after another year. Our school-house is too small for the number of children, but the sanitary condition is very good. It is well lighted and ventilated. We have the Burlington County Hospital located here, which is in a very good condition as to the sanitary care, and is kept in first-class order. We have the county prison here, also, which, at times, is quite full. The sanitary condition and keep is very good.

There has been a great number of complaints handed to the Board, of nuisances, and, as a general thing, the result has been very satisfactory.

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SOUTHAMPTON TOWNSHIP. - - *Report from* S. E. BRANSON.

Cesspools mostly open. This year the Health Board ordered them cleaned and contents carted out of town. The order was generally complied with.

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## CAMDEN COUNTY.

DELAWARE TOWNSHIP. *Report from* F. E. WILLIAMS, M.D., *Sec'y.*

Notices from the Board of Health are promptly attended to and the Assessor has no trouble in obtaining prompt returns of births, deaths and marriages.

There has been little or no disease among the animals this year.



Batesville, a small village in the southern portion of this township, and Haddonfield, a large town in an adjoining township, have been visited this fall by an epidemic of diphtheria which was of malignant form in most of the cases, having a high rate of mortality, four deaths occurring in one family resident at Batesville.

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CITY OF CAMDEN. - - *Report from* SEPTIMUS KNIGHT.

The laws and regulations of public health here are not very extensive, as the Board has been established but a short time. We are continually adding to our local laws for the protection and maintenance of the health of the city by compelling cleanliness, preventing and abating and removal of nuisances; also, by fumigation in cases of infectious diseases.

Diphtheria and scarlet fever seem to have been the most prevalent diseases of the year.

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GLOUCESTER TOWNSHIP, - *Report from* JOS. E. HURFF, M.D.

Several cases of scarlet fever occurred early this spring, but not enough to be termed an epidemic. During July and August quite an epidemic of dysentery broke out in this township. The excreta from these patients was thoroughly disinfected; the highest number sick in one family being four. The Board received but one complaint this year, which was promptly attended to. The drinking-water is almost universally obtained from wells. The general health of the township is good. Malaria still predominates, but not so prevalent as formerly.

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HADDON TOWNSHIP, - *Report from* J. STOKES COLES, *Sec'y.*

I will give you the workings of this Board during the past year. We have stated meetings the second Tuesday evenings of each month, and, during the months of July, August and September, we were compelled to have adjourned and special meetings.

We had many complaints of foul privies and hog-pens; some of them were horrid to behold, especially the first named; and it goes against the grain with some of the owners of the property to comply with our demands.

We made a new code of ordinances in September last, and have blank forms printed for the use of physicians and our own use, so we are fully prepared for most emergencies.

Our borough and township during the past year have been healthy, as usual, with the exception of diphtheria, which is now prevalent, and several deaths have occurred from it. It appears mostly in certain localities, one of the streets in the borough having most of the cases.

We elected F. E. Williams, M.D., Inspector for the Board in the summer.

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STOCKTON TOWNSHIP. - *Report from* P. W. BEALE, M.D.

We have a regular Board of Health, and everything that can be done for the improvement of the public health is done. No filth is allowed to accumulate; no contagious disease is permitted to exist; no effort on the part of the Board is spared to promote cleanliness and secure for the residents of the township safety from contagion.

The assessor registers every birth, death and marriage.

Vaccination was performed by me three years ago to all in the township who had not been vaccinated, and we use every effort to prevent spread of contagion.

The expense has been greatly reduced this year on account of having no small-pox, which is the first year for some time that we have escaped without a single case.

There seemed to be a marked decrease in the number of malarial fever cases. Considerable typhoid fever has been reported and a number of cases of diphtheria and scarlet fever, but on the whole the health of the township has been what we may call very good.

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## CAPE MAY COUNTY.

CAPE MAY CITY. *Report from* DR. H. A. KENNEDY, *Secretary.*

The sewers were inspected by the Board last spring, and where needed, city council had them dug up and relaid before the opening of the "season." They are flushed at stated intervals by the steam fire engines. The usual water-level of 8 to 10 feet is sufficient to secure dry cellars.

There is no yearly house-to-house inspection, owing to a lack of funds to meet the salary of a competent Sanitary Inspector.

All cesspools and privy wells are now required by ordinance to be cemented on the sides, with open bottom, and to be emptied twice a year or oftener if required, at night, by a permit from the Board.



There have been fourteen nuisances complained of, and abated, during the summer, most of them caused by accumulations of garbage and slops. An ordinance was passed last May by city council, creating a garbage department, under the control of the city, for the daily collection and disposal of garbage and slops, but like many other ordinances has never been carried out, and the old way of removing the same by careless and irresponsible parties causes the Board considerable trouble.

The keeping of swine within the city limits from May 1st to October 1st, has been prohibited by ordinance of the Board, and carried into effect this year for the first, thus obviating a great annoyance to visiting cottage families during the hot season.

We are happy to report there has been no epidemic during the year, and notwithstanding the great crowd of visitors to our city during the past season, it has been exceedingly healthy.

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CAPE MAY POINT. - - *Report from* W. P. EDMONDS.

Water-supply principally from driven wells. At present, the hotels have rain-water stored in cedar tanks, above ground. The Cape May Improvement Company have water-works which supply the three hotels and a number of cottages, also the system of sewers. The company are now sinking an artesian well, which has reached a depth of 240 feet.

There is a main sewer running through the place, back about half a mile, which has about six feet fall. Here the sewer empties into an underground, cemented receiver, from which it is forced, by a steam-pump, through iron pipe, about a half-mile further, on the company's farm, where it is utilized for fertilizing. Connected with the main sewer are branches for the hotels and cottages, each branch of which is supplied with an automatic flush tank. No sewage whatever passes into the ocean. The Improvement Company have a system of drainage for land, distinct from the sewerage system, consisting of open ditches, eight-inch drain-pipe and wind-engine pumps, by which all the ponds in the vicinity have been completely drained.

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LOWER TOWNSHIP. *Report from* WM. C. RUTHERFORD, *Secretary.*

Hog disease, supposed to be cholera, has been very bad in this township for the last four months, and quite fatal.

Public health laws and regulations are mainly under the supervision of the local Board of Health.

Registration and vital statistics are reported to the head of the department, monthly, by the Assessor.

Sanitary expenses are provided for by an appropriation of the township, at their annual town meeting.

There have been no prevalent diseases in the township, except the fever at and around Swainstown last May and June, which was in quite a malignant form. On the whole, the health of the township has been good.

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MIDDLE TOWNSHIP. - *Report from* STILLWELL H. TOWNSEND.

In some parts of the township there are overflowed swamps and salt meadow, which I think detrimental to the health of the inhabitants who live near them. Very many cellars have water in them some parts of the year.

A swine plague has been going the rounds in the township for about ten weeks, and there is still some of it. Several hundred have died from it. I suppose it to be lung fever. The Board have taken action upon it to see that all animals are buried immediately after death.

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UPPER TOWNSHIP. - - RANDOLPH MARSHALL, M.D.

The transition to fall weather was attended with usual derangement, and cholera morbus, diarrhea and dysentery prevailed to an extent unfrequent in these parts. There were two cases during this period which manifested symptoms savoring strongly of Asiatic cholera, though amenable to treatment.

There have been a few sporadic cases of typhoid fever, somewhat malignant in character. One death resulted from brain complication.

An epidemic disease in swine has prevailed here since early summer. Fifty per cent. of the hogs have been attacked and fully seventy-five per cent. of these have died.

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WEST CAPE MAY BOROUGH. *Report from* D. C. VANAMAN, *Sec'y.*

No artificial drainage has as yet been attempted, excepting such sluices and drains as the individual owners build; in fact, there seems to be no need, with our present population, for any corporate action in the matter, with the exception of a few acres of low land on what is known as the "Miller farm." This, in time, may become a breeder of malaria, though, as yet, no harmful effects have been traced thereto.



With refuse of all kinds, of our own producing, we have but little trouble, it being either carted away by farmers and composted, or burned by the tenant; but with refuse from Cape May City a great deal of trouble is experienced. Garbage carters, being deterred from depositing within the city limits, dump it over the line, leaving us to discover the guilty party if we can; dead horses, cows, hogs, dogs, cats, or any other offal, being freely turned over to our jurisdiction, and with a *sang froid* that is truly refreshing.

The so-called hog cholera has prevailed to some extent among the swine.

The Board of Health was regularly organized under the new law and measures were immediately taken to control the Cape May City garbage carts, swill wagons and swine. The owners of city swine had already began to build their pens within the limits of West Cape May, the purpose being to board the swine of their more unfortunate neighbors at a small weekly profit. In previous years this had been carried on to an enormous extent, upwards of sixty hogs having been kept on a lot less than 50x150. To prevent this nuisance the Board passed an ordinance prohibiting the keeping of swine except by special permit of the Board. Permits were granted to sixty-four persons, subject to conditions. No exceptions were taken to these regulations, except by non-residents.

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## CUMBERLAND COUNTY.

DEERFIELD TOWNSHIP. - *Report from* C. C. PHILLIPS, M.D.

No epidemics have occurred during the year. Very little sickness and but few deaths, and those were old chronic cases in elderly persons.

The swine plague has been somewhat in places in the township, but not as much as in neighboring townships; but some farmers have lost their entire herd, whilst others only a part.

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COMMERCIAL TOWNSHIP. - *Report from* DAVID MCELWEE.

Prevalent disease, malaria, caused by inundated meadows. The owners have allowed the banks to go down, which seriously needs the attention of the State authorities.

Mr. Seth Brown, our Sanitary Inspector, reports the death of 112 hogs, and calls it the hog cholera.

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FAIRFIELD TOWNSHIP. - *Report from* W. S. APPLEGATE, M.D.

Besides the ordinary diseases incident to the seasons, we have, during the fall of '84 and the earlier part of winter, passed through a fearfully fatal epidemic of diphtheritic laryngitis, the disease, in most cases, appearing as a rather mild attack of diphtheria, with limited throat exudation, and apparently doing well for a few days, only to be followed by symptoms of laryngal obstruction, in nine of the twelve such cases death ensuing in from twelve to sixty hours from asphyxia.

A few mild cases of scarlatina; no epidemic.

Though the weather has been excessively hot, there has been but little dysentery, or any other bowel trouble, either among children or adults, and that light. Typhoid fever has only occurred occasionally, and the cases mostly of a mild type.

Malaria, severe and persistent, has been much more common than in the two preceding years. There are swamps in the southern section of the township, and large tracts of salt marsh, but the condition as to drainage, etc., is the same as in the preceding year.

A fatal disease, known as cholera, has prevailed among the hogs during the summer and autumn, in sections almost annihilating entire herds, and yet is apparently as little understood as when it first appeared.

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HOPEWELL TOWNSHIP. *Report from* CHARLES H. DARE, M.D.

There has been added to our county almshouse during the past summer a building to be used for contagious diseases. It is located some distance from the main building or almshouse, and is to be used exclusively for contagious and infectious diseases. There are two wards in the building—one for males and one for females. The building is of frame and is 18x24, and stands on an elevated piece of ground.

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LANDIS TOWNSHIP. - *Report from* EBEN H. FOOTE, *Secretary.*

Since the middle of the past summer, quite a number of hogs have died with what has been called cholera. It was not general over the township, but only in spots; did not make a clean sweep, but singled out from different pens.

Hogs have been banished from the slaughter-houses, and no complaints have been made the past summer by the neighbors.



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LAWRENCE TOWNSHIP. *Report from* ELISTON R. BATEMAN, M.D.

An amount of sickness somewhat above the average is to be reported.

Acute dysentery, following the epidemic of 1884, has occurred throughout the year, increasing during the summer months; diarrhea and bowel trouble very prevalent.

Several cases of diphtheria during the winter; also, several cases of catarrhal laryngitis, a considerable proportion of which ended fatally from œdema of the glottis.

This latter disease occurred concomitantly with a severe and fatal endemic of membraneous laryngitis, which occurred in Fairfield township, an account of which will probably be found in their report.

The "cholera scare" has been an efficient sanitary officer this year, and has relieved the Board of much labor.

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MILLVILLE. - - - - *Report from* L. H. HOGATE.

There is no system of drainage or sewerage in the city; surface drainage is all we have. The usual water-level is such as to secure dry cellars. There are one or two swamps near the city, but malaria is very infrequent.

Cesspools are not generally cemented; mostly built with open bottom and sides. They are cleaned by scavengers, between eight o'clock P. M. and six o'clock A. M., the contents removed some distance out of town.

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STOE CREEK. - - - *Report from* EPHRAIM MULFORD.

The hog disease, for the first time, has been very fatal in this township during the summer and fall. It has made almost a clean sweep of the pigs. From descriptions given in your eighth annual report, it is the same disease that has prevailed in other parts of the State; therefore it is useless for me to undertake a description. But some of the conclusions you have arrived at I do not think can be sustained, viz.: that it is contagious and that it comes from filth.

We have never been troubled with anything like it before, and hope it is not a precursor of something more serious.

No care over contagious diseases, nor is vaccination looked after.

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## ESSEX COUNTY.

BELLEVILLE TOWNSHIP. *Report from* D. M. SKINNER, M.D.

There is nothing to be added to former reports, save that the year has been exceptionally a healthy one. There have been no epidemics. Three cases of diphtheria occurred in one family and were attributed to a local cause which the Board abated, and there were no further cases. The Board have employed an Inspector to make a personal inspection of the whole town, and the attention of the citizens generally has been directed to the importance of improving the sanitary condition of their homes.

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BLOOMFIELD TOWNSHIP. *Report from* DR. ED. M. WARD, M.D.

The answers to schedule having been made in previous reports, I would only add that our inhabitants seem to realize more and more the necessity of observing sanitary laws. This is shown by the number of applications to the Board of Health for the abatement of nuisances and in the neater and more cleanly manner in which they live and keep their premises. With the exception of measles in a mild form (no fatal cases occurring), there has been no prevailing sickness during the year.

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EAST ORANGE TWP. *Report from* T. R. CHAMBERS, M.D., *Sec'y.*

There is a public scavenger service in the crowded districts. Cesspools and privies are used for excreta. They are emptied when necessary, the material is disinfected, dumped in trenches on the poor farm and covered with fresh earth.

Vital statistics are furnished by the Assessor.

The Township Physician is active in the matter of contagious diseases whenever necessary.

Expenses about four hundred and fifty dollars.



NEWARK. - - *Report from* DAVID L. WALLACE, M.D.

The Passaic receives the sewage of the city of Paterson, which is situated about sixteen miles above the Newark intake. In addition to this, as will be shown in the remarks under sewerage and drainage, there are seven culverts opening into the river in our own city, which discharge the drainage of an area of 3,075 acres. With each incoming tide a portion of this is carried to and above the intake. The pollution one and one-quarter miles below the falls, due to the sewage of Paterson, is about three times greater than at the intake, and this demonstrates the power inherent in a flowing stream to purify itself after a sufficient number of miles of flow, and also that between this city and the intake the number of miles of flow is not sufficient to accomplish this in as thorough a manner as the flow between Paterson and the intake. Thus we are obliged to accept the fact that two-thirds of the pollution is due to the sewage of Newark and points below the intake, while one-third is due to the sewage of Paterson and points above the intake. At times the water is discolored, and, as regards taste, it is changeable; at times, no taste being perceptible, while at others, we will get a woody, then a vegetable and then an earthy taste. Taking all the above facts into consideration, one of two things will have to be done: either seek a new supply or purify the present supply by mechanical means, each having their advocates. The advocates of the former insist that nothing can be done whereby the water can attain the standard required, while those of the latter contend that if manufacturers and communities are required to subject their sewage to such a degree of purification as will return the effluent water to the Passaic with at least fifty per cent. of its organic impurities removed, this, together with the purification by flow, will reduce the sewage contamination to about twenty or twenty-five per cent. of the whole; this can then be removed by proper filtration, with aeration, giving us water of an excellent quality.

An elaborate plan has been adopted by common council, not only for the drainage from the sewers in the eighth and ninth districts, but that of all the trunk sewers in the city. This plan consisted of a series of intercepting sewers, to extend from different sections of the city to a point on the margin of the upland and the salt meadows corresponding with the intersection of Miller street and Avenue J, as seen on the city map, where a pumping station was to be erected to contain two pumps, each capable of pumping 15,000,000 gallons in

twenty-four hours; these to be used to force the sewage through two wooden flumes or culverts, four feet square, to be placed three feet below the ground, and to extend from the pumping station on a southerly deflection in a straight line to Newark bay, at the mouth of Maple Island creek, and out into the bay about two thousand feet. It was decided for the present to build only one section, erect the pumping station, and sink the culverts to the bay; the section to be built being that to care for the drainage from the sewers in the eighth and ninth districts. Work was at once commenced and is now being pushed forward as rapidly as possible.

A few years since the common council commenced the plan of inserting $50,000 in the tax ordinance, the amount to be used in improving our streets by removing the cobblestones and substituting the oblong granite blocks. Each year it is decided which streets are to be improved and in which of the unpaved streets the cobbles removed are to be placed. In this way not only are our prominent thoroughfares given a fine appearance, but a number of unpaved streets are improved. Newark has altogether six parks, all kept in an elegant condition, a certain amount of money being appropriated by the common council each year for that purpose.

According to the returns of the census of 1885, as filed in the office of the Secretary of State, there are altogether in this city 19,467 houses occupied by 34,496 families. Most of these houses have basements or cellars, although there are some exceptions. In some instances we have found the cellars of the low grade of tenement-houses occupied, but in each case have compelled the parties to move out, and also ordered the landlord to discontinue the practice of renting such apartments. Up to this year no systematic plan of a house-to-house inspection was carried out, but in June last one was commenced and up to the present time 2,415 houses have been inspected, with the finding of 519 nuisances. Notices have been served for the abatement of the same and 476 have been abated. Numbers of instances of defective drainage were found, and in the majority of instances it was only necessary to call the attention of the owner or agent to the fact when it was at once rectified. We are meeting with very little opposition in this work, which is still being prosecuted vigorously and which is to be kept up until a record of every piece of property in the city is on file in the office of the Board.

The following is a condensed report of the amount of work done by this department from January 1st, 1885, to October 1st, 1885:



| | |
|---|---|
| Notices served for the abatement of nuisances | 2,257 |
| Abatements | 2,108 |
| Permits granted for cleaning privy vaults | 2,770 |
| " " " cesspools | 670 |
| " " sewer connections | 694 |
| Number of cases of defective plumbing rectified | 461 |
| Analysis of water | 10 |
| " milk | 29 |
| " ice | 5 |
| Persons found unvaccinated | 1,225 |
| " vaccinated | 2,405 |

The difference between the notices served for the abatement of nuisances and the abatements can be accounted for to a great degree from the fact that a number of notices were served in the latter part of September that are not yet due, and in some instances where parties ask for an extension of time, and no harm will result thereby, it is in most instances granted.

The number of miles of sewers is fifty-four, and the number of miles of graded streets is one hundred and thirty-two, showing that about five-twelfths of the built-up portion of the city is provided with sewers. A large proportion of the houses on the line of a sewer have connection with it, although, this not being made compulsory, some parties still depend upon cesspools. In localities where there are no sewers, the inhabitants are obliged to depend upon these receptacles, all of which are built with open bottoms and sides, allowing the filth to pass out and not only saturate the surrounding soil, but poison the wells for distances around. Our privy vaults are all built on the same plan, and in a large number of instances, on the house-to-house inspection, were found to be constructed of wood, and, as if this was not vile enough, we have found scores of instances where they have drained the waste from houses into these vaults, and then connected the vault with a public sewer, the idea being to use the waste for flushing purposes, and thus save the expense of cleaning these receptacles. There is a city ordinance prohibiting this without permission from the Board of Health, under a severe penalty, but it seems to have been a dead letter. It is now, however, being thoroughly enforced, and in case parties desire to carry out a plan of this kind, they are first obliged to get permission at this office, and have the work done in the following manner: A water-tight vault is constructed two feet wide, five feet deep, and of any length up to twelve feet, according to the number of houses to be placed over it, these

being in the length, instead of the width, except in cases where more than four houses are required, when the width, at the top only, is increased to three feet and the houses are placed both on the width and length. At a certain distance from the vault, on one or both sides, according to circumstances, a stone foundation is built, to give support to the floors. The vault has a curved bottom, and, from the description, it will be seen that the width is just sufficient for the seats to cover. Extending from the house to the vault is a four to six-inch drain-pipe, with a running hand trap, and which enters one end of the vault about a foot from the bottom; to this is attached the leaders and soil pipe, the latter, in all instances, having to be ventilated above the top of the house. It will be seen that this drain receives all storm and waste-water, and is used for flushing purposes. Extending from the opposite ends, about four inches from the bottom to the sewer, is a six to eight-inch pipe with a running hand trap. Inside of and the same width as the vault, an iron grating is placed, the bars of which are three inches apart, and which extends in a slanting direction from a point seven inches above the opening leading to the sewer to a point on the bottom, six inches from the same opening; this is intended to catch any obstructing material that may be thrown in the vault. From the fact of the opening to the sewer being four inches from the bottom, it will be seen that that depth of water will always rest in the bottom, any amount over that passing on into the sewer, carrying the excrementitious matter with it. There are at present about fifty of these vaults in the city, and all work with perfect satisfaction, from the fact that if there is any doubt about there being a sufficient amount of water for flushing purposes, a permit for construction is refused. The contents of privy vaults and cesspools have, up to the present time, been emptied by both the pumping and pitting processes, but during the summer an ordinance was passed whereby all vaults and cesspools must be emptied by the odorless process and by the pumping process in all cases except where the vaults contained substances not soluble in water, no person to receive a license unless he had a complete outfit consisting of pumps, tanks, hose, deodorizing apparatus, tents, dunigans, etc. It was decided at the time this ordinance passed not to put it into effect until October 1st, in order to give such persons as intended to continue in the business an opportunity to purchase an outfit. At the present time the contents of these receptacles, when removed, are carted to four farms



situated a sufficient distance from all habitation, where they are used for fertilizing purposes. The Sanitary Committee of the Board have under consideration plans for a more effective disposition of the same, and they hope in a short time to have this, which has been a source of great annoyance, permanently settled.

Ashes and garbage are removed by a systematic process of collection, a contract having been entered into between the Common Council and certain parties for a series of years whereby daily collections are made in most of the streets, although in some portions of the outskirts collections are made only every other day. A contract has also been made with the same parties whereby these matters are utilized to fill in the meadow land in the southern section of the city, being afterward covered by from six to eight inches of dirt. All dead animals are also removed by contract and carried to a rendering establishment on the margin of the meadow land some distance from habitation; for this privilege nine hundred dollars is received, which is credited to the Board of Health fund in excess of the amount raised in the tax ordinance.

No person is allowed to keep swine, goats, cows, calves or cattle of any description without a permit from the Board of Health, renewable annually, and which is registered in the office of the Board.

We have in our city at present eight slaughter-houses, and with the exception of one or two, they have been kept in a deplorable condition. Four of them are situated on the margin of the meadow land in the southeastern section of the city, and all refuse from them has been allowed to escape over this land creating a terrible nuisance. This matter has been carefully considered by the Board since its reorganization, and an ordinance regulating the construction of slaughter-houses and the slaughtering of animals has been passed, to take effect December 1st. This ordinance requires that no person shall erect, use or maintain within the limits of the city of Newark, any building for the purpose of a slaughter-house without obtaining therefor a license from the Board of Health, which shall be granted only by a two-thirds vote of all the members; and he shall cause the floors of said building, together with all apartments, pens, etc., connected therewith, to conform to prescribed regulations.

In addition to this the owner shall provide movable receptacles with tightly-fitting covers, for the purpose of receiving and carrying away all the blood, offal, filth, and other offensive matter which may

accumulate in the building or yard; this must be deposited in said receptacles and removed, together with all the fats, hides, skins, tripe and bones, daily, between the hours of six P. M. and eight A. M. The first violation of the above ordinance is punishable by a fine of $50, and each and every subsequent offense by a fine of $100.

The Sanitary Committee of the Board of Education has effected a number of improvements in connection with the schools, and it is to be hoped that the work it has so well begun will be continued until finally all matters bearing upon the sanitary condition of our school buildings are in a perfect condition.

On May 27th, 1885, the Board reorganized and began their work under the general laws of the State governing health matters. All of the ordinances as passed by the common council previous to the reorganization of this Board were adopted as its ordinances, to be altered or amended at such times and in such manner as the Board saw fit. Since reorganization six ordinances have been passed, viz.:

1. Prohibiting the keeping of swine, goats, cows, calves, or cattle of any description, without a permit.

2. Regulating the construction of slaughter-houses and the slaughtering of animals.

3. Prohibiting the keeping or storing of rags, old papers, bones, scraps, or other refuse matter in any building used as a dwelling-house, or to be stored or kept within twenty feet of any dwelling-house.

4. Regulating the stabling and keeping of cows.

5. Regulating the removal of the contents of any privy, vault, sink, or cesspool, requiring that all contents, except substances not soluble in water, shall be removed by means of air-tight apparatus, and only on a permit granted by the Board.

6. An ordinance to prevent the adulteration and regulate the sale of milk.

All of these have gone into effect with the exception of the second, which takes effect December 1st next. It is the intention of the Committee on Laws and Ordinances to continue to formulate ordinances and introduce them as rapidly as is consistent with their proper construction.

At present the Board of Health requires the reporting of all cases of scarlet fever, diphtheria (including membranous croup), and small-pox, and furnishes postal cards to physicians for that purpose. As soon as a card, reporting any contagious or infectious disease, is received, the Inspector of the district in which the case occurs, is required to visit the premises and make a complete survey, and have any existing sanitary defects remedied at once, and, if possible, have the patient isolated. In the case of small-pox, the patient, if he lies in a tenement-house, is at once removed to the hospital; in other cases, the patient is isolated in the upper story of the house, and a placard is at once placed on the house to warn others of the existence of such a disease on the premises. In all cases of contagious and infectious diseases, thorough disinfection of the room and all discharges from the patient is required, and, after recovery or death, fumigation of the apartments. No public funeral is allowed in the case of death from any of the above-mentioned diseases. Circulars are furnished, giving directions for disinfection and fumigation, and such articles as are required for these purposes are furnished by the Board, in case the parties are not able to purchase them, and in all cases when asked for, an Inspector is sent to superintend the process of fumigation. In addition to what has been done, in connection with the Board of Education as to vaccination, the co-operation of the teachers, in all our private and parochial schools, has been obtained, and within the past few months, including those vaccinated at the dispensary, about four thousand persons have been successfully vaccinated.



*Zymotic Diseases.*—Diphtheria, croup and scarlet fever have prevailed more or less during the entire year, alarmingly so during the winter and early spring. Our monthly reports, however, show a gradual falling off in these diseases, and at the present time we have very few cases in the city. There were a great many cases of measles in the southern section of the city during the spring, and whooping-cough was more or less prevalent throughout the whole city. Diarrheal diseases prevailed to a great extent during the warm weather, and many deaths occurred among children; before the warm weather there were very few cases, and since that time the number has been very small, showing that no local causes exist to bring on this class of diseases.

During the past month four cases of small-pox occurred, in three of which (occurring in the same family) the infection was traced to the steamer Eider, the family having crossed the ocean in that vessel in the latter part of August, a case of small-pox occurring in the second cabin during the passage. We have had some few cases of typhoid fever, but in most of the cases brought to the attention of

the health authorities the infection could be traced to some sanitary defect existing on the premises.

*Constitutional Diseases.*—The only disease to mention under this head is phthisis pulmonalis, the deaths from this disease during the year amounting to 517, showing a death-rate from this disease of 3.37.

In concluding my report I wish to congratulate our Board of Health on the efficient corps of Sanitary Inspectors whom I have to assist me in my work. One and all of them are thoroughly interested in their work, and through their labors scores of nuisances have been ferreted out and remedied, many of which were of long standing. To aid and assist them in their work our consulting engineers, Messrs. Bassett and Nute, are giving them a series of lectures on such subjects as will be of interest to them. These are delivered in my office, and are exemplified by drawings upon the blackboard. After a lecture is concluded the men are given an opportunity to ask questions pertaining to the same. In this way it is the aim of the Board to obtain a corps of inspectors who will be thoroughly conversant with their work, and then, outside of any political preference, to retain them. This object being carried out, there is no reason why its good fruit should not be shown, and the report of next year should bear evidence of it.

The work of milk inspection has been prosecuted vigorously since spring. During the first few months the quality, in a number of instances, was found to be poor and many suits had to be brought. This has had a very salutary effect, and at present the milk as a whole is of very good quality, it being the exception that a sample has to be taken for analysis.

The veterinary and meat inspectors have done excellent work in their departments, keeping a close surveillance over all places which they are expected to visit.

The common council of this city has now made the Board of Health an independent body, with all the powers needed to carry out its work, and if that work does not show its good effects the blame can only rest with the Board.

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SOUTH ORANGE TOWNSHIP. *Report from* A. A. RANSOM, M.D.

Our township for the last year has been free from all epidemics and but little sickness of any kind. Less malarial diseases than for



the last twenty years. In Vailsburg, a part of our town joining on to Newark, also East Orange, we had a few cases of diphtheria and four deaths occurred. On investigating the cause we found that both Newark and East Orange were drawing night-soil and dumping it on the ground. After we stopped them we had no more trouble. Had no little trouble with East Orange, as they had a strip of land coming out to the avenue, and they acted as if they had a perfect right to use their own lands as they saw fit. But we went before the grand jury with the case and have no more trouble.

I am thoroughly convinced that the contents from privy cesspools, where the evacuations are emptied, may be carried for miles and, after being spread on the ground as manure, a child can take the disease. I have more than one case to prove it. Will state we have no trouble in keeping our place in a good sanitary condition. Have in the spring put into our local paper a few rules and instructions how to put their houses and grounds in order, and have done more good in that way than one would at first think.

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## GLOUCESTER COUNTY.

GLASSBORO TOWNSHIP. *Report from* JACOB ISZARD, M.D., *Sec'y.*

The houses mostly have cellars, used for storing vegetables. There are two or three cellars that are used for shops or pool-rooms. Most of the tenement-houses are single, only one family in each house. There is a Health Inspector that has visited and inspected nearly every house in the town, and distributed printed rules in every family on sanitary health.

Cesspools are the receptacles of excreta. Some are cemented, but most are not. They are emptied by farmers, who haul the contents out of the town on their farms, which is mostly done in cold weather in the winter time.

There has been no prevalent disease this year. Slaughter-houses have been inspected, and the owners keep them so as not to be a nuisance to neighbors.

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GREENWICH TOWNSHIP. - *Report from* WM. G. COWGILL, *Sec'y.*

Source of water-supply is wells almost exclusively, and water is

principally surface-water, especially in the towns of Paulsboro and Gibbstown, and their immediate vicinity. The average depth of wells is about ten feet, except at Billingsport, where they are about thirty feet. The water in the wells along Mantua creek rises and falls with the tide.

Fully one-fourth of the land in the township is reclaimed land, the majority of which is included in the Repaupa, Clemmell and Mantua Meadow Companies. They are mostly well-drained, except a portion of Clemmell meadow, of which there has been some complaint. Drainage is accomplished by natural water-courses, dykes, ditches and sluice-ways. The township is nearly level, and it is almost impossible to secure proper drainage in towns. Practically, the water is allowed to work its way down into the soil. Cellars are usually dry, mostly cemented, shallow and above water-level. Malaria prevails at times, especially after very high tides or heavy rains that flood the meadows. Very few cases of malaria this year.

GEORGE C. LAWS, M.D., of Paulsboro, adds as follows:

The past twelve months have been remarkable for general good health, especially during the months of July, August and September. In connection with low-water level, there has been less fever of malarial type than at any time during five years. There have been some cases of typhoid, or rather typho-malarial, fever. Typhoid fever, *per se*, is rarely seen in this vicinity. In April and May, there were a few cases of bilious-remittent fever.

November, December and January, there was a general epidemic of influenza, in which muscular pain was a prominent symptom. In January, February, March and April, a decided epidemic of whooping-cough, and in February, March and April, an epidemic of scarlatina. In connection with the epidemic of influenza, there was an unusual number of cases of rheumatism. A few cases of malarial fever, especially in the neighborhood of the meadows.

This township, and, in fact, the entire neighborhood, is remarkably free from phthisis, but glandular affections (non-suppurating) are common. There have been eight fatal cases of Hodgkins' disease (malignant glandular-sarcoma) in the neighborhood within the past ten years. Renal calculus is also a comparatively common affection, especially in the town of Paulsboro.



HARRISON TOWNSHIP. *Report from* E. E. DEGROFF, M.D., *Sec'y.*

Our dwellings all have cellars. In some instances they are used for the storage of vegetables, and occasionally, from investigation, we have learned that typhoid and malarial fevers have arisen from decomposition of vegetable matter in the cellars.

With the exception of the usual amount of bowel disorders and diseases incident to children, during the summer months, we have had no epidemics.

Malaria does not seem to be so prevalent as that of last year. Our community is almost free from hog cholera, and entirely so from pleuro-pneumonia among cattle.

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LOGAN TOWNSHIP. - *Report from* S. B. PLATT, *Secretary.*

No sewers. Cesspools and privy vaults heretofore have been built with open sides and bottom, but now some old ones are being cemented and nearly all new ones are being built with tight bottoms and sides; contents generally used for fertilizers.

Local Board have adopted a sanitary code, the circulation of which has been some advantage and benefit by calling attention to sanitary matters which would otherwise escape notice.

Returns are generally made once a month, and few cases of neglect.

Physicians report less sickness in township this year than for any one year for six years past.

Three complaints of nuisances have been made to Board this year, and on notice to owner or tenant said nuisances were abated, as far as possible.

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MONROE TOWNSHIP. - *Report from* L. M. HALSEY, M.D.

The sanitary condition of the town has been very much improved during the last year. All property owners seeing the necessity of this have tried to keep their property in good condition. Privies are more frequently cleared; disinfectants more freely used, and at this writing our town is in better condition than for years past. A great deal of trouble arose from so many pig-pens. This nuisance has been almost entirely abated. Dysentery has been the prevalent disease the last summer, over a hundred cases occurring in the township. At present measles are epidemic. There have been some cases of typhoid fever, but all have been traced to bad water. In one family six have been

down. Not of a fatal type. The Board of Health have issued a pamphlet, giving instruction as to keeping nuisances abated. We have attended to all complaints and make regular examinations (house-to-house) as often as deemed necessary.

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WASHINGTON TOWNSHIP. *Report from* CHARLES D. NICHOLSON.

In making my assessment this summer I had a good opportunity to look over this township, and I found it in a good, healthy condition. Dysentery prevailed among small children during July. The hog cholera is in some parts of the township, some forty having died. No nuisances have been reported this year.

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WEST DEPTFORD TOWNSHIP. - *Report from* LOUIS K. WILKINS.

We take every precaution against contagious diseases. Vaccination is carefully looked after.

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WOODBURY. - - - *Report from* W. MCGEORGE, M.D.

The statistics of births, marriages and deaths from our city show that eighty-two births have been reported to the city clerk, forty-six deaths and forty-five marriages. The health of the city has been good. The Board of Health have done efficient work, and our city is in good sanitary condition. Many of the low places have been drained, and more care is observed in keeping drains open and dirty water moved. Compared with ten years ago the number of cases of intermittent fever are one-half to two-thirds less in number, and the cases of diphtheria fully seventy-five per cent. less. There is very little typhoid fever at any season of the year compared with what we used to have. A violent outbreak of whooping-cough has resulted in a few deaths, but on the whole all forms of disease are controllable and readily yield to treatment.

The most important question agitating our people now is the one relating to water works. The vote has been in favor of building, and council are now constructing the works. Unfavorable criticisms have been made because competent and unprejudiced experts were not engaged to thoroughly and carefully analyze and test the water. It is believed to be pure, and so reported on a partial test, but the fact of its flowing over and near marsh beds, and being subject at times to receive the drainage from the West Jersey Marl and Transportation



Company's marl beds, has set some of our people against the source of supply.

Another objection is that no provision has been made to get rid of the waste-water that will be so plentifully distributed, and the fear that adding the cost of sewers to that of building water works will largely increase our indebtedness and not increase the health of the city. Some of us had hoped that one of the experts of the State Board of Health would have been invited to make an official investigation and report of the whole matter.

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WOOLWICH TOWNSHIP. - *Report from* DANIEL LIPPINCOTT.

Public health laws and regulations are enforced where needed in case of filthy pig-pens, privies and decaying vegetation, etc. A great public nuisance exists at our depot. New York manure is landed there almost daily and unloaded. The stench is terrible and ought to be removed, but the township so far has been unable to stop the nuisance. The State Board of Health will have to attend to this matter, for the railroad companies promise but never fulfill their promises to local Health Boards, and the expense would be more than the township would willingly pay.

Sanitary expenses have been nothing during the year, everything going along nicely, and no cases requiring any other duties from the Health Board officers than requesting individuals having nuisances existing on their premises to remove them.

Contagious diseases have not been in this township this year. Dysentery existed pretty generally during July, but in a mild form, few deaths being reported. Malarial affections we have with us at all seasons of the year, but less during the past than during the preceding year.

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## HUDSON COUNTY.

HUDSON COUNTY. - - *Report from* E. J. ROONEY, Jr.

There was an outbreak this year of scarlet fever, which was almost exclusively confined to Jersey City. It occasioned 277 deaths in that city, the greatest number that has occurred in the county in the last eleven years. In some cases all the children of a family would be carried off.

It first assumed a serious extent in October, 1884, and culminated in November and December of that year. It ran through December, 1884, January, February and March, 1885, without diminishing much in virulence, and subsided by June, 1885.

This Board is frequently called upon by the authorities of towns and townships to aid them in compelling refractory citizens to abate nuisances. Much has been done by legal action on the part of counsel of this Board, and otherwise to apply and enforce a remedy in such cases; also by conference with the authorities defects of sewerage, etc., have been corrected.

The rapidly increasing population of some of the northern towns has brought the subject of disposal of sewage prominently forward, and the obstruction of primitive water-courses has often been the cause of contention, in the settlement of which the aid of this Board has been invoked.

In the case of Jersey City much complaint has been made of the condition of certain sewers, drains and natural water-courses, and of Mill creek, a sluggish natural stream, part of which winds its tortuous course through the sunken marshy land from the Bergen ridge, near Newark avenue, to the New York bay.

The condition, filthy and ill smelling, of these drains has been brought to the attention of the honorable the Board of Public Works of Jersey City, which body has jurisdiction of such matters, but so far, owing to lack of funds, only temporary remedies have been applied, such as the removal of accumulated rubbish. It is to be hoped that an appropriation for these uses can speedily be obtained by the Board of Public Works, so that effectual measures of relief can be prosecuted.

Much could be done by the city to better the drainage of the Heights by keeping the gutters free from obstruction. In many cases their being choked up causes the foulest odors to be exhaled from the quagmires that form in the unpaved streets. The authorities are being constantly urged in this matter.

There is great need of sewers in the Bergen Ridge section of the city, a need that is being but slowly supplied.

The census shows a very rapid increase of population of Jersey City. Much building is going on, many of the structures being of the tenement class.

The financial obligations of the city restrain the making of many



of the indicated necessary improvements in the shape of sewers, etc. A house-to-house inspection of privy vaults was carried out under the direction of the Health Inspector of Jersey City, Mr. D. W. Benjamin, and in all cases where found necessary vaults were ordered to be emptied.

The disposal of night-soil has been long a problem to the city. A scow has been used, which, when filled, is taken away and the contents disposed of to farmers along the Jersey shore. Often three weeks elapse before there is any receptacle ready to receive the contents of vaults.

It was necessary this summer to devise some plan to dispose of excreta in the absence of the scow. Arrangements were made by this Board and by Jersey City with local farmers to allow of excavations on their land in the suburbs of the city and outlying towns. In these pits the night-soil was dumped and covered with earth. Some objection was made by the residents of some localities, but now the plan is carried on in such a manner as not to annoy any one.

Arrests were made by the Inspectors of this Board of scavengers who did not comply with the terms of the special permits under which they were working. The Inspectors of the Board have frequently been out all night watching scavengers in order to arrest those who dump night-soil on the county and other roads, of which much complaint is made. None have been detected. It is difficult to catch them in the act of depositing the material, as they take precaution to be certain of no one's being in the vicinity when they do so.

The whole business of taking away privy-vault contents is carried on in a much less objectionable manner than formerly, owing to the enforcement, in several cases, of the penalty attached to the infraction of the ordinance covering this subject.

Closed wagons are now used generally by the swill and fat gatherers, instead of the reeking, uncovered boxes and barrels formerly the rule. This reform has been brought about by arrests, in many cases, made under the ordinances passed by the Board.

Many improvements have been made by slaughter-house owners at the suggestion of the Board's Inspectors, and an amelioration of the offensive sights and noisome odors has resulted. Much, however, might yet be done.

The State prosecuted keepers of piggeries and swill-boiling estab-

lishments in the northern part of the county, with the effect of driving many of them out of the business.

The Board, this summer, proceeded to consider methods of abating, if possible, the nuisance caused by stagnant water on sunken property in various parts of the county. It was determined to select one section and try what could be done to compel private owners to fill up to grade. An act was passed at last session of the Legislature empowering the Board to fill such lots and make the cost a lien on the property. Armed with this power, the Board selected the section of Jersey City from Fifteenth street north to the city line, between Grove and Henderson streets. Its efforts, through counsel, have met with wonderful success. Owners of all the sunken property have signified their intention to fill up as rapidly as possible.

In Hoboken, much filling has been done by private enterprise. The Board has begun to take steps in order to ascertain if measures cannot be had to compel the filling of the sunken property adjacent to the elevator of the North Hudson County Railway, which company have done much, by filling along their line, to better the sanitary condition of the adjacent property.

An effort is now being made to have the honorable the Board of Public Works of Jersey City, by placing drains, to relieve from surface-water the sunken meadow land between the Erie Railroad and Newark avenue, Brunswick street and the Heights. It is hoped that a feasible plan will be devised.

An act giving control to this Board, of plumbing, ventilation and drainage of buildings, was passed at last session of the Legislature. In view of the increasing density of population in many sections of the county, this is a matter of importance.

The assistance of the Counsel of the Board has been found necessary, in order to restrain persons engaged in business liable to cause the spread of contagion, such as dealing in emigrant bedding from ocean steamers. These beds are bought by parties who take out the straw, bale and sell it for stable bedding. The ticking is often used to cover barrels containing vegetables, etc. The Board has been uniformly successful in such suits. In most cases, the mere threat of legal action has been found sufficient to correct abuses.

Persons carrying on offensive trades in unsuitable locations have been compelled to seek other and more appropriate sections.



## HUNTERDON COUNTY.

CLINTON TOWNSHIP. - - *Report from* JOHN SHURTS.

The Board of Health has been called together several times during the past year to act upon complaints of nuisances. Such nuisances consisted of foul cesspools and bad and defective drainage. Upon the action of the Board, however, the nuisances have been abated and removed, and there appears to be a kindly spirit on the part of the inhabitants to comply with any request or demands from the Board.

During the months of July and August heavy and unprecedented rains caused an overflow of the banks of the streams passing through the township. Besides doing much damage, this overflow resulted in a vast surface of waste material placed under the heat of the sun, and in consequence diseases of a malarial type have occurred within these limits. Also, during the months of July and August and September there were numerous cases of diarrhea, of a dysenteric type, caused probably by the great quantity of surface-water which was forced into the wells by reason of the heavy rains. No contagious diseases are reported. The health of the inhabitants has been up to the usual standard, except the water trial trouble hereof spoken.

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FRANKLIN TOWNSHIP. *Report from* GEO. HOFFMAN, *Secretary.*

A few cases of typhoid fever and scarlet fever, also diphtheria, have occurred.

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BOROUGH OF FRENCHTOWN. *Report from* GEO. C. LANDON, *Sec'y.*

Surface drains are the only means of carrying off the water. There is no system of sewerage. In the spring of the year the cellars are often partially filled with water. There are no swamps in our borough, but the general surface is level and the water does not readily flow off except in those streets that are more thickly inhabited, where more pains has been taken to secure better drainage.

Cesspools are mainly employed to dispose of the waste-water and slops from the house. These cesspools are seldom cemented.

Our principal school is located on a hill, and is in four departments. The health of the pupils, I think, is carefully looked after by intelli-

gent teachers and trustees. The buildings are not overcrowded so as to endanger health.

Since my last report the local Board of Health has passed its sanitary ordinances, conforming to the requirements of the law of the State, fixing penalties for violating its provisions.

Our local Board is now in a good working condition. The citizens generally take pride in keeping cleaned up. There are, however, a few things which will need to be looked after in the near future if we would keep our borough in a healthy condition.

The physicians look after the vaccination, and when any contagious disease makes its appearance the patient or patients are quarantined.

The Board of Health appropriated fifty dollars for sanitary purposes.

Since my last report the sunken lot, owned by the Pennsylvania Railroad Company, below the depot, has been drained by running a pipe under the railroad adequate to carry off the water which collects in the spring, and becoming stagnant tends to produce malaria and other diseases.

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HOLLAND TOWNSHIP. - - *Report from* J. F. ANDERSON.

I have the pleasure to state that the valuable suggestions of the State Board have been fully carried out, thanks to the enterprise of Messrs. W. and E. Thomas, and the favorable action of our Township Committee. I mean the suggestions in regard to removing the obstruction in the creek that passes through our town, and the throwing up of embankments on its eastern shore. The work done, we confidently expect will prevent the annual or semi-annual overflow of one-half of our village, and consequently remedy numerous ills that human flesh is heir to.

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KINGWOOD TOWNSHIP. *Report from* GEO. E. DALRYMPLE, *Sec'y.*

The health of the township has been good during the past year. There have been a few cases of scarlet fever, but only one death therefrom. I have called on every family in the township during the past year, and there was only some three places but that were kept in a clean and decent manner.

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LAMBERTVILLE. - *Report from* GEO. M. HOLCOMBE, Jr.

Houses generally have cellars. Very few houses occupied by more than one family. We have a yearly house-to-house inspection.



Cesspools with open bottoms are generally used; contents generally removed in barrels and taken from premises. In the past year privies at about two hundred residences have been cleaned and contents removed.

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LEBANON TOWNSHIP. - *Report from* A. S. BANGHART, *Sec'y.*

Excreta is generally disposed of by burial, and very often is left to decompose on our vacant lots.

There has not been no disease among animals with the exception of cholera among fowls.

Our butchers are careful as to the refuse, and the slaughter-houses are kept clean.

Our school-houses are in good repair, and are as well built and ventilated as any in the State.

The past year has been healthy, no epidemics of any kind having made their appearance in our township.

Our local Health Board is active, obeys all summons, and in all cases strives to do its duty.

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READINGTON TOWNSHIP. - *Report from* D. T. STRYKER.

The township Board of Health has received several complaints of foul drains, etc., have notified the owners and they attended to them. It has been generally healthy.

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TEWKSBURY TOWNSHIP. - *Report from* O. A. FARLEY, *Sec'y.*

The general health of the township has been excellent during the past year, except the village of Califon, in which village typhoid fever has been prevalent during the past month. The disease is supposed by the attending physician to have originated from stagnant water in the cellar.

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## MERCER COUNTY.

CHAMBERSBURG. - - *Report from* JAMES H. TINDALL.

Garbage and refuse carted away at the expense of citizens and deposited with farmers outside borough limits, for use upon their land as manure.

There are only three slaughter-houses in the borough and they are in a clean, healthy condition, and are visited monthly by the members of the Board of Health.

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HAMILTON TOWNSHIP. - *Report from* WILLIAM T. YARD, *Sec'y.*

The Board of Health met at Hamilton Square to inspect the rubber works, pig-pens, slaughter-houses and other sources of nuisance. We found the slaughter-houses in a good state of cleanliness, but some of the pig-pens and yards in a very filthy state. We ordered them to have the same cleaned up and use disinfectants. We found the rubber works in a bad state as to drainage. They drain into the street the waste from the rubber, which is a source of annoyance to the property owners along the street. We want to have them drain the same on their own property.

The township is in a healthy state. The death-rate is one-third less than it was the year before.

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PRINCETON. - - *Report from* PROF. J. S. SCHANCK, M.D.

No public sewers yet, but privies and cesspools. The college distribution is on surface of about twelve acres, and is fairly satisfactory. We need public sewers. Some of our cellars are damp. Some malaria; less than two years ago. But few basements are used as kitchens. No systematic house inspection.

Frequent publications in town paper by Board of Health. Just now engaged in formulating a code of regulations.

Much care and anxiety during the year regarding the prevalence of diphtheria. Considerably over one hundred cases have occurred in and about Princeton since early spring, and a large number have proved fatal. It is almost entirely confined to children—largely the indigent and with unfavorable surroundings. Many cases may be traced to direct communication with the disease. Many have appeared to begin spontaneously. Latterly it is much intermixed with scarlet fever. The diseases seem very closely allied. We have been thorough in fumigations and care. Only tolerably successful in preventing public funerals.

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TRENTON. - - *Report from* WILLIAM CLOKE, *Secretary.*

I beg herewith to submit my third annual report of the operations of the Board of Health of the city of Trenton. The Board organ-



ized on the 24th of July, 1882, and at present comprises the following membership: President, Dr. John Woolverton; Health Inspector, James H. McGuire; Secretary, William Cloke; Dr. Cornelius Shepherd, Thomas S. Chambers, Dr. Joseph B. Shaw, G. D. W. Vroom. Since its organization the Board has accomplished important sanitary reforms. It has secured the establishment of a complete system of garbage removal. Heretofore garbage was removed by the individual citizens at their will and pleasure. In many cases it was dumped in back yards, in alleys and any out-of-the-way corner that was convenient. As a consequence the city was fairly gorged with refuse, and the air in warm weather reeked with the fumes. All this has been remedied by the removal of the garbage twice a week in winter and oftener in summer, by persons employed for that purpose under contract.

Another great reform which the Board has brought about is the absolute suppression of the ancient and obnoxious system of cleaning out cesspools with buckets, and carting the contents away in ill-constructed tanks that often slopped it all along the streets. This system had been in use in Trenton from time immemorial. It was very offensive, particularly in hot weather. When a privy vault was being cleaned out the whole neighborhood was saturated with insufferable stench, and people were often made ill by the nuisance. The Board passed ordinances abolishing this system, and providing for the cleaning of cesspools and vaults by inodorous excavators. The change has been a great relief to the city.

The Board has also secured the abatement of what was known as the water-power nuisance. The raceway of the water-power—an artificial stream—was used as the general cesspool or sewer for hundreds of privies, creating in the summer a terrible nuisance. This nuisance has been completely abated. The Board has carried through the Court of Chancery and court of last resort a case which fully establishes the rights and powers of Boards of Health established under the act of 1880. It has made decided headway with the vexed Petty's Run nuisance, and has it in its power to put a stop to it at any time, under the decision of the court referred to. The Board has refrained from exercising this power to the utmost, in the hope that the great inconvenience which would thus be caused may be averted by the adoption of a system of sewerage by the city.

The Board has done all in its power to forward the sewerage

project, and the enterprise is now in a hopeful condition. A plan prepared by Engineer Rudolph Hering has been adopted by the city, and the construction of the outfall sewer and some of the more important intersecting sewers will be commenced in the spring, if some additional necessary legislation as to the payment for the work can be obtained from the Legislature this winter.

During the three years that it has been in existence the Board has secured the abatement of more than fifteen hundred nuisances of various degrees, and has markedly improved the sanitary condition of the city. From the recent annual report to the Board by the Health Inspector. I make following extracts:

"The health of the city for the past year has been remarkably good, there having been no epidemic of any kind whatever. Our markets have received my careful attention. I am glad to report that they are generally supplied with good and wholesome food. The milk-supply has also received my attention, and there have been a few arrests made for selling adulterated milk, which have resulted in conviction in each case, and by this good effect we now think the citizens are receiving a pure article. The water supplied by the city is most excellent and much credit is due the management of the water-works for the uniform quality of water supplied. We have caused a number of wells to be abandoned and filled up, and there are no doubt many others that should be abandoned and will receive our attention as they are brought to our notice. The public schools have been visited and found to be in good sanitary condition, with perhaps the exception of poor ventilation in some of them. I have visited and inspected the county jail and find it in a most excellent sanitary condition so far as cleanliness goes. Physicians have reported the following number of cases of contagious diseases during the year: Typhoid fever, twelve cases; diphtheria, forty-five cases; scarlet fever, forty cases; scarlatina, twelve. There have been 601 deaths reported during the year. There have been about 1,000 privies and cesspools emptied during the year, and about 600 nuisances of various kinds reported at this office, and 107 compulsory notices served."

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WASHINGTON TOWNSHIP. - - *Report from* JOHN B. YARD.

The health of the township is very good. Only one complaint this year; it was about some phosphate stored in the freight-house at Windsor. I saw the agent of it and he said he would move it off



out of the village and did so. It smelled very bad, night and day, while it lay in the freight-house. It is all wrong thus to store different kinds of fertilizers in our small towns on the line of our railroads. Some of it has a very sickening smell. It should not be placed almost in a man's door, and left for months for us to breathe night and day.

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## MIDDLESEX COUNTY.

NEW BRUNSWICK. - *Report from* T. L. JANEWAY, M.D., *Sec'y.*

Upon the matter of drainage it seems proper to remark that the drainage of the lower part of the city is extremely defective, and owing to the present incomplete system of sewerage it is an almost insurmountable trouble, owing to the fact that the level of the water in the Delaware and Raritan canal, which occupies the water-front of the city, is above the bottoms of many of the cellars; in times of freshets many basements and cellars are filled with water, producing a condition necessarily far from salubrious.

The streets are very badly paved; many ruts and holes allow water to stand in them, which becomes contaminated with the excreta from animals, and under the summer sun exhales noxious gases.

The houses are mainly comfortable homes and not subject to much overcrowding.

Just upon the confines of our city we have several slaughter-houses, and within the more densely populated portion of the town is a hide-cleaning establishment which have been the source of much complaint and a standing cause of complaint to this Board.

During the current year 1885, a small emergency hospital has been established, which has afforded much needed assistance to the suffering, and has, we trust, been the means of saving some lives.

During the year 1885, the Board of Health, feeling the necessity of increased power, has reorganized under the laws of 1880–81, and, we trust, has been more efficient in its operation than ever before.

This Board feels that the subject of vaccination is one demanding serious consideration, not so much from any tendency towards negligence, as from the want of confidence in the efficiency of the virus supplied from many establishments having no legal authorization. It would seem that governmental action might effect marked improvement in this direction.

The popular vote has awarded the sum of $500 to this Board for its current expenses, and thus far this has been sufficient for our needs.

In the main the past year has been free from any marked epidemic. During the summer there was a marked tendency to dysentery, and we have more typhoid fever than should exist in our population. This tendency has been jealously watched and we hope by the care and industry of the members of our committees that the sources of disease may be detected and rendered harmless.

During the summer months the nuisances due to imperfect drainage and fermenting sewage in the gutters were combated by disinfection. A large cask provided with a hose and sprinkler was mounted on a cart, and by means of this apparatus gutters and streets were readily disinfected. This committee made a thorough inspection of the city, and marked in red on the map published by the Board, the gutters, etc., requiring disinfection. This map was then placed in the hands of the man employed for the purpose, who immediately proceeded to distribute disinfectants in all places so designated.

The solution used for disinfection of streets was made by dissolving corrosive sublimate in water, in the proportion of eight grains to a pint of water and adding sufficient crude carbolic acid to give the solution a distinct odor. This disinfectant was found to be very satisfactory in its action.

A printed form of blank for any complaints was issued by the Board of Health, and placed in all of the drug stores of the city. The intention was to make the citizens realize that the Board was working for their good and was desirous of acting promptly in all matters in their jurisdiction. The distribution of circulars had an immediate effect in greatly increasing the number of complaints, and consequently the efficiency of the Board. The confidence of the people in the work of the Board was also much increased.

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PERTH AMBOY. - - *Report from* CHARLES K. SEAMON.

During the past summer the health authorities of the port paid close attention to all incoming vessels from foreign ports, and application will be made at the next session of the Legislature for additional powers to quarantine and inspect such vessels, which is greatly needed.

Considerable sickness, chiefly malarial, has occurred at a new settlement in the north end of the town, the majority of which was among Poles and Scandinavians.



The company from which the city obtains its water-supply has in course of construction an artesian well, which, it is hoped, will prove a source of great convenience to the public, as last summer it was cut off from the water-supply for over a month. There is an abundant supply at present from springs and surface-water, and of a better quality than is sometimes furnished.

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SOUTH BRUNSWICK. - - - *Report from* CHARLES L. STOUT.

There has been no disease among animals reported to the Board, and do not think any existed, as inquiry was made during my annual visitation throughout the township. Slaughter-houses are looked after, and, am happy to say, are kept in good condition. The schools and school-houses are in good condition in the main, and the system of ventilation is receiving more attention than formerly. The cemeteries are generally near the churches, and are not laid out in regard to sanitary regulations. An epidemic of measles swept over the township in April and May last, and caused some of the schools of the township to close, but no fatal cases. All circulars of the Board are promptly distributed, and can say no complaints to Board of nuisances have been made.

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WOODBRIDGE. - - *Report from* JONAS H. CODDINGTON.

Have had no occasion for quarantine; vaccination is not enforced in the public schools by the trustees as it should be.

Nothing unusual, with the exception of quite a number of cases of dysentery in the southwestern part of the township, a large percentage of which were fatal.

Of possible causes of sickness or sources of hazard to the public health, we regard as worthy of mention a small stream used to carry off sewerage matter from a number of dwellings and water-closets along its course. This stream becomes quite dry in its upper portion during the summer, and in its lower portion is much filled up and obstructed; also, there is considerable undrained and swampy land in or near the village of Woodbridge.

## MONMOUTH COUNTY.

EATONTOWN. - - - *Report from* W. B. BEACH, M.D.

The Board of Health have held monthly meetings during the summer. Have urged that every one take an interest in sanitary affairs. Inspection and legal notice have done much toward the removal of the causes of diseases.

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FREEHOLD TOWNSHIP. *Report from* O. R. FREEMAN, M.D., *Sec'y.*

Great good has resulted from the establishment of the Boards of Health in city and township. In one instance only has there been shown a disposition to defy their authority. The contents of the cesspool connected with the county jail were deposited within the limits of the town, and after notification by the town Board, the nuisance was partially abated. Complaint was again made, and this time to the township Board, as the nuisance then existed beyond the corporate limits, but still in a locality dangerous to the public health. Evading the notification of this Board, the offenders were proceeded against by suit at law, and punished by a fine.

The storing of phosphates and manufactured manures in barns and store-houses, on the outskirts of the town, was made a subject of general complaint by neighboring residents, but notification by this Board was followed by prompt abatement of the nuisance complained of.

The past year has been marked by comparatively little sickness in the township. In the autumn of '84, typhoid fever made its appearance in one locality and spread among three or four families. All the cases were severe and protracted, but all in the township were successfully treated. The fever originated from impure water. A barrel, sunk but a few feet below the surface of the soil, with a very meagre supply of water, constituted a shallow well providing all the water used by a large family. Here, spring-water and surface-water mingling, produced an impure and stagnant pool—typhoid fever resulting as above.

During the winter there was also a general epidemic of measles, but fatal only in a few cases.



FREEHOLD. - *Report from* WILLIAM J. MCCLURE, *Secretary.*

The county jail, I am sorry to say, has undergone no change for the better, although the attention of the Board of Freeholders has been called to the matter several times. The cesspool is a matter of frequent complaint from the accumulation of liquid matter and filth, and the unfaithfulness of the party who has contracted for the emptying of its contents.

Several so-called cesspools have demanded the attention of the Inspector, and a notice to the occupants of premises where these nuisances have existed, has resulted in having the evil in most cases remedied.

Our town has been free from epidemics; several cases, and a few deaths of children from diphtheria, confined to the locality adjacent to the depot of the New York and Freehold Railroad, were noticeable, but they could not be traced to any conditions of the surroundings.

We find persuasion answers a very good purpose, and, although our efforts to improve the sanitary condition of the town have not at all times been successful, yet we are hopeful and avoid unnecessary expense in the enforcement of ordinances.

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MATAWAN TOWNSHIP. *Report from* BENJAMIN GRIGGS, *Secretary.*

Last March, in conformity to a general law of the State, by a vote of the inhabitants, the village of Matawan was constituted into a borough.

The borough commissioners have appointed William Spader, Richard Bedle, Dr. Cyrus Knecht, Peter C. Disbrow and Benjamin Griggs as a Borough Board of Health.

Said Board of Health met in July and organized by appointing William Spader, Chairman; Dr. C. Knecht, Physician; Peter C. Disbrow, Health Inspector, and Benjamin Griggs, Recorder of Vital Statistics and Secretary.

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MIDDLETOWN TOWNSHIP. *Report from* R. S. SNYDER, *Secretary.*

There was some cause of complaint of neglected privies, and of decaying animal matter in a community at Seaville. The Board of Health viewed the premises and served notices on a number of the owners, and posted ordinances for the maintenance of excellent

sanitary improvements, which were unanimously complied with, and all of our borders are now exceptionally exempt from disease, the death-rate being unusually low for so large a township.

The Board has been highly indorsed by the local press for its energetic administration.

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ASBURY PARK. - *Report from* RANDOLPH ROSS, *Secretary.*

During the past year the Board of Health has continued its work of detailed examination of premises. Every general re-inspection discloses new defects in construction or management, and it has been found that constant watchfulness, by a keen Inspector, is needed to prevent both owners and tenants from creating dangers to health. Decided benefits have been realized from the use of inspection records. Without them the Board would be unable to satisfactorily carry on its work, but by their aid the most important classes of dangers can be learned, and the labors of the Inspector can be directed to advantage. In October, 1884, the Board instructed the Sanitary Committee to inquire concerning the privy vaults of certain hotels and boarding-houses which had been reported as objectionable during the previous summer. After visiting the premises indicated, the committee advised that the vaults on thirty-eight premises be declared to be nuisances endangering the public health. This was done, and notices were sent to the owners, requiring that these structures be excavated and filled with earth.

Nearly all of these vaults were made of brick and cement, and were believed to be water-tight, but they were so situated that offensive gases entered the dwellings. Before May 1st, 1885, thirty of these vaults had been removed, and plumbed water-closets substituted. Only one suit was brought to enforce the orders of the Board in this batch of improvements. More of the same work will be done this fall.

Wooden cesspools are now so nearly eradicated that little remains to be done with that class of annoyances. Only ten of these structures now exist in the borough. The Board has caused the water to be analyzed in places where soda water or pop beer is manufactured, and has secured the closing of two polluted wells on such premises.

It has been found that much of the waste saccharine and fermentable liquids about such establishments, from washing bottles, etc., finds its way into the soil, and moreover such factories are often situated in a stable-yard, or on other polluted ground. We therefore believe that a serious danger to the public health is liable to exist in the case of all such establishments, where the water-supply is taken from wells on the premises. During the past year, October 15th, 1884, to October 15th, 1885, 760 complaints and nuisances have been investigated. There have been 2,125 inspections and re-inspections of buildings and premises.



Twenty cases of reported contagious diseases have been investigated.

Thirty-two children have been excluded from school on account of contagious diseases.

Thirty-three samples of kerosene oil have been examined, and fifteen samples found to be dangerous.

Since the organization of the Board we have sent 1,707 notices.

Twenty analyses of well-water have been made, and twelve wells condemned and closed.

Much of the ice sold in the borough comes from neighboring ponds, the shores of which have received deposits of garbage and night soil. Two analyses of this ice have been made, but its chemical quality did not warrant an order for its disuse. It is very desirable that protection should in some way be afforded to consumers against the collection of ice from stagnant pools and polluted ponds.

The prospect for an early introduction of the public water-supply is now very encouraging. The street mains are being laid and artesian wells are being bored. Thus far seven artesian wells have been put down by the Water Commissioners, but the quantity of water obtained is insufficient, and other wells are to be sunk.

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OCEAN TOWNSHIP. - *Report from* GEORGE. W. BROWN, Jr.

The Board was regularly organized last spring, and has abated all nuisances which have been reported to it, and with much less trouble than in former years. Arrangements are made for a system of sewerage.

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OCEAN GROVE. - *Report from* A. E. BALLARD, *Secretary.*

The garbage during the season is collected every day, and taken away a distance of ten miles, where it is either fed to animals or buried. The sanitary condition of every property in the Grove is

carefully inspected before the season commences, and recorded in the minute-book of the Board of Health. The owners are notified of whatever sanitary changes are necessary, and granted a suitable time to make them. If not made by that time, the Board of Health, under the authority of the Association, makes them themselves, and the cost is collected in their regular bill against the property. So far, this has been done without any serious collision.

After this general inspection, an officer is detailed to report anything he can see of an unsanitary character, and the people are encouraged to report any offensive or unhealthy surroundings. No name is given as to who reported, and the system appears to work well. During the winter, all vaults, etc., are examined and cleansed, and their condition reported and recorded. The water is also examined, and in cases where the test of a scum after boiling, or an offensive odor is emitted, the well is changed. The test is not a satisfactory one, but it is the best we can do in cases where the old wells are still used.

Since the last report, the Ocean Grove Association united with some public-spirited citizens of Asbury Park, and drained the meadows lying beyond it, which were becoming both offensive and dangerous from the population which was settling upon them, and from the water pools which stagnated in them. The effect both upon the atmosphere and the waters of Wesley Lake has been good.

At the present time, the Lake Commissioners of Ocean Grove and Asbury Park are engaged in sinking an artesian well at that point where these waters enter the lake, from which they hope to obtain a flow into them which shall send a sufficiently rapid current downward and over the dam into the sea to keep it fresh and pure all the time, and thus avoid the interruption which has heretofore been caused by the necessity of flushing the bottom so frequently with the waters let in from the sea.

During the season, the Association have added ten artesian wells to their former supply. Their depth has been about the same—420 feet. The flow is very slightly less than the first, while the quality is the same as that analyzed under Professor Cook, and pronounced among the purest in the State. Arrangements are being made to sink additional wells at different parts of the grounds where the flow will be conducted in pipes through the streets toward the reservoir of one hundred and ten thousand gallons. The houses along the line



are being supplied from the pipes, and beyond the reservoir supplied from the reservoir, in which will be stored all the night flow. The reservoir will be also used as an aid in case a fire should occur. The arrangements for water from the lakes meet all the needs in this respect, as any house in the Grove is easily reached from them, but this is added to the precautionary means for this purpose.

The sewage system still works without difficulty. There has been but one stoppage of a few hours in the pipes, which arose from the want of water in a large hotel, where the wells had given out, and very little went into the pipes. The difficulty was remedied by forcing water through the pipes, which carried the accumulated matter forward. The sewage is still carried out over 500 feet into the sea, and its continuous flow is uninterrupted. There is never any odor or discoloration over five feet from the point of discharge, and, while the experiment has been a very costly one, the Association feels that it has solved a problem which had been more perplexing than any other. The piling upon which the galvanized iron pipes are carried out, is of iron, and put down in the same way as and by the same man who put down the iron pier at Long Branch and Manhattan Beach. It is believed that they will stand firmly against the tides and wrecks which took away the wooden ones there before.

During the past year there have been 102 sewer connections made, and, as arrangements are being made to extend the sewer system, the health ordinances are being put in a shape which will make connection with it practically compulsory.

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SHREWSBURY TOWNSHIP. - *Report from* RICHARD A. SICKLES.

Red Bank has a water-supply owned by the town, a description of which was given in my last report. The pipes have been laid in all the principal streets of the town.

Very few cesspools are cemented; emptied by pumps into tight barrels and carted out on the farms.

This year one hundred and twenty-eight notices have been served by the town Inspector, and in every case the people have complied with the notice without making trouble.

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UPPER FREEHOLD TWP. *Report from* H. G. NORTON, M.D., *Sec'y.*

There is no house-to-house inspection in this township.

This spring there was an epidemic of measles of great malignancy,

characterized by severe complications, the disease seeming to increase in severity to the end of the epidemic.

Typhoid fever is prevalent at this writing about Imlaystown.

Four cellars, which had become very foul, and a slaughter-house were ordered cleaned in Allentown.

At Imlaystown station the privy was ordered cleaned, there being in it the accumulations of several years; very offensive in warm weather. Have also had a hog-pen moved from near a well and the spot sown in grass. We think the cases of typhoid fever occurring in this township, scattered as they are, must be owing to defective drainage and want of cleanliness about wells and pumps, many of which evince very primitive efforts to remove water and slops from the doorway and about the well. In most instances the drains only serve to hide the refuse of the kitchen and pump under ground to percolate in time into the well.

It would be a good lesson learned, if people could be brought to understand that slops cannot be carried away from pump-boxes through underdrain tile; where terra cotta tile, cemented at the joints, cannot be afforded, we think a wooden trough on top of the ground the best and most cleanly.

We commend burning as much house refuse, sweepings, (fruit and vegetable parings, in towns,) etc., as possible; to see ashes, sweepings, vegetable parings, etc., thrown into the street points directly to a slovenly housekeeper.

There are some farmers in this township whose hog-pens are too close to the kitchen, but we have been unable to convince them of any danger.

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## MORRIS COUNTY.

BOONTON. - - - - *Report from* A. E. CARPENTER.

Water-supply is entirely from wells. The wells all seem good, disease never having been attributed to any since the establishment of the village. I have not known of a single case of typhoid during my residence and practice here of eleven years. Dr. Ryerson also says he has never seen a case in twenty-four years' practice originating in the city limits. The wells have not been generally affected by dry weather this season.

The natural drainage is perfect, as the town is principally located



on the side of a hill, and every shower washes the place thoroughly, carrying all surface-matter entirely into the rapid river below. The subsurface drainage is also perfect, as the city is built upon a large sand and gravel hill, with no underlying strata, at least not within two or three hundred feet of surface.

Water-closets are generally situated in back yards. Some are of concrete and water-tight. In one part of the town, concrete water-closets and cesspools are obligatory to the requirement of a deed for property from the real estate owners. The majority, however, throughout the town are mere "holes in the ground," loosely walled up. The city ordinance requires all water-closets and cesspools to be cleaned at least once in two years. The excreta is removed with tight wagons, generally by farmers, and cesspools emptied likewise. I have never known of the water-supply being affected by privies or cesspools in the limits of the town.

Vaccination has been generally neglected during the last six years. The scare from Canada is at present waking people up a little to this important step.

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CHATHAM TOWNSHIP. - *Report from* J. N. DEHART, M.D.

The health of Chatham township during the past year, has been much better than that of several previous years. Although malarial fevers prevailed during the spring months in a greater degree than formerly, they were of less severity. Intermittent and remittent fevers were the most frequent, with a very few cases of a typho-malarial or typhoid nature.

The complaints of nuisances, which were caused by badly constructed privies and surface drainage of sinks, have been quite numerous. Some thirty-five complaints have been made to the Board, and all have received personal attention, and been abated as speedily as possible. The question as to what shall be done with the sewage has frequently arisen when these complaints have been made to the Board, but there seems to be no other alternative at present except the digging of additional cesspools.

In taking the school census, inquiries are made as to whether the children who attend school, between the ages of six and eighteen years, have been vaccinated thoroughly, and if any child has not been vaccinated, the parents are told that the child cannot attend school unless he or she has been vaccinated. The sanitary expenses of our town-

ship last year did not exceed one hundred dollars, and that was required principally for printing and publishing the code of health ordinances.

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MORRISTOWN. - - *Report from* JAMES DOUGLAS, M.D.

The high rate of mortality shown by the report of the State Board of Health, as applied to Morristown, is explained by the fact that Morristown has become a sanitarium, and every year there are from six to ten deaths among visitors who have been here but a short time, and in addition to these there are some who pass a few months or a year or two before dying from the disease for which they came to Morristown.

In the early spring of the present year the Board of Health caused a personal examination to be made of every piece of property in the corporate limits, with reference to the size of the premises, number of people residing thereon, water-supply and sewerage facilities, all of which is recorded in a book made for that purpose. A second examination, made later in the season by the Inspector, disclosed the fact that changes and improvements ordered by the Board of Health had been generally complied with.

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PEQUANNOCK. - - - *Report from* E. W. MARTIN.

There has been no disease among animals this year. I was very particular in inquiring in regard to this matter.

There have been no prevalent diseases this year. It has been quite healthy through the whole township.

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ROCKAWAY. - - - *Report from* WILLIAM P. BRYAN.

During the past year there have been no epidemics, and, if anything, a decreased death-rate, owing to the falling off in our mining villages. From these villages all men, who were so situated as to leave conveniently, have gone.

The principal causes of death during the last year have been meningitis and pneumonia, there being eight cases of the former and nine of the latter.

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WASHINGTON TOWNSHIP. *Report from* S. W. HANCE, *Secretary.*

I don't think returns of vital statistics are generally neglected. The fault lies in assessors and city clerks. Most physicians and undertakers and ministers hand returns to assessor or clerk of their own town or township, who place them on their own record, thus making the town and township record misleading. Clerks and assessors should be instructed to mail all returns where they actually occurred, and receive the same fee as for recording. When they refuse, they ought to be fined.



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## OCEAN COUNTY.

BRICK TOWNSHIP. - - - *Report from* A. W. DOWNEY.

This year a code of sanitary laws were adopted, to better regulate and govern all matters that pertain to or affect the health of the township. It is very evident that much good has resulted from the enforcement of these laws. During the summer and autumn of 1884, an epidemic of typhoid fever prevailed throughout the township, but, during the summer and autumn of the present year, only one or two isolated cases have come under the notice of the Board of Health.

The water-supply of the township is mainly derived from wells, and the strictest attention has been given in order that no privies should be located near the wells. The people have had brought to their notice, through a series of well-timed papers and through the printed sanitary code, the source of all epidemic diseases and the prevention of the same.

The refuse and excreta are made away with nightly in almost all the seaside resorts located within our limits. In Point Pleasant City, deep vaults, entirely impervious, are provided for all the hotels and cottages. At Lakewood, the provision for the removal of refuse and excreta, and all danger therefrom, is not so thorough and efficient. Yet within the next year the Board hopes to correct much that is evil in their system.

All slaughter-houses and abattoirs are prohibited within the limits of any town or village. This rule is strictly enforced, during the summer especially.

Some decided improvements have been perfected in several of our schools during the past year. More space has been provided and better ventilation. Still our school facilities are far from approaching the ordinary standard. In no other line of progress have our citizens

shown themselves so backward as in giving proper provision for the education of the young. However, in this direction there are also indications of an early action looking toward better things.

We earnestly believe that the Board of Health has been more efficient this year than it ever has been before. We feel more the responsibilities of life and death resting upon us, and are more and more resolved to meet these responsibilities conscientiously, and hereafter to have less deaths set down to "the mysterious workings of Providence" that are really due to the neglect of securing proper sanitary precautions.

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LACEY TOWNSHIP. - *Report from* MARCUS KENYON, M.D.

Township has been remarkably healthy, with exception of throat and lung troubles in winter and spring, and a few cases of measles.

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PLUMSTEAD TOWNSHIP. - *Report from* AARON S. BRONSON.

Sewers are not used in the township, and our cesspools are built with open bottoms, and their contents are carted away very generally and used for agricultural purposes. We have had a few sporadic cases of typhoid fever, but not of a contagious nature, and none fatal. And we have had no epidemic of any kind in the township during the last year, and but few contagious diseases. The Assessor makes due and proper inquiry every year in regard to all contagious diseases among animals, which we have entirely escaped for many years. Slaughter-houses are not complained of as a nuisance.

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## PASSAIC COUNTY.

MANCHESTER TOWNSHIP. *Report from* WM. D. BERDAN, *Sec'y.*

The most prevalent diseases of the year have been typhoid fever and diphtheria. There have been nine cases of each disease, with two deaths, one with each disease.

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PATERSON. - - *Report from* WILLIAM K. NEWTON, M.D.

About 48,000 people use Passaic river water. The remainder of the population use water from wells or cisterns.



It seems hardly necessary to say much about the Upper Passaic river as a source of supply. Its purity is well known, and the State Water Commission, in its report, speaks highly of the water as a source of supply for other cities than Paterson. The water usually has no taste or odor, but occasionally it has an earthy taste and odor. During the warm months, when drawn from the pipes, it is too warm to drink without ice, and often tastes earthy, but it is always safe and healthful. The water-works are owned by a private company. The water is pumped directly into reservoirs, of which there are three—one with a capacity of 8,000,000 gallons, another of 8,000,000 capacity, while the third holds about 3,000,000. A fourth is now building, and when finished will hold 25,000,000 gallons. About 6,000,000 gallons are pumped each day, a large proportion of which is used for manufacturing purposes.

The water remains in the reservoirs long enough to provide for the precipitation of a portion of the suspended matter, such as mud and earth, hence is clearer when delivered than when pumped. There is a constant interchange of the water in the different parts of each reservoir, and as the whole contents of all the reservoirs are completely changed at least once in each seventy hours, there is no danger of the water becoming stagnant, as is the case with water long impounded.

A rigid inquiry has also been made into the condition of the well-water, and the Health Inspector has analyzed the water of all the public wells, and many of the private ones. An ordinance was passed controlling this matter, and the wells are ordered closed when the water is discovered to be impure.

When this Board began the investigation there were 124 public pumps maintained by the city authorities. These wells were situated under the sidewalks, alongside of the gutter, and hence received the leaching from the soil and the soaking from the surface, besides the filth that had escaped into the ground from defective sewers and from privies and cesspools. Of the 124 public wells, the water in 98 was found unfit for use, the remainder were but slightly contaminated, or in some cases showed no evidence of dangerous pollution. The water from 48 private wells has also been analyzed, and 37 were ordered closed.

The following analyses will give an idea of the composition of some of the public wells.

| Location. | Free and albuminoid ammonia. | Chlorine. | Nitrates and nitrites. | Nitrogen in nitrates and nitrites. | Oxygen consumed. |
|---|---|---|---|---|---|
| Redwoods avenue | Exceedingly large in all cases. | 9.71 | Heavy traces. | 3.41 | .122 |
| Jefferson street | | 11.1 | " | 3.13 | .107 |
| Holsman street | | 13.1 | " | 9.08 | .13 |
| Jersey street | | 17.82 | " | 7.82 | .56 |
| Van Houten street | | 12.8 | " | 3.91 | .26 |
| Ellison street | | 4.6 | " | 4.07 | .18 |

The analysis of well-waters is being kept up, and an account kept of these analyses, which will be of service in the future.

About two miles of new sewers have been built this year, and portions of the city not previously sewered have been embraced in this year's work. The Broadway sewer has drained the land and cellars that heretofore were always water-soaked or damp. In our first report we gave all facts concerning the public sewers, and it does not seem necessary to repeat what has been said.

The usual house inspection has been kept up, with the result of abating many nuisances and making improvements. The cellars under many of the older houses are not in a sanitary condition, and the wall is not laid up so as to be water-tight, but in the newer houses great improvements have been made. The Board does not permit basements below the level of the sidewalk to be used for living rooms.

All premises abutting on sewered streets are required to be connected with the public sewer, and all waste must be discharged into the sewer. Since this Board was organized, over 700 houses have been ordered connected with the sewer; this year we have issued 188 orders to this effect.

A new ordinance was passed by the Board relating to sewage, cesspools and privies, and it is now pretty thoroughly enforced.

No cesspools are allowed on sewered streets, and as rapidly as sewers are built, these filth receptacles are ordered cleaned out and filled up.

No privy vault or cesspool is now allowed to be built on premises abutting on a sewered street.

During the past year about 1,100 privy vaults have been emptied with the odorless apparatus.

No contagious diseases of animals have been noted by this Board.



Only one slaughter-house permit has been issued by this Board. This is the only one in the city limits. Much of the slaughtering is done out of the city, or the meat is brought from the West.

A sanitary survey of the 13 public school buildings was made this year by the Health Inspector and the Superintendent of Schools. A report, embracing the heating, lighting, ventilation and other facts, was presented to the Board of Education. As a result of this report, many improvements have been made.

Two ordinances were passed this year, one relating to the water-supply, the other concerning privy vaults and cesspools.

The usual routine work of inspection and nuisance abatement has been kept up. During the year 603 specific nuisances have been abated. Fines to the amount of sixty dollars have been imposed.

Three thousand dollars was allowed the Board of Health this year.

As to typhoid fever, it may be said that many of the cases reported as such are not true enteric fever, but are severe forms of remittent or that bastard disease called typho-malarial fever.

Four of the cases reported in December were in one family and were caused by drinking water from a well into which a drain-pipe leaked. The well was closed. Several other cases were also traced to foul water or to filthy surroundings.

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Pompton Township. - - *Report from* Peter J. Brown.

The Butler Hard Rubber Company, doing business in Pequannock township, Morris county, has its factory situated so as to take the water from the Pequannock river, and, after using it, it is returned to the same stream. They employ 500 or more hands. Their privy vaults are emptied once a day into the above-named river. The village of Bloomingdale is situated upon the banks of this stream just below, in Pompton township.

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Wayne Township. - - *Report from* Richard J. Banta.

There are five school-houses in the township, all in good condition; there has not been any contagious disease in the schools.

The Board of Health are looking after all contagious diseases.

## SALEM COUNTY.

MANNINGTON TOWNSHIP. *Report from* DAVID F. GRIER, *Sec'y.*

Houses mostly occupied by farmers and have cellars under them, and they are dry, except in two colored villages of small houses with no cellars.

No contagious diseases among domestic animals, except the swine plague or cholera has prevailed to an alarming extent in this township since my last report, many persons losing from 60 to 80 per cent. of their entire herd. Efforts are made by the Board to have them buried after death. Some cases, through ignorance and indifference, have been neglected. The disease appears to spread more rapidly in warm weather through the medium of flies, which, we believe, convey it from the diseased feeding-grounds and troughs to the healthy ones. The disease seems to run its course through a herd in about six weeks. In many cases there were individual hogs that entirely escaped, though living with the diseased ones all the time. With suckling pigs and shoats it has carried off 80 to 90 per cent., but larger hogs have fared some better. One case to our knowledge, where a herd of 44 hogs, from 5 to 16 months old, were attacked, the owner began, as soon as he was aware they had it, to feed two tablespoonfuls of carbolic acid in their swill, which was made of middlings and water, just rich enough for them to drink it, and no richer. This was given them three times a day, about 25 gallons each time; about four ounces of copperas a day was also added. They were allowed the run of a field, but had good, roomy sleeping apartments, dry and well-ventilated, which were disinfected daily with about six tablespoonfuls of Little's sheep dip, mixed with about two gallons of rain-water. This treatment was followed up for about three weeks, since which, about one-half the amount of carbolic acid has been fed. The result at this time, after the disease had been in the herd six weeks, is one hog dead, which was the first one taken sick, and was sick five days before any acid was fed; two others a little stiff from the effects of the fever, and the rest as well apparently as ever. The party who treated these hogs believes that by so doing one-half of them escaped entirely, more than half of the balance had it light, and the rest, having good constitutions and good care, also were able to live through it, with one exception. He arrives at the foregoing conclusion from the fact that every pen of hogs in his neighborhood which had the disease, suffered at least ten times the loss that his did.



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PILESGROVE TOWNSHIP. - *Report from* J. M. C. RICHMAN.

Slaughter-houses are inspected so as not to be a nuisance to neighbors.

We have three canning factories, and there has been complaint made to the Board about their emptying their refuse matter into the creek.

Returns are generally promptly made.

Borough lock-up, one cell; prisoners turn in together. Poor ventilation; generally conceded a nuisance.

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QUINTON TOWNSHIP. - *Report from* GILBERT A. AYARS.

No prevalent diseases this year. Assessor has diligently inquired in regard to cattle and hogs, etc. Our township almost exempt from hog cholera. Our cattle and horse stock in good, healthy condition.

Slaughter-houses inspected and will be carefully looked after.

Local Board of Health is prompt in bringing up any and every question in regard to health, and we hope, by careful attention, to keep our thriving village of Quinton (population between five and six hundred) in prime health all the year. Hence, we are looking after the storm-water drainage and slaughter-houses and all other points with a sharp eye.

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SALEM. - - - - *Report from* S. L. RICHMOND.

The City Clerk reported nothing different from the previous year, except the outbreak of diphtheria, of which the following brief outline was furnished by F. Bilderback, M.D.:

There have been about 70 cases and 17 deaths. I include in this number, two fatal cases of membranous croup with no pharyngeal deposit; and also one case which occurred early in the epidemic and was not pronounced diphtheria, but which later had pharyngeal paralysis and incomplete paralysis of the respiratory muscles, terminating in rather sudden death from slight bronchial catarrh. The epidemic was confined almost entirely to the town, among the poor who lived in small tenement-

houses. With two or three exceptions, the disease attacked only children; one adult died. Did not seem asthenic. It caused death in every case by invading the larynx. Seemed to be endemic rather then epidemic, that is, was confined to isolated spots on the outskirts of the town; it did not seem very contagious, although it would generally attack all of a family of children, yet there were exceptions notwithstanding. The sick were not separated from the well, as that was impossible. I cannot account for the beginning or ending of this epidemic. The first case occurred in a family that had not been from home. The next in a family that lived about a mile from the first. This family had not been away and had had no visitors. I am not sure that bad hygiene or bad drainage had much to do with it. It would attack one end of a double house and not the other, although both ends would use the water from the same well and were subjected to the same hygienic influences, so far as could be seen. I do not believe the canning factories had anything to do with it. Last March three children died of croup in quick succession in one family. This croup seemed to be contagious or endemic in this house, for it destroyed in succession every child in the house. This house was a double one and had but one well for both ends. This disease might have been diphtheria, but it was confined entirely to this house, and there was no other case of it from that time till this recent outbreak, which began the fore part of this last October or last of September. I think there was a fatal case of diphtheria in one end of the house which had the croup cases last March.

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## SOMERSET COUNTY.

BEDMINSTER TOWNSHIP. *Report from* WM. P. SUTPHEN, *Sec'y.*

This Board has no extended report as referring to the past year. A notice duly signed was received by the Board on the twenty-fifth day of December, 1884, from citizens of Pluckamin, occasioned by the appearance of diphtheria of a malignant character. Two children died in one family and one in another before the disease could be checked. The Board met the next day and made an examination of the houses and their surroundings, and promulgated an order, by posters in public places, with instructions in accordance with Circular No. 44, of the State Board. The public school was closed one week,



and a quarantine placed upon the children of the town. The result was all that this Board could wish for. The disease ceased to spread and soon abated. The health of the township has been generally good. The condition of our school-houses is perhaps worse, as to health and cleanliness, than any other buildings in the township.

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BERNARDS TOWNSHIP. - *Report from* W. PENNINGTON, M.D.

There have been no epidemic nor endemic diseases during the past year. Malaria, at times, shows itself, but only within the confines of the great Morris swamp. Our healthful condition has led a greater number than usual of city boarders to make their summer homes in this township, and particularly about this village. The water is supplied by dug wells and is quite hard, but pleasant to the taste. All sanitary conditions are good.

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BRIDGEWATER TOWNSHIP. - *Report from* A. P. HUNT, M.D.

Water-works situated at Raritan. Private company; capital $50,000. Water pumped by water-power and steam-power from the Raritan river, in a stand-pipe 10 feet in diameter, 150 feet high. Used for domestic purposes, also supplied from hydrants in streets for suppression of fires; not used in more than half the houses. A new filtering process has been lately adopted, since which time the water is not discolored in the least, even when the water in river is very muddy, or during a freshet. There is no iron or other taste to the water; it is soft; not bad in any season of the year. Water-pipes are cleaned quite frequently, or when necessary. No sewage above the supply. Examination has been made as to pollution. About half depend on wells, and a few on cisterns with filters. We have an abundant supply from the water-works at all times.

Slaughter-houses are frequently inspected by the Board of Health and kept so as not to be nuisances to neighbors.

A great many nuisances complained of have been abated. Especial pains has been taken as to contamination of wells from cesspools and privies. No new privies are allowed to have deep pits, but are constructed with boxes for emptying the contents, and many of the old ones have been ordered filled and so arranged that surface-water cannot enter them. The quality of the water in wells has been very much improved.

HILLSBOROUGH TWP. *Report from* W. H. MERRELL, M.D., *Sec'y.*

There is an increasing intelligence in sanitary affairs. Vital statistics are recorded by assessor.

For the past two or three years malaria has been much less prevalent than formerly, and this year scarcely any has existed. During the winter sporadic cases of pneumonia occurred.

During the summer a severe epidemic of whooping-cough prevailed. Several had it then who are very confident they had had it before. And some who had before had it, became tormented with a severe paroxysmal cough lasting for weeks, but did not get the whoop.

During the summer there was a marked increase in the amount of dysentery over previous years.

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MONTGOMERY TOWNSHIP. *Report from* WILLIAM OPPIE, *Sec'y.*

We have three slaughter-houses in the township, and they are very nicely kept.

Our school-houses are in good condition, and the ventilation is fair.

I have visited the entire township this summer, and am pleased to report the general good condition of the same.

Malaria, which threatened us in former years, has mostly disappeared.

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## SUSSEX COUNTY.

ANDOVER TOWNSHIP. - - - *Report from* G. C. COOK.

Water-supply from wells and cisterns. Wells are all hard water, and furnish greatest supply of water. Some depend entirely upon cisterns for their supply of water.

No system of drainage. Cellars usually dry. Population of the village of Andover near three hundred. No sewers of any extent.

Houses all have cellars or basements. Cellars generally used for storage of vegetables. No tenement-houses with more than two families. No annual inspection of houses.

No prevalent diseases to report. General health has been good; but few deaths in the township. Population, 1,014. Have made general inquiry as to diseases of animals. None to report except one case of hogs, where six, in a pen of eight, died, attributed to over-feed.

No slaughter-houses complained of. One meat market has caused some complaint as being very offensive to the smell at different times during the summer season, from the proprietor's carelessness and neglect to remove the accumulation of stale meat, etc., and allowing his place of business to become filthy.



Our Board of Health is only on paper, no interest being taken in sanitary matters, from the fact, I suppose, that nothing of any serious import has visited our township injurious to the general health.

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SPARTA TWP. - *Report from* THEOPHILUS H. ANDRESS, M.D.

It has been very healthy during the last year. No epidemic diseases whatever, and malarial difficulties being less prevalent by far than for preceding years.

One thing I might add, viz.: Our school building is very deficient in regard to ventilation. It has been my zeal to have it properly ventilated, but my attempt was voted down by the district.

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STILLWATER TOWNSHIP. - - *Report from* C. V. MOON.

The Board of Health of Stillwater, Sussex county, N. J., held a meeting at Swartswood, a small village at the north end of Swartswood lake, in Stillwater township, on the 5th of September last, a complaint having been made to the Board from that village with reference to a tannery, situated on a small stream of water, one and a half miles north of that village. The complaint was that the refuse of the tannery being thrown into the stream was the cause of sickness in the village. An examination of the tannery by the Board revealed the fact that twice a year the contents of the lime vats are pumped out into the stream. The green hides are placed in the "limes," so called, to loosen the hair and fleshings. The hair is removed and sold; the fleshings are removed and dried, and sold to manufacture glue. It is a question whether strong lime-water is deleterious to health in causing disease. The supposition is that it is not. We found that spent tan-bark was allowed to float down the stream.

In connection with the tannery, we found a privy seat just on the bank of the stream. We ordered that nuisance removed. A mile further up the stream we found a man in the business of making cider, and much of the pomace found its way in the stream. We ordered that abated. A part of the village of Swartswood is located on a low, gravelly drift, in which the water of the stream settles in

dry weather, and the water of the wells located there no doubt is unhealthy. We found a cesspool much too near a well, and ordered its removal. The most of disease prevalent in that vicinity was simple intermittent fever.

About the usual amount of cases of intermittent fever have been prevalent; more numerous during the summer months.

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WALPACK TOWNSHIP. - - *Report from* MARTIN HULL.

The Township Physician quarantines and disinfects houses which have contagious diseases. Only a few cases of scarlatina occurred in the last year, communicated to patients by clothing. Vaccination has been performed on a greater portion of the inhabitants.

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WANTAGE TOWNSHIP. *Report from* NELSON DEWITT, *Secretary.*

Much of the low-lands have been drained, and some of them are productive, but the most are covered with wild grass, and used for pasture during the driest part of the season. The sewerage is quite extensive in the village of Deckertown, and is in good condition.

The Board of Health during the past year have been on the look-out, and, by persuasion, have had a general cleaning-out out of all places that seemed at all dangerous to the health.

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## UNION COUNTY.

CLARK TOWNSHIP. - *Report from* WILLIAM J. THOMPSON.

There are no prevalent diseases or slaughter-houses in the township. No resident physician and no public cemetery. The local Board of Health supervises matters and acts promptly in all cases brought to its notice.

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ELIZABETH. - - - - *Report from* A. R. REEVE.

There are thirty-seven miles of sewers, brick and pipe, which empty partly into the Newark bay and Staten Island sound, and partly into the Elizabeth river.

The Elizabeth river has been cleaned and deepened in the center during the past year as a sanitary measure, in accordance with suggestions kindly made by the Secretary of the State Board. Results promise to prove beneficial.



Refuse removed two and three times a week by public scavenger, as directed by Board of Health and Street Commissioner, and used in filling up low-lands near meadows.

Burials permitted only on certificate of City Clerk. Private burials in church-yards within the city limits almost entirely done away with.

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FANWOOD TOWNSHIP. *Report from* F. W. WESTCOTT, M.D., *Sec'y.*

The Assessor inquires each year as to losses of animals and contagious diseases, and states that no contagious diseases have been known in the township during the past year.

Slaughter-houses in our borders have been conducted so as not to prove a nuisance to the neighbors.

I know of but four cases of diphtheria in the township during the past year, but during January scarlet fever was quite prevalent in Scotch Plains, and of a malignant type. The Board of Health promptly closed the schools, and rendered efficient aid in quarantining the families, disinfecting and cleaning all places not in proper condition.

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LINDEN TOWNSHIP. - - *Report from* JOHN A. ETHERIDGE.

Our township has been remarkably healthy this year, only a few cases of scarlet fever, and every precaution was taken to prevent the spread of the disease. There has been very little malaria this year, I may say less sickness this year than formerly.

We have made some improvements the past year in sewerage, and shall continue doing so as fast as we conveniently can.

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PLAINFIELD. - - *Report from* WILLIAM C. BOONE, M.D.

The source of the water-supply is exclusively from wells, either dug, driven or drilled. The quality of the water is excellently pure, and in never-failing abundance. The average level of this subterranean supply is about sixteen feet below the general surface of the ground.

There is no established system of sewerage, with the exception of a limited extension of pipe from the lower part of North avenue to

Green brook stream, and the house refuse-water is, as a general thing, discharged into private cesspools, built mostly with open bottoms and loosely-stoned sides, eight feet in depth as an average; in some few instances with cemented walls and bottoms. These cesspools are emptied at the discretion of the owner or tenants, and at very irregular intervals. Outdoor privy vaults are numerous, and they do not get that careful attention which is necessary for the best sanitary condition of the localities in which they are situated.

Garbage, with ashes and other house refuse, is collected daily by house-to-house visitation of parties contracting for its removal at so much per barrel or load, and is deposited outside the corporation limits, to be used as fertilizing material, and to fill up inequalities in lots and marshy places.

The privy vaults and cesspools are mainly cleansed by the use of the odorless excavating apparatus.

The school-buildings are large, elegant and expensive, intelligently designed for healthfulness, safety of their inmates and convenience of pupils and teachers. These buildings possess most of the modern improvements that the tests of time and experience have approved, for ventilating, heating, lighting, drainage and other necessary sanitary arrangements, and are typical exponents of what an enlightened and liberal system of education can accomplish in the promotion of knowledge, with due regard also to the health and comfort, safety and convenience of all connected therewith.

The state of health of Plainfield during the past year has been highly satisfactory, with the exception of two instances of deterioration of the public health, which we deem it our duty to report.

One of the above exceptions has reference to the prevalence, in June, July and August, of a large number of cases of inflammatory diarrhea and dysentery, in adults mostly, of which a few proved serious and troublesome.

The second instance of deterioration of the public health may be noticed in the prevalence of a number of cases of typhoid fever, in the months of July, August and September. A city ordinance makes it obligatory for any physician practicing here to report to the Board of Health all casses of a contagious nature. From these reports we learn that eight cases of typhoid fever have occurred in our city during the above-named months. As this is claimed among the preventable diseases, it should exist only in the least possible degree;



and its recent development in certain quarters of the city furnishes but another proof of the well-known fact that filth and poverty supply a readier breeding-place for the germs of this disease than locations in which hygienic rules are observed and carried out. For all these cases reported have occurred in those streets of the city which are conspicuous by the utter neglect of cleanliness and of sanitary observances by the dwellers therein.

There have been some cases of malarial fever, probably a slight increase in number since last year, but not attributable, in the opinion of the Board, to any faulty sanitary condition here, as a careful inquiry reveals the fact that most of the cases have been brought to us by persons who have been residing or sojourning in other localities.

We cannot pass by, without dereliction of duty, another large danger to the general health of the city from the imperfect system of drainage which exists in a certain part of the city, viz.: The emptying of the Park avenue and Peace street sewers, as well as of the surface drainage of the streets and gutters (in some instances with suspected water-closet connection with the above-named sewers), into slack water—the two small streams, Green brook and Cedar brook, which course through the city on either side.

It will be readily seen that the deposit of animal and vegetable matter, the refuse of a large portion of the city, must contain elements formidable to health. When, therefore, these streams are very much reduced by drought, and exposed to the sun with their bottoms covered with filth and decaying matters, there necessarily obtains a most unwholesome state of affairs. There can be no doubt that the influence upon the public health is such as to favor the development of specific causes of disease.

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SPRINGFIELD TOWNSHIP. - - *Report from* W. B. STILES.

Only one complaint of nuisance has been reported to the Board this season, which was abated soon after the parties were notified and ordered to remove it.

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SUMMIT TOWNSHIP. - - *Report from* W. F. EDWARDS.

Houses generally have cemented cesspools and are emptied with a sanitary wagon, closed tight. The contents are taken to remote parts and either plowed under ground or disinfected.

The Board of Health have ordinances for the preservation of health which are strictly enforced.

There have been no prevalent diseases during the year.

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UNION TOWNSHIP. *Report from* D. HOBART SAYRE, *Secretary.*

Malarial fevers not as prevalent as in past few years. Diphtheria in one locality caused death of five children in two families. Preventive measures stopped disease from spreading.

Complaints of nuisance in one part of township, caused by discharge of sewage and waste-water in a water-course, was made to us. The Secretary of State Board was notified and made personal inspection, and rendered efficient aid and advice in abating the nuisance. The parties complained of were notified that the penalty of the law would be enforced unless the nuisance complained of was at once abated.

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## WARREN COUNTY.

FRELINGHUYSEN TOWNSHIP. - *Report from* F. RORBACH, M.D.

The refuse is mostly fed to pigs and chickens, but in some cases is thrown outside the kitchen door, a custom to be deprecated.

During the past year the amount of sickness and disease has been quite up to and, I think, a little above the average of the three previous years. We were again, for the third consecutive year, visited by an epidemic of scarlatina, which commencing early in January lasted until about the middle of April. The cases numbered sixty-two, but were of milder type than those of the previous two years, and none was fatal. There was an unusual absence of sequelæ; albuminuria and dropsy occurring in five, and otitis in two cases only. The total number for the last three years was 181, of which four were fatal. Following the scarlatina, sixteen cases of measles, all of mild type. During the winter and spring pneumonitis was unusually prevalent and severe.

Malarial fevers of all varieties were much less frequent than in former years, and I have to report only two cases of typhoid, neither fatal, the mineral acid treatment being employed. Also, only three cases of diphtheria, only one severe, and all recovered. In August and September, intestinal diseases, *i. e.*, cholera-morbus and infantum, catarrhal enteritis and dysentery were quite prevalent.



GREENWICH TOWNSHIP. - *Report from* WILLIAM SHERRER.

Excepting five cases of scarlatina early in the summer we have had no special disease. The all-prevailing disease (intermittent fever) is, during the summer, common with us.

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HARMONY TOWNSHIP. – *Report from* JOHN K. VANATTA.

The school-buildings, except two, are in a poor condition. They are in bad repair, small and poorly ventilated.

The public health has been good. Measles prevailed from April to July; no deaths occurred.

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HOPE TOWNSHIP. – *Report from* E. J. BERGEN, M.D., *Sec'y.*

The Board of Health for this township have little to report; only once the past year has it been necessary to call the Board together to abate a nuisance, which was promptly done.

The past year has been one of unusual good health among the people, only two cases of typhoid fever have been observed, one doubtless due to an untrapped cesspool, allowing gases to enter the house, but the cesspool remains in the same condition, probably to cause more sickness. There are malarial diseases among us at all times, but of a mild type. Our school-houses are in fair sanitary condition, although the out-houses are filthy. The attention of the trustees was called to their condition, and no doubt they will be attended to. Probably one-half of the children are not vaccinated, and unless there should occur cases of small-pox doubtless will remain so.

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LOPATCONG TOWNSHIP. *Report from* JEREMIAH YEISLEY, *Sec'y.*

The Board of Health attended to the sanitary affairs, and in all cases where nuisances were reported to them they have had them abated. There have been no prevalent diseases during the year, and although the death-rate is much higher than that of the preceding year, this may be accounted for by the death of quite a number of aged persons, and two suicides, which will cut it down to that of the former rate. There has been no prevalent disease among any of the cattle.

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OXFORD TOWNSHIP. *Report from* L. B. HOAGLAND, M.D., *Sec'y.*

Our water-supply is from wells, cisterns and springs. The former are, for the most part, well situated, and are kept in good condition

by being periodically cleaned. The springs, too, are mostly well located, except one in particular, in the town of Oxford, from which a number of families occupying the Oxford Iron and Nail Company's houses are obliged to obtain their drinking-water. This is so situated that during heavy rains a large amount of surface-water necessarily runs into it, and at the same time carries considerable filth with it. The Board of Health have notified the company, and have suggested means by which the matter could be remedied, but thus far they have paid little or no attention to it. We will try moral suasion for a while yet, and then see if legal suasion won't have a better effect.

Among the company's houses in Oxford, many have wet cellars, owing to the bad location of the houses and the springy condition of the soil in their vicinity.

Malaria is quite prevalent among us. In fact, almost every disease met with presents, in one way or another, the characteristic periodicity of malaria. There is a large area of reclaimed swamp-land near the town and also a mill-pond, which probably give rise to it.

Whooping-cough has been quite prevalent in the township during the spring and summer months, with a few deaths from complications.

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PHILLIPSBURG. *Report from* P. F. BRAKELEY, Jr., *Secretary.*

The water-supply is furnished by the Lehigh Water Company, of Easton, Pa., a private corporation. The water is sometimes discolored by heavy rains, but generally is perfectly clear and of a good quality. It contains a slight trace of iron and lime, but not in such quantities as to affect the natural softness of the water. The stream from which the water is supplied receives a limited amount of sewerage at a point eighteen miles above the location where the water used is obtained. About one-third of the population is supplied in the above manner, the balance depending chiefly on cisterns.

As a general rule cesspools are not cemented; some are walled at the bottom and sides, others are simply dug in the earth. Cesspools are emptied by the contents being pumped into barrels which are air-tight, and conveyed out of the town limits, there prepared and afterwards used as a fertilizer.

There is not a slaughter-house within the limits of the town, consequently the inhabitants are not annoyed by anything that might be caused by them.



WASHINGTON BOROUGH. - *Report from* C. S. STRADER, *Sec'y.*

The general health has been very good. No contagious diseases have visited us, and malaria, though existing, has not assumed a general character.

Slaughter-houses, which have caused some former trouble, have been kept clean. Hogs, as a general thing, are not kept in the borough limits. There has been no disease among horses, cattle or fowls.

Streets have been kept clean and well sprinkled.

The water-supply is from the Water Company's works and cisterns.

# REPORT OF THE COMMITTEE OF ANALYSTS TO THE STATE BOARD OF HEALTH.

## INTRODUCTORY REPORT BY PROF. ALBERT R. LEEDS, CHAIRMAN.

During the past year the work of the Committee has been prosecuted as far as the scanty material submitted to them by the local Inspectors would permit, and as far as opportunity was afforded them of studying the methods of analysis to be pursued in the examination of the articles of food, etc., officially submitted to them. In this relation, I would call attention to the valuable paper by Prof. H. B. Cornwall and Mr. Shippen Wallace, members of this Committee, upon "Reichart's Method of Butter Analysis." The writer has himself been more particularly engaged in the examination of malt foods, of infant foods, and in the water-supplies of our cities.

### EXPERIMENTAL WATER ANALYSIS.

In the latter connection he has had occasion to propose the addition to the method of chemical analysis now in use of a method of experimental analysis. It would occupy too much space to give the details and results of the method in this place, and the reader is referred to my report to the Special Commission appointed by the State of New York to recommend a new water-supply for the city of Albany, and to the Journal of the American Chemical Society. Briefly stated, the method is as follows: The water under examination is submitted to complete chemical analysis, including a determination of the dissolved oxygen and other gases. It is then purified by oxydation and destruction of the dangerous organic and organized matters which it contains. The fact of this destruction is ascertained by biological analysis to see what, if any, micro-organisms are left behind in the water after purification. Then the water is again chemically analyzed, and the amounts

of dangerous matters which have been removed in order to effect a purification, give the coefficient or index of impurity in the original waters. As an illustration of this method, I may mention the case of the water-supply of the Insane Asylum at Morris Plains. At the time of the outbreak of typhoid fever in that institution, it became necessary to ascertain whether the drainage and sewerage of the institution could be purified in such a manner as not to be a source of danger when allowed to flow into the water-courses in the vicinity. A sample of the drainage waters was first analyzed, then it was purified, and the resulting perfectly clear, limpid and pleasantly-tasting water was again analyzed in the manner indicated. From a water originally foul and dangerous, a water can be obtained which is pure, and from which pathogenic micro-organisms are absent, and the differences, as established by analysis of the water before and after purification, are those which are most important to know, and which are spoken of above as affording us the coefficient index or measure of impurity.

## INFANT FOOD.

In a former contribution upon this subject the author gave the analyses of the various articles of infant food at that time in use, and gave as a final result of their examination the conclusion that the most satisfactory article of artificial infant food was cow's milk. Not cow's milk, however, just as taken from the cow, but so modified that the ratio between its several constituents and the nature of its albuminoids or caseine should be so modified that the modified cow's milk, or "humanized milk," should be the equivalent both chemically and physiologically of woman's milk.

The main difficulty is to obtain good cow's milk to begin with, since the physician employs both of these in the writing of the formula for preparing the "humanized" milk, and if it is impure or watered or skimmed the desired equivalency in the composition of the "humanized" to human milk cannot be so exactly attained.

The method has now been successfully pursued in many thousand cases. The reasonableness and propriety of starting with pure cow's milk as a basis has been admitted on all hands, and the further advantages of modifying the cow's milk, so as to make it equivalent in composition to woman's milk, have been abundantly confirmed by



medical practice. Unfortunately the success of this method has led to the production of other articles of food which are advertised as containing the same constituents as human milk, but which are in reality farinaceous preparations similar to the milk-foods of which I gave an extended account and analysis in previous volumes of these reports.

Of such a nature is a tasteless flour-like powder, sold as Carnrick's Soluble Food, or Milk-Wheat Food. The information contained in the statements made by the manufacturers concerning it are sufficient to show the crude and imperfect manner in which they have appropriated the literature of the subject. For it is stated that "The analysis of this prepartion will show that its constituents are almost identical with an average sample of human milk, its formula being: fifty per cent. of the solid constituents of milk (the caseine being brought to a soluble condition by means of pancreatine); fifty per cent. of wheat (the starch of the wheat being converted into the soluble form of dextrine and maltose)."

It would appear almost unnecessary to say that such a preparation cannot possibly be almost identical with human milk, when it is stated to contain fifty per cent. of dextrine and maltose, neither of which substances are present in human milk.

The analysis of this "milk-wheat" food shows that the name is a correct one, and that whilst it contains the constituents proper to a milk-food, the statement that it is almost identical with an average sample of human milk is absurd. I add an analysis of the American-Swiss Milk Food, and the average composition of milk-foods in general for comparison:

MILK FOODS

| | Carnrick's. | American-Swiss. | Average. |
|---|---|---|---|
| Water | 3.42 | 5.68 | 7.50 |
| Fat | 7.45 | 6.81 | 5.50 |
| Albuminoids | 10.25 | 10.54 | 13 25 |
| Soluble Carbohydrates | 27.08 | 45.35 | 45.00 |
| Insoluble Carbohydrates | 37.37 | 30.85 | 25.00 |
| Ash (saline constituents after ignition), | 4.42 | 1.21 | 2.25 |

The peculiar and inexplicable feature in the composition of the Carnrick's food is the enormous percentage of ash. How very large it is will be seen on comparison of the analysis of the ash of many

samples of condensed milk and of wheat-meal, the former containing on an average 2.6 per cent., the latter 0.75 per cent. of ash. To discover to what this great excess of saline matters is due, an analysis was made with the following results. I quote analyses of the ash of milk and wheat for comparison (Königs, Nahrungs and Genussmittch):

| | Ash of Milk. | Ash of Winter-Wheat. | Ash of Milk-Wheat Food. |
|---|---|---|---|
| Sodium Monoxide | 9.70 | 2.25 | 16.74 |
| Potassuim Monoxide | 24.67 | 31.16 | 11.16 |
| Calcium Oxide | 22.05 | 3.34 | 27.07 |
| Magnesium Oxide | 3.05 | 11.97 | 5.02 |
| Ferric Oxide | 0.53 | 1.31 | Trace. |
| Phosphoric Anhydride | 28.45 | 46.98 | 22.34 |
| Sulphuric Anhydride | 0.30 | 0.37 | 2.29 |
| Silicic Anhydride | None. | 2.11 | 0.54 |
| Carbonic Anhydride | None. | None. | 7.79 |
| Chlorine | 14.28 | 0 22 | 9.09 |

These analyses reveal a great excess of soda in Carnrick's food, which must have been artificially added in the form of carbonate of soda, as is shown by the carbonic anhydride present in the ash of the milk-wheat food and absent in that of wheat and milk.

This addition gives a persistently alkaline reaction to the food, and is tantamount to the giving of a dose of carbonate of soda to the infant on every occasion when the food is used. There is a similar great excess of sulphuric anhydride, due to the inexplicable presence of a large amount of sulphates. These excesses are made up by a corresponding deficiency in the salts of potash, a most unfortunate blunder, inasmuch as these potash salts are vital to infant nutrition.

I have written thus explicitly of Carnrick's soluble food, for the same reason that I spoke severely in a previous report of Savory's and Moore's food. The latter, whilst claiming to be prepared in accordance with Liebig's principles, was actually in point of composition and preparation in opposition to them. And the former, whilst claiming to afford a food of similar composition to woman's milk, is in reality a wheaten milk-food, similar in composition to milk-foods hitherto prepared, except in the very large proportion of its saline constituents, and in the artificial addition of an excessive and injurious amount of carbonate of soda.



## CONDENSED MILK.

A somewhat similar literature has been promulgated in reference to the substitution of condensed milk, properly diluted, for human milk. It has been stated that in the process of condensation a certain amount of modification is effected which renders the diluted condensed milk more readily assimilable than cow's milk in its natural condition, before condensation. And, furthermore, that by the condensation of cow's milk, especially rich in cream, a condensed milk can be manufactured which affords on dilution a milk similar in the ratio of its constituents to woman's milk.

Neither of these statements are true, and the attempt to realize them in practice has been attended with failure. This was notably true of the so-called "Special Cream Brand" of the Romanshorn condensed milk, extensively alluded to in the medical journals during the spring of the present year. It was contained in glass bottles, to do away with the objection arising from the use of tin, and was of a yellow color with thick, creamy consistence. I give its composition, first, as determined upon the original sample; secondly, when diluted ten and a half times; and compare both of these with the averages of cow's and human milk, which I have given in previous annual reports of this Board.

ANALYSIS OF ROMANSHORN SPECIAL CREAM BRAND CONDENSED MILK.

| | I. Romanshorn Special Cream Brand. | II. The same, diluted 10.4 times. | III. Average commercial milk. | IV. Average woman's milk. |
|---|---|---|---|---|
| Water | 54.21 | 95.61 | 87.7 | 86.73 |
| Fat | 13.60 | 1.30 | 3.75 | 4.13 |
| Albuminoids | 15.06 | 1.44 | 3.42 | 1.99 |
| Sugar | 15.24 | 1.46 | 4.42 | 6.94 |
| Salt | 1.89 | 0.18 | 0.64 | 0.20 |

From these analyses it is evident that the special cream-brand, especially prepared, as it was stated, for the use of infants, did not yield by dilution a milk in which the ratio of the constituents was the same as in human milk.

On keeping a short while after opening the bottle, this condensed milk became very offensive. Moreover, much of it spoiled before opening the bottles, and for these various reasons the project failed disastrously.

### CONDENSED PEPTONISED MILK.

A proposition which has more in its favor than the employment of milk prepared by direct condensation, is that of first peptonising the nitrogenous constituents of the milk, and then condensing it. The difficulty in carrying the method into practice appears to be in obtaining a condensed product which will keep indefinitely without change, and one which will not acquire a more or less bitter taste and a darker color than ordinary condensed milk. The difficulty has in one sense been overcome by the addition of a very great excess of cane-sugar to the milk in process of condensation. By means of this addition, a thick syrupy liquid is obtained without carrying the condensation nearly to the point which otherwise would be requisite. Moreover, the keeping qualities of this syrupy condensed milk are, as may readily be supposed, almost perfect. Some open cans stood in my laboratory for six months without any serious alteration in their contents. The surface of the milk became covered with a crust, upon which well-defined crystals of cane-sugar were formed by process of evaporation, but the liquid appeared quite unaltered and palatable. I give an analysis of some milk of this description, prepared by Savory and Moore:

| | Condensed Peptonised Milk. | The same, diluted 6.8 times. | Average woman's milk. |
|---|---|---|---|
| Water | 15.32 | 87.76 | 86.73 |
| Fat | 13.95 | 2.02 | 4.13 |
| Albuminoids | 7.16 | 1.03 | 1.99 |
| Cane-sugar | 55.54 | 8.05 | ..... |
| Milk-sugar | 5.20 | 0.75 | 6.94 |
| Ash | 2.65 | 0.39 | 0.20 |

It will be seen from this analysis that the diluted condensed peptonised milk is in no sense a substitute for human milk. Out of 12.24 per cent. total solids in the sample of such diluted peptonised milk analyzed, 8.05 per cent., or much more than one-half, is cane-sugar, which does not exist in human milk. The ash was large in amount and was alkaline from the presence of alkaline salt, added to the milk in the process of condensation. The fat, albuminoids and milk sugar were as largely deficient as the cane-sugar was excessive in amount. From these considerations the injury and defective nutrition resulting from the substitution of such diluted condensed milk for human milk, are readily apparent.



### BIOLOGICAL ANALYSIS OF MILK.

It is evident that in the course of inspection of commercial milk, much milk that is capable of originating disease, either from the fact of having polluted water added to it, or from having been derived from diseased cows, escapes detection. This unfortunate state of affairs has been illustrated in the case of a sample of milk which was suspected to have been the cause of sickness in the family using it. The milk was brought to me as having been obtained especially from the milk of one cow, and as being of superior excellence. It proved to be entirely abnormal in composition, having a specific gravity of only 1.0246 (corrected), with 21.28 per cent. of total solids, of which 13.95 per cent. was fat and 0.94 per cent. of saline matters.

On examination under the microscope great numbers of colostrum and pus corpuscles were apparent. It was then submitted to biological experiments in sterilized culture tubes, when large numbers of bacteria were discovered to be present. The use of the milk was promptly discontinued. How large a quantity of similarly affected milk finds its way into the market it would be difficult to say, but the employment of biological methods in the examination of milk would unquestionably be of the greatest service in its detection.

### ANALYSIS OF ASH OF ABNORMAL MILK.

Had I obtained a milk containing 0.94 per cent. of ash in the ordinary course of inspection of commercial milk, I should have deemed it wise to examine the ash for foreign substances, inasmuch as 0.94 per cent is much above the average. I find a limited number of analyses in which as high or even higher percentage of ash is given, but know nothing of the physical condition of the cows from which the milk was taken. In the present instance there was considerable ulceration of the udder, due to improper milking. I give, for comparison, the minimum and maximum results obtained in the analysis of four samples of milk, presumably normal, by R. Weber and Haidlen:

| Ash | Normal Milk. | | Abnormal Milk. |
|---|---|---|---|
| | Minimum. | Maximum. | |
| Potassium Monoxide | 17.09 | 33.25 | 17.02 |
| Sodium Monoxide | 8.60 | 11.18 | 7 88 |
| Calcium Oxide | 17.31 | 27.55 | 32.75 |
| Magnesium Oxide | 1.90 | 4.10 | 1.07 |
| Ferric Oxide | 0.33 | 0.76 | ..... |
| Phosphoric Anhydride | 27.04 | 29.13 | 25 72 |
| Sulphuric Anhydride | (0.30 per cent. mean.) | | 3.03 |
| Chlorine | 9.87 | 16.96 | 12.15 |

From this analysis, the abnormal milk would appear to be deficient in alkalies and iron, and excessive in regard to lime and sulphuric acid. It should be added that whilst its smell was normal, it had an acid reaction and the taste of scalded milk.

# REPORT OF PROF. H. B. CORNWALL, MEMBER OF THE COMMITTEE OF ANALYSTS.

*Prof. A. R. Leeds, Chairman Committee of Public Analysts:*

DEAR SIR—I have the honor herewith to transmit to the State Board of Health, through you, my report of work done during the year as a member of the Committee. I have examined a sample of kerosene, received from Dr. William K. Newton, Paterson, which flashed at 100.7° Fahr., and another from Inspector McGuire, Trenton, which flashed at all ordinary temperatures, and was simply benzine. It was said to have been sold by mistake.

A specimen of "Eier-nudeln"—egg noodles—was sent to me by Dr. Newton. It was suspected to be colored with yellow chromate of lead, and did indeed contain an exceedingly minute quantity of that pigment, chrome yellow. The quantity was, however, quite too small to have any effect on the color of the noodle. It may have been the residue of a larger dose originally used, some of which remained in the kneading trough when the batch of noodle was made, from which my sample was sent. This seems the most reasonable explanation of the fact that the chrome yellow seemed to be pretty evenly distributed through the sample, but in so small quantity as to preclude the idea that it was purposely added.

The most important part of my work has been spent in preparing, together with Mr. Shippen Wallace, the paper on "Butter Analysis," accompanying this report.

## REICHERT'S METHOD OF BUTTER ANALYSIS.

BY H. B. CORNWALL AND SHIPPEN WALLACE

The analysis of butter may seem a well-worn subject, but increasing experience with existing methods shows, as in the case of the analysis of milk, that the methods and standards are not yet as perfect as might be desired.

It was determined by the Committee of Public Analysts, in view of the importance of a reliable method of butter analysis, to subject Reichert's method to a careful series of tests, and we were requested to prepare the results for publication.

The method in question was discussed, in connection with the general subject of butter analysis, in the report of the New Jersey State Board of Health, 1884. Since that time some new facts have been published relating to it, which are now deemed worthy of presentation.

It will be well to repeat here the directions for performing the analysis, as abstracted (in the report alluded to) from Reichert's original article in Fresenius' *Zeitschrift für Analytische Chemie*, 1879, p. 68; because none of the descriptions which we have met with among English translations possess the desired accuracy of detail. As will be seen, the method must be performed under fixed conditions (very easily attained), and it is greatly to be desired that Reichert's original and very simple directions might be followed by all who make the test.

The fat to be tested is melted, best on a water-bath, any water allowed to settle and the fat filtered through good filter paper or cotton. If not perfectly clear it must be filtered again. Then 2.5 grammes of the liquid fat are weighed in a flask of about 150 c.c. capacity, Erlenmeyer's form being best. (The size of the flask is probably of some importance, as influencing the subsequent distillation.—*Abstractor.*) One gramme of solid caustic potash and 20 c.c. of alcohol (80 per cent. weight) are added, and the whole heated to gentle ebullition on a water-bath, with frequent agitation, until the mass is no longer slimy. (The alcohol must all be removed, leaving the soap nearly dry.—*Abstractor.*) Afterwards 50 c.c. of water is added to dissolve the soap, and when *completely* dissolved the soap is decomposed with 20 c.c. of dilute sulphuric acid, (1 of pure, strong acid to 10 of water, by volume,) which is poured into the flask. The latter is then distilled with moderate boiling, until 10 to 20 c.c. has passed over into a 50 c.c. flask placed to collect the distillate, which must first pass through a small wet filter to retain any insoluble fatty acids that come over with the steam. The 10 or 20 c.c. are returned to the first flask, and the distillation is now continued until exactly 50 c.c. have come over. This is then *at once* titrated with decinormal alkali solution (Reichert used decinormal soda). He used also litmus as an



indicator, adding the alkali until the blue color was permanent for some time. We find that phenolphthalein gives identical results, as has been also stated by others. Reichert's device for preventing bumping was by a gentle current of air, but Caldwell found (Report of the Board of Health of New York, 1882,) that two or three bits of pumice stone attached to platinum wire spirals served the purpose admirably, and we use this device.

It will be seen that Reichert's method is a strictly comparative one, and must not be arbitrarily altered. Slight variations (scarcely to be avoided) in the weight of the solid potash, or the strength of the alcohol, are not important; but the great license which some operators have apparently allowed themselves is to be deprecated, to say the least. There is always a smell of escaping butyric ether at first, when true butters are being saponified, but careful experiments under an inverted condenser have shown us that no essential loss of butyric acid is thus occasioned. Duplicate tests by Reichert's method, as above described, have always been very satisfactory.

One important point should be noted: A blank test with the alcohol and potash should always be made, to determine how much of the acidity of the distillate from the tested butter is really due to volatile fatty acids.

Reichert admits that his test needs further trial, and invites the same. He concluded that the distillate from pure butter would require an average of 14 c.c. of decinormal alkali, and never less than 12.5 c.c. A very large number of tests by many chemists have now been published, all made essentially according to Reichert's method. His lowest limit of 12.5 c.c. has not been absolutely confirmed. Sendtner especially (Wagner's *Jahresbericht*, 1883, p. 979,) obtained results that would indicate 12 c.c. as a better limit, while he considered that a butter requiring even 11.5 should not be unhesitatingly condemned.

Beckurts (Wagner's *Jahresbericht*, 1883, p. 978, an abstract from *Pharm. Centralhalle*, 1883, p. 557,) proposed, on the other hand, to raise the limit, since he consumed 15.6 to 17.5 c.c. of decinormal alkali. Wagner does not state how many butters Beckurts tested, but if he found such high figures in many different cases, his results are certainly unique and, in our present knowledge of the subject, do not warrant raising the standard.

Munier, on the other hand (Fresenius' *Zeitschrift*, 1882, p. 394), proposed to lower the standard very much. He deviated in several

particulars, however, from Reichert's method, and his results have been either rejected or severely criticised, especially by Sendtner (*loc. cit.*) and by Reichardt (*Archiv der Pharmacie*, 222, 1884, p. 93), as already stated in the New Jersey report, above mentioned. Within the past year, also, reports of other chemists have been published, and none of them support Munier's view, which was that the proportion of volatile acids obtained by Reichert's method varies with the seasons of the year. From his own results he proposed that the standard should be made 10 c.c. of decinormal alkali from October to March, 12.1 c.c. from March to May, 12.4 c.c. from May to August, and 11 c.c. from August to October. His figures range from 9.2 c.c. (in December) to 14.5 c.c. (in April).

There are a few strange features connected with Munier's results which render us unwilling to accept them without further confirmation, apart from the important alterations of method which he introduced and which were fully described in the New Jersey Report for 1884, already cited. In the first place, although he reported one butter as consuming only 9.2-c.c. of decinormal alkali, in December, yet he apparently placed little confidence in the result, since he only proposed to lower the standard even for December to 10 c.c. Secondly, his figures are, for the most part, very low, as compared with all other observers. The highest is 14.5 c.c.; only in three cases out of the whole sixty-six did he exceed 14 c.c., and the average of the whole is only 12.07 c.c., while the average of 162 pure butters, reported by eight or ten different experimenters in the papers to which we have had access, including those given later in this paper, is 13.89 c.c.

Munier states that he used butters "known to be, without doubt, pure." They were obtained, at least in great part, from three creameries at Amsterdam, Holland, which he thought gave a good opportunity for getting average samples, because the milk came from a large number of dairies. Other observers have failed to obtain, even from Dutch breeds of cows purposely selected, and in any season of the year, the least proof of the correctness of the conclusions deduced by Munier from his work with the butters furnished him by the "Israelitische Molkerei," and other Amsterdam creameries. Munier also tested his butters according to Hehner's method, obtaining, in two instances, 90.17 and 90.1 per cent. of insoluble fatty acids, and in eight more cases, 89.5 per cent. or more.

Notwithstanding the fact that Munier's results have been impugned



by many writers, we have not seen any defense of his figures published, nor any reply to the criticisms.

The analyses published in the present paper were made expressly to test the truth of Munier's conclusions, and, at the same time, to serve as a further guide toward the determination of the standard for butter by Reichert's method.

The proposed plan was to prepare butter in each month from the milk of a single cow, since by so doing any cases differing from the average standard would more surely be encountered. In establishing a standard for a substance like butter, which so often comes into the market as the product from a single cow, this course seems especially necessary.

The tests during the summer months were not regularly made, since Munier's low figures refer especially to the fall and winter months. One of us (Cornwall) obtained the following results: The tests were made strictly according to Reichert's method as above described, and in every case 0.3 c.c. has been deducted from the actual figures obtained in the test, because it was found that this much decinormal alkali was consumed in a blank test of the potash, alcohol and sulphuric acid used. This butter was made in the laboratory, by shaking in a bottle the cream from one quart of milk.

The cows, belonging in Princeton, N. J., were of mixed breeds, fed with the usual fodder given to cows by owners of small herds or single cows, and represented a great variety as to age and time after calving. No connection between the above points and the results of the tests could be traced.

| Month. | Decinormal Alkali, c.c. | Month. | Decinormal Alkali, c.c. |
|---|---|---|---|
| January | 13.4 | October | 13. |
| January | 12 5 | October | 12.4 |
| January | 13.7 | October | 12 8 |
| January | 14.5 | November | 12.2 |
| February | 12.9 | November | 14.2 |
| February | 14.2 | November | 12.6 |
| February | 12.6 | November | 14.4 |
| February | 13.2 | December | 15 2 |
| March | 13.3 | December | 11.5 |
| March | 14.5 | December | 12.2 |
| September | 12.2 | December | 12 9 |
| October | 12.3 | | |

The average of these butters is 13.17 c.c. of decinormal alkali consumed.

The very last butter made, being the second one set down for December, falls below the lowest limit assigned by Reichert, or even the limit of 12 c.c., found by Sendtner (*loc. cit.*) It is also the only instance, excepting the figures of Munier, which we have met with in our own experience, or the published result of others, in which less than 12 c.c. of decinormal alkali was required. No butter from this cow had been previously tested, although it is our intention to to make further tests of her butter. Of the figures there can be no doubt. The butter was made in one of our laboratories from sweet milk; the test was made in duplicate, and the standard of the decinormal potash carefully verified by one of us (Cornwall) and also compared with that used by Mr. Wallace.

The melting point of the butter was 35.6° C., tested in a capillary tube. It is to be noticed that this butter, when tested by Hehner's method, gave a high percentage of insoluble fatty acids—89.6 per cent. The Hehner test was made on 3.57 grammes of the butter (not in duplicate) and the insoluble acids were washed with boiling water until they ceased to give any perceptible acid reaction with sensitive litmus solution; a little more than 1,000 c.c. of wash water was used, although the acid reaction had apparently ceased when 900 c.c. had been consumed. The acids were dried in an air bath at 100° C. This high figure by Hehner's test would have stamped the butter as adulterated, according to the generally accepted English standard for insoluble acids; a standard which we believe is not to be maintained (see N. J. Report, 1884, above quoted), at least for butter from a single cow.

Although the above unique instance of butter requiring only 11.5 c.c. of decinormal alkali was met with in December, yet it cannot be taken as any confirmation of Munier's conclusions, because the highest figure, 15.2 c.c., was also found in that month (from a cow in the same herd) while the average for November and December is actually higher than for September and October.

It is, however, certain that the standard for butter from single cows must be reduced below that originally proposed by Reichert, 12.5 c.c., and we would be unwilling to condemn a butter unhesitatingly which required anything over 11 c.c. of decinormal alkali.

The following results with pure butters have been obtained by Dr. William K. Newton, also a member of the Committee of Public Analysts of New Jersey:



| Month. | Decinormal Alkali, c.c. | Month. | Decinormal Alkali, c.c. |
|---|---|---|---|
| August | 13 7 | October | 13.7 |
| August | 14.2 | November | 13.7 |
| August | 13.1 | November | 13.9 |
| September | 13 9 | November | 12.9 |
| September | 14.2 | December | 13.3 |
| October | 12.9 | December | 13.8 |
| October | 14.1 | December | 13 9 |
| | | Average | 13.66 |

They also show no noticeable diminution in November and December.

The following results were obtained by Wallace. The butter from the "one cow" was obtained in the same manner as described previously; the "commercial" butter was that supplied to the family, together with a number bought at stores and brought in for examination. All of the results obtained go to prove the reliability of the method, and also that the figures do not vary according to the time of the year. We also give the results obtained with samples of known imitation butter, and would call especial attention to one which, by the use of Reichert's method, there was no difficulty in pronouncing "imitation;" but if Hehner's method had been used it would have been passed as "genuine," since although the figures are slightly higher than he says, yet there can be no doubt that "genuine" butter yields sometimes 88.2 per cent. of insoluble fatty acids; in fact, one instance has already been given in this paper, as occurring in our own experience:

| "One Cow" Butter. | | "Commercial" Butter. | |
|---|---|---|---|
| Month. | Decinormal Alkali, c.c. | Month. | Decinormal Alkali, c.c. |
| February | 13.8 | March | 15.0 |
| February | 13.7 | March | 14 7 |
| March | 14.0 | April | 15.2 |
| March | 14.5 | April | 15.0 |
| April | 14.8 | April | 14 8 |
| April | 15.5 | May | 15.3 |
| April | 16.0 | May | 15.0 |
| May | 14.7 | June | 15.0 |
| May | 15.0 | June | 14.5 |
| June | 15.0 | July | 14.8 |
| June | 15.2 | August | 15.0 |
| *July | 13 0 | August | 15.5 |
| August | 14.0 | September | 14.5 |

*New cow.

"One Cow" Butter.

| Month. | Decinormal Alkali, c.c. |
|---|---|
| September | 14.8 |
| October | 14.0 |
| November | 13.8 |
| November | 13.0 |
| November | 13.2 |
| November | 14.2 |
| December | 13.5 |
| December | 14.0 |
| Average | 14.27 |

"Commercial" Butter.

| Month. | Decinormal Alkali, c.c. |
|---|---|
| September | 14.0 |
| September | 14.7 |
| September | 13.8 |
| October | 13.5 |
| November | 14.3 |
| November | 13.8 |
| November | 13.5 |
| December | 13.7 |
| December | 14.0 |
| Average | 14.52 |

IMITATION BUTTER.

| | | | | |
|---|---|---|---|---|
| 0.8 | c.c. | Decinormal | Alkali | Oleomargarine or Butterine. |
| 0.6 | " | " | " | " " " |
| 0.5 | " | " | " | " " " |
| 4.1 | " | " | " | Sueine. |
| 3.7 | " | " | " | " |
| 3.9 | " | " | " | " |
| 4.2 | " | " | " | " |

This last one, which required 4.2 c.c., is the sample referred to, which, on treatment by Hehner's method, yielded 88.2 per cent. of insoluble fatty acids. This, in the writer's opinion, would, in all probability, prove to be the case with the other samples of "sueine," since this article is composed of butter and lard. This one known case, however, is a very strong argument in favor of Reichert's method, since no chemist could have declared the sample "imitation" if he had relied on Hehner's method. Another strong argument in favor of Reichert's method is the uniform results obtained with duplicates, and the closeness of results obtained by two persons working with the same butter, but using different solutions.

The method is simple, does not require any apparatus that is not generally to be found in a chemist's laboratory, and occupies but a few hours. In a case in which one of us was engaged it was very important, dollars and cents being involved, to determine within *three* hours whether a sample submitted was or was not butter. This was done within the time, but it could not have been if Hehner's method had been used. The method is also founded, undoubtedly, on the true difference between genuine and imitation butter, which is the amount of volatile fatty acids in the two, rather than the insoluble



fatty acids. The question submitted to the food analyst is rather whether an article is what it is represented to be than what its composition is, and if he can satisfy himself by a qualitative analysis that is sufficient, quite as much so as it would be in case an ore was submitted and he was asked if it contained a certain element. This method of Reichert's is a "qualitative" analysis in the fullest sense of the term, and is also "quantitative" in a partial sense. It is perfectly possible, and is done in manufacture, to produce an imitation butter, which, by the use of Hehner's method, would be passed for the genuine article, but if Reichert's method was used, no analyst would hesitate a moment in pronouncing judgment as to its true character.

To us it appears that Reichert's test, with a proper standard, is the most rational of the common quantitative methods for testing butter, as it certainly is the most convenient. Only those who have used both Reichert's and Hehner's methods can appreciate the convenience of the former.

Moreover, as has been shown by one of us before, (Report of the State Board of Health of New Jersey, 1884,) Hehner's method is far less capable of detecting a possible adulteration of butter with cocoanut oil than Reichert's, while one of us (Wallace) has met with an artificial butter in actual commercial analysis, which would have passed Hehner's test, but fell far below Reichert's limits.

It has been asserted by an eminent authority (*Analyst*, London, June, 1885,) that a process should not, on principle, be tolerated, "by which only a fraction of the substance to be estimated was obtained." To this it may be replied that Reichert's process is just as thoroughly a quantitative process as any other process for butter analysis, as regards the conclusions to be deduced from it. A chemist can mix a pure butter and a foreign fat (lard, for instance,) in certain proportions, and can announce beforehand that it will require, within certain reasonable limits, a given quantity of decinormal alkali by Reichert's method. Can any one do more by any method of butter analysis? Before a court of law the chemist can affirm that a certain fat is not pure butter, because pure butter always consumes at least so much decinormal alkali (say 11 c.c.) when tested by Reichert's method. Can anything more certain and definite be reasonably insisted upon?

In these days, when the analysis of foods is so much to be desired, is not every method that yields the required result in a shorter time

to be preferred? It is not necessary to urge that Reichert's process is more accurate than any other. Grant that it is only as accurate: it cannot be denied that it is more convenient.

We believe that it should be preferred to all other methods, both on account of its accuracy and its convenience, while recognizing the fact that since butter is of variable composition, no method can be absolutely correct.

The result of the investigation of this method by the Committee of Public Analysts of the State, has been that eighty analyses of pure butter have been made, embracing butter received and produced in three sections, with the following average result:

| Samples. | | |
|---|---|---|
| 14. Newton | Northern Section | 13.52 c c. |
| 23. Cornwall | Middle " | 13.17 c.c. |
| 43. Wallace | Southern " | 14 39 c.c. |
| Or a general average of | | 13.68 c.c. |

with the following as the maximum and minimum:

| | Maximum. | Minimum. |
|---|---|---|
| Newton | 14.2 c.c. | 12.9 c.c. |
| Cornwall | 15.2 | 11.5 |
| Wallace | 16. | 13. c c. |

The average result is very near that originally reported by Reichert, and although the minimum proposed by him should, in view of the results given in this paper, be probably reduced from 12.5 to at least 11.5, yet we believe that his formula for determining the probable percentage of true butter fat in case of a butter falling below the minimum, is still a thoroughly reliable one.

His formula is $B = 7.3\ (n - 0.3)$; $n$ being the number of cubic centimeters of decinormal alkali used in titration.

In closing, we would recommend that especial care be taken, when reporting the results of Reichert's test, to state whether the butter is from a single cow's milk, and would also point out the desirability of making tests of such butter in experiments directed toward ascertaining the minimum standard by any method, since it is certain that butters vary greatly in composition, notwithstanding the different opinions which have been advanced on this point. (See especially Reichardt's article, *loc. cit.*)

POSTSCRIPT.—As already stated, one of us (Cornwall) has met with a single case where the quantity of decinormal alkali solution consumed in Reichert's test fell below any limit as yet reliably established. Since that sample of butter was prepared another sample has been made from milk of the same cow (December 28th, 1885), in the laboratory. This butter has been tested by each of us in his own laboratory, using entirely separate sets of re-agents, and we have each obtained identically the same results, viz.: A consumption of 11.3 c.c. decinormal alkali by Reichert's process, after deducting the amount of alkali consumed in blank tests on our re-agents alone. Using the best "potash by alcohol" obtainable and a highly rectified alcohol, one of us (C.) finds that 0.3 c.c. of decinormal alkali is required in the blank test. Since there can be no doubt that the butter from this cow falls below the usually received minimum of Reichert, we believe that, for butters made from the milk of single cows, the minimum cannot safely be above 11 c.c. of decinormal alkali. Whenever it may be possible to prove that the butter is mixed butter from the milk of several cows, we should accept the usual minimum of 12 c.c.



The cow which yielded this butter is one of a herd of eight cows in Princeton, N. J. She is of mixed breed, chiefly Alderney; is nearly five years old; had a calf eight months ago and is expected to have another next May; yields from six to seven quarts of milk daily, at present; her food is barley meal and corn-stalks (maize); she is apparently in sound condition. The butter made separately from five other cows in the same herd, within the same week or nearly so, ranged from 12.2 to 15.1 c.c. decinormal alkali, so that neither the season of the year nor the food appears to have had any influence on the result. It is simply an illustration of the variability in the proportions of volatile fatty acids obtainable from different pure butters.

Since this variability exists, it becomes desirable to confine, for the most part, to butters known to be the product of single cows, any tests made with a view to establishing actual minimum and maximum standards for the fatty acids (whether soluble or insoluble) obtainable from butters.

In case of butter made on the large scale, from the mixed milk of several cows, the lower standard above proposed (11 c.c.) is practically equal to the usual one of 12 c.c., because such butter cannot be profitably adulterated without falling much below either standard when tested by Reichert's process.

# REPORT OF THE MILK INSPECTOR.

BY WILLIAM K. NEWTON, M.D.

*Ezra M. Hunt, M.D., Secretary State Board of Health:*

SIR—I herewith hand you my sixth annual report.

During the past year the work of inspection has been carried out on the plan outlined in previous reports and nearly all sections of the State have been brought under the operations of the law.

The milk sold in the following cities and towns has been inspected: Hoboken, Jersey City, Elizabeth, Plainfield, Paterson, Burlington, Bordentown, Camden, Mount Holly, Bridgeton, Gloucester, Perth Amboy, South Amboy, Lambertville, Atlantic City, Asbury Park, Ocean Grove, Passaic, New Brunswick and Trenton.

The milk-producing sections of the State have also been visited, and the milk shipped therefrom has been thoroughly and frequently inspected.

The results of these inspections have been as follows: In Hoboken and Jersey City many cases of adulteration have been discovered; in Elizabeth, six cans of milk brought into that city by railroad were condemned, while the milk sold from wagons and produced in the adjacent country, was found to be of uniform excellence; at Plainfield, all the milk inspected was found to be good; at Paterson, out of 234 samples examined, but four were found below the standard; at Burlington, Bordentown and Camden no milk was found below the State limit; at Mount Holly, two cases of adulteration have been brought to trial; at Bridgeton and Gloucester, one sample in each place was found to be adulterated; at Asbury Park, one sample was also below the standard; at South Amboy, while the milk was uniformly of poor quality, none was found so low as to warrant prosecution; at Perth Amboy, one sample was taken for analysis; at Lambertville, one case was prosecuted; at Asbury Park and

Passaic, one sample in each place was found to be of poor quality; at New Brunswick, two men were fined for selling adulterated milk.

In the city of Newark, the local inspection has been under the charge of Mr. Henry Negles, the Milk Inspector of the Local Board of Health, who, by his care and efficiency, has done much towards insuring the excellence of the supply. At Trenton, Mr. James H. McGuire, the Health Inspector, has so watched the supply that the quality has been maintained at a high standard.

The inspections through the dairy sections also show a constant and improved quality of milk, and cases of violation of the law have been very rare; one being found in Sussex county, two in Hunterdon county, two in Burlington county, one in Gloucester county and one in Passaic county.

It will be seen by looking over this brief history of the year's work that there has been a decided improvement in the quality of the milk sold throughout the State or shipped from the dairy sections. Formerly many cans of milk were condemned in each city, whereas now it is rare that any infraction of the law occurs.

Assistants have been assigned to work as follows:

Mr. Peter L. Vandegrift has had charge of the inspection in the southern and western parts of the State, and by strict attention to duty has checked adulteration to a great extent.

Mr. Henry B. Everhart has inspected in Hudson county, and the few cases of debased milk found in Hoboken and Jersey City are evidences of his watchfulness.

Mr. James H. McGuire has done considerable special work under my direction.

The amendment to the Milk law that authorizes a trial by jury, has not worked satisfactorily in all parts of the State. In the rural and less densely populated sections it is almost impossible to obtain a jury of unprejudiced men to try a case, and in many instances a neighborly feeling often outweighs all evidence, for the defendant frequently is well known to the jury, hence to prove him guilty of the charge, even in the face of the strongest testimony, is very difficult. In cities, on the other hand, the jury trials have been well conducted, and the cases fairly tried.

The evidence required by law is so surrounded by checks and safeguards that a clear case does not require a jury to weigh it, and the Inspector has no authority or right to begin a case until the testimony is conclusive.



As an instance of the miscarriage of justice through a prejudiced jury, I may mention the facts concerning a case tried in Sussex county. The complaint made before the justice of the peace charged a producer with shipping a number of cans of impure milk, and the proof that the milk was below the State standard was amply supported by the results of the chemist's analysis; this evidence was still further fortified by the written confession of the defendant. After a prolonged trial, and a still more protracted debate in the jury-room, no verdict could be arrived at. The case was retried, and, notwithstanding the conclusive evidence, the jury acquitted. An appeal was now taken to the Quarter Sessions, and after a trial lasting near an entire day, and after much deliberation by the jurors, they could not arrive at a verdict. The result of the new trial, soon to occur, can only be conjectured.

The change in public opinion concerning the purposes and methods of enforcing the provisions of the milk law is remarkable. In portions of the State, where the opposition was heretofore the strongest, the benign and salutary effects of the statute have been so apparent that the most hearty indorsement is now given to the work of the Inspector. Only those people who have felt the rigor of the law in the role of defendant, those who do not yet understand the objects of sanitary measures and those who are never satisfied with any law, remain to be classed amongst the opponents of this now very popular enactment.

## MILK ANALYSES.

In the following tables I have given the results of analyses made during the year. The first table will show the results of analyses of pure milk, the second gives the results obtained from milk of doubtful purity, while the third outlines all cases that fell below the legal standard:

TABLE I.

ANALYSES OF MILK KNOWN TO BE PURE.

| No. | County. | Total Solids. | Fat. | Solids-not-fat. | Specific Gravity. |
|---|---|---|---|---|---|
| 1 | Gloucester | 14 23 | 4.48 | 9.75 | 1.0319 |
| 2 | Burlington | 14.63 | 4.51 | 10.12 | 1.0330 |
| 3 | Atlantic | 12.80 | 3.00 | 9.80 | 1.0319 |
| 4 | Cumberland | 19.50 | 10.11 | 9.39 | 1.0292 |
| 5 | " | 14.85 | 4.88 | 9.97 | 1.0324 |
| 6 | Burlington | 12.84 | 3.06 | 9.78 | 1.0324 |
| 7 | Middlesex | 15.76 | 6.36 | 9.40 | 1.0292 |
| 8 | Passaic | 13.12 | 3.70 | 9.42 | 1.0304 |
| 9 | " | 13.57 | 4.69 | 8.88 | 1.0307 |
| 10 | " | 13.77 | 4.87 | 8 90 | 1.0316 |
| 11 | " | 14 13 | 4.23 | 9.90 | 1.0320 |
| 12 | Burlington | 15.21 | 6 00 | 9.21 | 1.0292 |
| 13 | Cumberland | 15.59 | 5.54 | 10.05 | 1.0330 |
| 14 | Burlington | 18.43 | 8.88 | 9.55 | 1 0313 |

Nos. 4, 5 and 13 were taken from the cans of a vendor in Bridgeton. Each sample represents the mixed milk of more than one cow, and was as it is sold to customers.

No. 8 was from a cow in Passaic county, claimed by the owner to be "the poorest milker in the county;" this claim being made by the producer when notified to stop selling impure milk. The character of the milk on sale at the time may be seen by reference to No. 9, Table III.; the difference between the two samples is notable.

No. 12 is a fair sample, taken from the can of a vendor at Mt. Holly.

No. 14 gives the results recently obtained by an analysis made by Mr. Shippen Wallace. The figures are remarkable and lead one to suppose that the milk was from an Alderney cow, but the following history will give the true facts in the case: "The cow was of common stock, six years old, had her fourth calf last August, and is fed on bran and meal besides ordinary pasture." The remainder of the samples given in this table were from vendors' wagons or from ordinary cows.



TABLE II.

SAMPLES ABOVE THE STANDARD, OF DOUBTFUL PURITY, BUT MANY OF THEM KNOWN TO HAVE BEEN EITHER WATERED OR PARTIALLY SKIMMED.

| No. | Total Solids. | Fat. | Solids-not fat. |
|---|---|---|---|
| 1 | 12.60 | 3.94 | 8.66 |
| 2 | 12.64 | 3.96 | 8.68 |
| 3 | 12.16 | 3.70 | 8.46 |
| 4 | 12.08 | 3.96 | 8.12 |
| 5 | 12.51 | 4.11 | 8.40 |
| 6 | 12.66 | 4.28 | 8.38 |
| 7 | 12.90 | 4.48 | 8.42 |
| 8 | 12.10 | 3.83 | 8.27 |
| 9 | 12 85 | 3.73 | 9.11 |
| 10 | 12.23 | 2.67 | 9.56 |
| 11 | 12.84 | 3.06 | 9.78 |
| 12 | 12.30 | 3.36 | 8.94 |
| 13 | 12.53 | 3 31 | 9.22 |
| 14 | 12.67 | 3.67 | 9.00 |
| 15 | 12.21 | 4.60 | 7.61 |
| 16 | 12.21 | 3 66 | 8.55 |
| 17 | 12.51 | 4.32 | 8.19 |
| 18 | 12.22 | 4 00 | 8.22 |

The specific gravity of all these samples was below 1.029, a figure below which pure milk never registers. The solids-not-fat in nearly all instances is too low. In a few cases proof was offered that the milk had been watered or partially skimmed, but as the standard set up by law is so low, no complaint would hold in court.

TABLE III.

ANALYSES OF CONDEMNED MILK.

| No. | Total Solids. | Fat. | Solids-not-fat. | Disposition of Case. |
|---|---|---|---|---|
| 1 | 11.73 | 2.43 | 9.30 | From the State Camp at Sea Girt. See note below. |
| 2 | 11.20 | 2.40 | 8.80 | |
| 3 | 11.12 | 2.16 | 8.96 | |
| 4 | 11.42 | 2.44 | 8.98 | |
| 5 | 9.84 | 2.43 | 7.41 | Plea of guilty. Fined $50. |
| 6 | 10.51 | 1.30 | 9.21 | Skimmed, shipment stopped. |
| 7 | 11.49 | 3.18 | 8.31 | Partly watered. |
| 8 | 10.70 | 2.70 | 8.00 | Defendant not found. |
| 9 | 11.91 | 3.30 | 8.61 | See No. 8, Table I. |
| 10 | 9.70 | 2.42 | 7.28 | Plea of guilty. Fined $50. |
| 11 | 10.52 | 2.97 | 7.55 | " " " |
| 12 | 10.72 | 3.17 | 7.55 | " " " |
| 13 | 10.50 | 2.35 | 8.15 | Destroyed. |
| 14 | 11.84 | 2.94 | 8.90 | " |
| 15 | 11.72 | 3.64 | 8.08 | " |
| 16 | 9.48 | 2.84 | 7.00 | Plea of guilty. Fined $50. |
| 17 | 9.87 | 2.87 | 7.00 | " " " |
| 18 | 10.54 | 3.18 | 7.36 | " " " |
| 19 | 10.81 | 2.95 | 7.86 | " " " |
| 20 | 11.64 | 2.92 | 8.72 | " " " |
| 21 | 8.26 | 2.01 | 6.25 | " " " |
| 22 | 9.20 | 2.70 | 6.49 | Plea of guilty and paid $61 for the two cases. |
| 23 | 10.35 | 3.38 | 6.96 | |
| 24 | 9.26 | 2.06 | 7.20 | Plea of guilty. Fined $50. |
| 25 | 10.34 | 2.89 | 7.45 | Two samples from same man. Fined $50. |
| 26 | 10.54 | 2.75 | 7.79 | |
| 27 | 10.44 | 2.96 | 7.48 | Plea of guilty. Fined $50. |
| 28 | 11.16 | 2.98 | 8.18 | " " " |
| 29 | 11.92 | 3.56 | 8.36 | Case pending. |
| 30 | 11.30 | 3.22 | 8.03 | " " |
| 31 | 10.90 | 2.66 | 8.24 | Fined $25. |
| 32 | 10.13 | 2.55 | 7.58 | Plea of guilty. Fined $50. |
| 33 | 11.32 | 3.33 | 7.99 | No complaint made. |
| 34 | 10.07 | 2.45 | 7.62 | Plea of guilty. Fined $50. |
| 35 | 11.52 | 3.59 | 7.93 | No case made out. |
| 36 | 11.79 | 2.76 | 9.03 | " " " |
| 37 | 11.02 | 3.26 | 7.76 | " " " |
| 38 | 10.58 | 3.30 | 7.28 | Plea of guilty. Fined $50. |
| 39 | 11.85 | 3.14 | 8.71 | Case not tried. |
| 40 | 10.11 | 2.77 | 7.34 | Plea of guilty. Fined $50. |
| 41 | 10.74 | 4.31 | 6.43 | " " " |
| 42 | 11.09 | 3.46 | 7.63 | " " " |
| 43 | 10.12 | ..... | ..... | Case pending. |



SUMMARY OF CASES IN TABLE III.

| | |
|---|---|
| Cases tried and penalty inflicted in each case | 24 |
| Cases now pending | 3 |
| No case, or complaint not made out | 6 |
| Milk destroyed, no prosecution | 5 |
| Defendant not found | 1 |
| Sea Girt cases, in charge of Quartermaster-General | 4 |
| Total | 43 |

Of the twenty-four cases paying penalties, twenty paid a penalty of $50 each; one paid a penalty of $61 for two cases; and one, through error, was only fined $25. Four cases were made out on the same day against the same man, but the penalty was only inflicted for one offense. The total amount of penalties collected by justices of the peace, and which should now be in the hands of the State Treasurer, was $1,086. When a penalty is inflicted, I immediately notify the Comptroller of the Treasury, and then my responsibility ceases, for the law does not permit me to have any charge over the money collected. The money thus paid to the State will go very far towards paying the running expenses of this department.

As was stated above, in six cases no action was taken. This may be explained by the fact that in many instances it is impossible to comply with all the requirements of the law. The law insists that the sample of milk must be taken and sealed in the presence of a witness and then sent to one of the members of the Council of Public Analysts. As a witness to the sealing cannot always be obtained willing to testify, many cases are lost to the State, and no case can be made out without this witness. In a few instances, the absence of the analyst from town has made it impossible to have the work of analysis done in time. In four cases the milk was destroyed and no further prosecution undertaken, because the owner lived at a great distance, or out of the State

The four samples, Nos. 1, 2, 3 and 4, taken on different days at Sea Girt, represent the quality of milk furnished to the State Camp by the contractor. The inspection was made at the request of Quartermaster-General Perrine. None of the milk was pure, or up to the State standard, it being skimmed and a mixture of whole and skimmed milk. The results of my inspection were reported to General Perrine, it being understood that the contractor would not be paid, because of his breach of contract, hence no prosecution was

begun by me. At the time of writing, I have had no advice from the Quartermaster's Department as to whether any action has been taken to punish the contractor.

### EXTENT OF ADULTERATION SHOWN BY THE TABLE.

The amount of adulteration, by adding water to the milk, as shown by Table III., varies from thirty-three per cent., in a few cases, to from twenty to as low as five per cent. The abstraction of cream is noted in many instances.

### DISPOSITION OF VIOLATIONS OF THE LAW.

Only six or seven cases have been subjected to a prolonged trial before a justice of the peace and a jury. The greater majority of persons charged with a violation of the law have entered a plea of guilty, and paid into court the penalty prescribed. Although the penalty may be paid without a protest, yet many men are inclined to ease the pangs of conscience by ascribing the blame to the "hired man," or it is said that an unusual quantity of "rinsings" have found their way into the milk-can, both of these phrases being the euphonious manner of admitting the adulteration.

### THE STATE STANDARD.

The State standard of 12 per cent. of solids has been repeatedly tested during the past year, and I have not yet found a sample of pure milk that fell below that figure. Many requests have been made for analyses of milk from cows reported to be poor milkers, but in no case did a sample contain less than the required amount of solids. Tests made in New York and Massachusetts indorse, in every point, the wisdom of setting up a limit, but it is acknowledged that the 12 per cent. standard does not represent milk of extra quality; in fact it is said by some that a premium for the production of inferior milk is thereby offered. If any change is to be made in this standard, it should be in the direction of increasing the severity of the test, so that no milk shall be sold that contains less than 3 per cent. of fat and 9 per cent. of solids-not-fat.

In New York State it was recently determined, after many analyses, that a minimum of 12.5 per cent. of solids would be the proper limit,



and that all milk below that figure should be rejected. The milk of 296 cows was analyzed by the chemist to the New York Dairy Commissioner. In each case the milk was drawn from the cow in the presence of an inspector, so that the authenticity of each sample was insured. The results of these tests show that the minimum of milk solids was 12.53 per cent., of fat 3.29 per cent., and of solids-not-fat, 9.17 per cent.

Rules for estimating the amount of pure milk in a given sample are printed in all works on the chemistry of milk. As they are convenient and more or less accurate, they are added here.

When the amount of total solids is known, we may compare the sample in question with the State standard in the following way. Take for instance sample No. 21, Table III., which had 8.26 per cent. of milk solids, then we have this formula:

| Pure Milk. | | | | Solids in Sample. | | Pure Milk in Sample. |
|---|---|---|---|---|---|---|
| 12 | : | 100 | :: | 8.26 | : | $x$ |

Carrying out the proportion, we find that $x$ equals 68.88, or the amount of pure milk in that particular sample, which, of course, means that 31 per cent. of water had been added.

When the amount of solids-not-fat in a given sample is known, we may use that as a factor by which to calculate the quantity of pure milk in that specimen. Multiply the amount per cent. of solids-not-fat found in the sample, by 100, and divide by 9,—the minimum of solids-not-fat in pure milk. Take, for example, the same sample, No. 21, Table III., the solids-not-fat in which was 6.25 per cent; the sum will be: $6.25 \times 100 = 62{,}500 \div 9 = 69.44$ per cent. of pure milk in the sample.

### METHODS OF ANALYSIS.

In my report for the year 1883 the methods of milk analysis in vogue were outlined at considerable length, but as possible improvements have been suggested recently the subject may be reviewed with profit.

The experience of the majority of the analysts of this State and New York leads them to prefer the method devised by Prof. Waller, and known as his or Cairns' method, which is a modification of Wauklyn's or the English method. Recently the American Society of Public Analysts, an association composed of public analysts,

chemists and inspectors of food, made an extended inquiry as to what was to be considered the model method of milk analysis. The results of this investigation show that nearly all chemists who had much to do with the analysis of milk were strongly in favor of Waller's or Wauklyn's method; the points in its favor being that it was accurate, rapid and convenient, and, in the hands of competent men, all that could be desired for official work.

Dr. A. R. Leeds is the only analyst employing Ritthausen's method, but in his hands it seems to be capable of yielding satisfactory results.

All the methods mentioned above may be found described at page 259 of the seventh annual report of the New Jersey State Board of Health, and space forbids a more extended reference here.

Quite recently, Mr. M. A. Adams, an English chemist, described a process of analysis that has attracted considerable attention and has been investigated by many chemists with varying results. (*The Analyst,* Vol. X. No. 108.) The process is described by the author as follows: Strips of stout white blotting paper are cut two and one-half inches wide, and twenty-two inches long; each of these strips is rolled into a helical coil on a glass rod the size of a lead pencil. These coils are thoroughly dried. The milk to be examined is mixed and 5 c.c. are discharged into a small beaker. This beaker is weighed with the milk and then a coil of the paper is gently thrust into the milk, and in a few minutes the paper sucks up nearly the whole of the milk. The paper is then carefully withdrawn by the dry extremity, gently reversed and stood, dry end downwards, on a clean sheet of glass. The beaker is again weighed and the milk taken got by difference. The charged paper is next placed in the water oven on the glass plate and dried. It is next placed in a Soxhlet extractor and the fat extracted. The paper is removed from the extractor and dried in the air bath and the fat determined in the usual way. Experiments with this method show that the fat determinations are higher than with the Waller or Wauklyn methods. The many steps of the process make it more difficult to manage than either of the above-named methods, and great care is necessary to obtain concordant results. This method is now being tried and the results will probably be reported next year. Full details may be found at page 47 of the journal quoted above.

The method of analysis devised by Dr. S. M. Babcock, chemist to the New York Agricultural Experimental Station, and described on page 167 of the second report of that station, was brought to the



attention of the American Society of Public Analysts and excited much discussion. It seems to be worthy of extended trial by chemists.

In Babcock's method the milk is put into a platinum dish containing freshly ignited asbestos and dried at 100° C. to constant weight. As he says: "The asbestos serves as an absorbent of the milk and presents a large surface, which greatly facilitates the drying." When the amount of fat is desired, the milk is placed in a test-tube with a perforated bottom and filled three-quarters full of ignited asbestos, and a plug of cotton inserted to prevent the escape of loose fibers of the asbestos. The tube and contents are weighed, the plug of cotton removed and five grammes of milk run in and the cotton replaced. The tube, connected at its lower end by a rubber tube and adapter with a filter pump, is placed in a drying oven at 100° C., and a slow current of dry air drawn through till the water is completely expelled. This tube, when cool, is weighed and the total solids calculated. The tube containing the solids is placed in a fat extractor and exhausted with ether. The fat is dried at 100° C. and weighed.

All the methods described call for extended trial at the hands of chemists, and it would well repay the State to have a series of experiments properly conducted to determine which shall be the official method. All the work so far done in this direction has been voluntary on the part of the analysts, and without remuneration; it is certainly time that some official recognition was given for this painstaking work.

Some two years ago the British Society of Public Analysts appointed a committee, composed of seventeen of the most prominent chemists in England, to go over the whole subject of milk analysis and to report the results of their investigations. After the two years of deliberation and experiment the committee has just reported to the society and recommends the following process of analysis (*The Analyst,* No. 117, page 215):

(1) *Total Solids.*—"These to be estimated by evaporating in a platinum dish about 5 grammes of milk. The residue to be dried to practical constancy, at the temperature of a water-oven or water bath."

(2) *The Process of Fat Extraction.*—"Measure 5 c.c. of milk into a beaker 2 inches deep by 1¼ inches in diameter; weigh, and place into it one of Adams' coils, which must have been previously

extracted with ether in a Soxhlet and the ether driven off. When as much as possible of the milk has been absorbed by the paper, the coil is removed and placed dry end downwards upon a slip of glass, and the beaker is at once reweighed. Dry the coil in a water-oven for one to two hours, and extract the fat in a Soxhlet apparatus, twelve siphonings at least being necessary, the flask in which the solution is collected being as small and light as possible. Boil off the ether and place the flask in a water-oven in a horizontal position and dry to constancy; allow to cool for about ten minutes and weigh."

(3) "*The Solids-not-fat* in all cases to be determined by difference."

"It is recommended that the specific gravity be taken in all cases."

This report of the committee was not adopted, but will come up for discussion during December.

Leaving, now, the considerations of analytical methods, it may be profitable to note some other facts concerning the inspection of milk.

## THE LACTOMETER.

The many thousands of tests of pure milk that I have made during the past six years verify the statements often made in my official reports, to the effect that the mixed milk of healthy cows never has a specific gravity below 1.029 at 60° F., and I have not yet seen a cow that yielded milk that would register a lower figure. This result has been so often verified that it may now be accepted as being absolutely accurate.

Martin, in a recent exhaustive monograph on this subject,* has, with great care, collected and tabulated the results obtained in this country and Europe by twenty-one competent observers. He says "That the average lactometric standing of all the milk as given in the tables, the result of testing some 20,000 specimens, is 1.319. If, then, the average specific gravity of milk is placed at 1.029, it certainly is at its lowest possible limits."

It was found by Martin, after testing the individual milk of over seven hundred cows, that no specimen registered a lower specific than 1.029, at 60° F.

I am strongly inclined to the belief that the specific gravity, and the amount of fat in milk, when taken together, enable us to judge of the purity of milk more accurately than the total solids, for a rich

*Report on milk and its adulterations, by Edward W. Martin, Ph.D., Albany, 1885.



sample of milk may be watered down to the State standard of twelve per cent. of solids, and thus be passed as a pure milk, while the lactometer may easily detect the fraud in such a case.

The specific gravity of milk is simply its weight compared with water, and alone gives no indication of its quality, being dependent upon two constituents, namely: the solids-not-fat and the fat. The former raises the gravity above that of water while the latter lowers it. This explains the reason of skimmed milk indicating higher on the lactometer than whole milk, and this fact is used by those ignorant of what this instrument really indicates to base the claim that it is valueless. It is so, in the hands of one incompetent, but when used by one who understands what causes the fluctuations, and who has more or less practical knowledge of the physical appearances of milk, it is seldom that he cannot tell pure milk from that which has been either skimmed or watered.

The fact that the relation of the fat to the solids-not-fat influences the specific gravity, has led several chemists to attempt the production of a formula by means of which, if two of the factors are known, the third may be obtained by calculation.

Mr. Otto Hehner, in *The Analyst* for August, 1882, gives a formula by means of which the solids-not-fat, and hence the fat, may be determined, if one knows the specific gravity and the total solids in a sample of milk. His formula is follows:

(Total solids $\times .725$)+specific gravity$\div 4.33$=solids-not-fat.

Mr. Shippen Wallace, one of the Public Analysts of this State, has investigated this formula and has tested it in the analyses of some two hundred samples. He reports that "This formula is, with milk containing from two to three and a half per cent. of fat, to be depended upon as a check and verification of solids-not-fat, as obtained by extraction of the fat, and if there should occur a greater difference than one meets with in duplicate analyses, the analyst should then look for a reason and determine the amount of ash, when the probable cause, such as the addition of some solid substance to the milk, will no doubt be found."

## THE LACTOSCOPE.

As was said above, the amount of fat in a sample of milk greatly influences its specific gravity, hence an instrument for the rapid determination of the fat is of great value to the inspector. Mar-

chaud's lacto-butyrometer, which was described in previous reports, is of value in the laboratory, but what is needed is an instrument that can be used in ordinary inspection and without the use of chemical agents. Many such instruments have been devised, amongst which may be mentioned the lactoscopes of Donné, Vogel, Hoppe-Seyler, Seidlitz, Tronimmer, Heinrich, Feser, Leeds and others. These instruments all aim to enable an observer to ascertain the amount of fat by optical methods, by measuring the degree of capacity or turbidity caused by mixing a certain quantity of milk with a known quantity of water, or *vice versa*. Two modifications of these methods are employed: either a uniform dilution of the milk with water is used, which still permits one to recognize through the tube a certain object; or else the experiment is begun with a stated and uniform quantity of milk, which is diluted with water until a black line or figure may be seen through the mixture. The former method is not very accurate, while the latter admits of a considerable degree of accuracy. Of all the instruments devised for this purpose Feser's lactoscope is the most satisfactory and the one most in use. For the past two years I have used it considerably and have found it to be a rough-and-ready means for estimating the amount of fat in milk, and when very carefully used its readings approximate quite closely the results obtained from an analysis. The difficulty of obtaining concordant results is against its use, for the light used, the eyesight of the observer and other factors interfere with a correct reading of the instrument. The milk inspectors of Brooklyn and Boston have used it for two or more years and claim good results by its use.

The instrument is a hollow glass cylinder, graduated with two scales, one giving the number of cubic centimeters it contains, the other the per cent. of fat. In the lower part of the tube a piece of milk-white glass is inserted upon which are black lines. When testing a sample of milk 4 c.c. are transferred to the lactoscope and water added until, after thorough shaking, the black lines are just visible. The difficult point to decide is when to commence the reading.

The instrument under discussion has been thoroughly tested by the German Board of Health, and a recent report gives the results of the investigation as follows:*

*Arbeiten aus dem Kaiserlichen Gesundheitsamte. Erster Band. Erstes und Zweites Heft. Berlin, 1885, page 36.



"The results of different observers, in reference to Feser's instrument, deviate not only from the chemical test, but also amongst themselves, so considerably that, in spite of Feser's warm recommendation, this instrument does not appear to be practicable for the *exact* test of the amount of fat."

"The optical instruments in their application encounter a number of difficulties. First—the kind of light existing at the time of examination influences the test very markedly. Second—the power of the observer's eyesight is of great importance. The degree of turbidity, which is considered the measurement of fat, depends not only on the quantity of fat in the milk, but also on the casein which it contains. Besides this, the butter is contained in the milk in globules of different diameters, and it is plain that a certain amount of fat in the form of smaller globules obstructs the light more than the same quantity of fat in larger globules. If the cream is removed the larger globules are also withdrawn, and then the smaller ones preponderate, then the amount of fat is easily found too high in the lactoscopic examination."

From this we may claim that the lactoscope is of little value from a scientific point of view, but as a rough means for inspection it may be depended on to a great extent.

### NIGHT AND MORNING MILK.

The popular idea that the night's milking is richer than the morning's, is, as a general rule, true, and recent experiments made at the New York Experiment Station show conclusively that this fact has some foundation. Over one hundred and fifty separate analyses of the night and morning milk were made, and the work continued for nearly three months. The figures show that almost invariably the night's milk contained more fat than the morning's. This report is of value, as it settles a disputed point. But it does not affect the methods now in use to test commercial milk as shipped on railroads through this State, for, as a rule, no attempts are made to keep separate the two milkings.

### THE DETECTION OF IMPURE WATER ADDED TO MILK.

The addition of water to milk is a practice much to be deprecated, but adulteration by means of foul or polluted water, or that contam-

inated with sewage, is a very dangerous crime, for it is well known that milk so poisoned may carry such diseases as cholera and typhoid fever into the human organism.

We have seen that chemistry can not distinguish between pure water and the water normally existing in milk, and that the most satisfactory way to determine the amount of added water is to compare the sample in question with a standard. The question now comes up, Can chemistry determine whether or not polluted water has been used to dilute milk? This is an important problem, for if contaminated water can be detected, we have another link in the chain of evidence. Fortunately we are able to answer this question in the affirmative, at least to a partial extent. To determine the existence of organic pollution, we naturally look to the methods employed for the detection of pollution in drinking-water.

Waller and Martin have found (*op. cit.*, p. 74,) that nitrites may be detected in milk adulterated with contaminated water in the same manner that nitrites are determined by methods employed in water analysis. They say: "In order to detect impure water in milk we can apply a modification of the ordinary sanitary analysis of water, as follows: 300 c.c. of milk are to be coagulated with acetic acid and filtered; to 100 c.c. of the filtrate are added about 10 c.c. of a mixture of a solution of equal parts of sulphanilic acid and sulphate of napthylamine. Now, should the milk contain nitrites, or in other words water contaminated with sewage, a rose-red color will commence to form, deepening in intensity on standing, and the deeper the color the more the nitrites present. I have tried this test on milk which I knew to be pure, with negative results, and have detected the presence of nitrites in milk to which one part in a million had been added."

Any of the tests usually employed to detect nitrites may also be be used, such as Griess' method.

As a corroborative test, the one described by Uffelman (*The Analyst*, No. 113, p. 146,) may be employed. This has for its object the detection of nitrates and is used as follows: A small quantity of diphenylamine is put in a white capsule; over this is poured about 25 minims of sulphuric acid, free from nitric acid; the mixture is stirred with a clean glass rod until it is of a pale rose color. Now let three or four drops of the suspected milk trickle down the side of the capsule. If nitrates or nitric acid be present a blue color appears.



In closing, I may offer as an excuse for the length of this report that it was thought important to collect together the scattered facts relating to the subject under discussion. The literature of milk analysis is rapidly multiplying and the work in this direction is great, the analysts of this State having contributed no inconsiderable portion to our stock of knowledge bearing on sanitary chemistry.

# CIRCULARS AND LAWS.

## MODEL HEALTH ORDINANCES FOR TOWNSHIPS.

The public health laws of this State empower local Boards of Health to pass ordinances for certain purposes, and to impose penalties for the violation of such ordinances. These ordinances, to be legal, must be enacted in a certain manner, must be properly drawn, and may embrace the objects outlined in the laws, but must not include any subject not allowed by these laws.

To be lawful, ordinances passed by local Boards must in no way depart from the form or matter required by the statutes.

As the purposes of, and the methods for, enforcing these local laws are not clearly understood, we shall recapitulate all points relating to the matter under discussion.

Local Boards of Health of any city, town, township, borough, or any commission government, may pass, alter or amend ordinances for the purposes named: I.–IX., Chapter CLV., Laws of 1882. See Circular LIV., page 10; and all but townships may also pass ordinances on subjects named, Chapter CLIX., Laws of 1884, page 13 of Circular LIV.

Local Boards of Health may pass ordinances embracing the subjects as thus mentioned, and on any other subjects that would fairly come under Sections 7 and 8 of Chapter CLV., Laws of 1880, page 7 of Circular LIV.; and ordinances for purposes not thus mentioned are illegal, and cannot be enforced.

It must be remembered that Health Boards have no powers except those conferred by law, and they cannot assume any powers not given them.

Ordinances, codes, resolutions and rules, except as permitted by statute, have no binding force and cannot be enforced.

Ordinances can only be passed at a stated or adjourned meeting at which a *quorum* is present.

All ordinances must be published once a week, for three weeks, in

some paper printed and circulating in the city, town, borough or township, but in case no paper is published the ordinance must be posted in five different public places in the city, town, township or borough, and published in some paper of the county once a week for three weeks. (See Circular LIV., page 11.) Ordinances go into effect thirty days after the day of the first publication.

Ordinances may be amended, altered or repealed at either an adjourned or stated meeting; this action must be published the same as the original ordinance.

Penalties not exceeding one hundred dollars, and not less than ten dollars, may be enforced for violation of ordinances.

The action at law being one for a debt, the penalty to be enforced must be stated in the section of the ordinance, and no less or greater sum than is stated can be recovered.

It is well to state in each section what the penalty for violation is, and, as a different penalty may be required for different offenses, it should be fixed at a high enough figure to deter violations.

One great mistake made by local Boards, is in passing too many ordinances and then not enforcing them; it is far better to have a short, comprehensive code and to see that it is rigidly enforced.

No provision is made in the various laws for the collection of fees for permits, licenses or registration, and it is questionable whether the imposition of such fees is legal, except where the Legislature has authorized it.

We have endeavored to make the following model codes as comprehensive as possible, but it is not probable that they will apply equally to all cities and towns, for each place has its local customs or practices that need special attention, but the ordinances are so drawn as to be capable of modification to suit each particular case.

Two forms are given, one for cities, towns, boroughs, etc., the other for townships. (The first form is not printed this year because of lack of space.)

In enforcing ordinances, two methods are available, either to proceed against the person for violation of the ordinance, or else to notify the person first, giving a stated time in which to abate the nuisance or to remedy the defect, and then to proceed under the law if the notice is not obeyed.

As far as possible, the following sections of the model code follow the order in which the subjects are given in the State laws, and are grouped together in that order.



## CODE FOR TOWNSHIPS.

NOTE.—To avoid repetition the final clause in each section is omitted, but in passing an ordinance, whenever a penalty is provided for, it must be inserted. It is a maxim of law, that the two most important things are the penalty of disobedience and the mode of process. The clause should read as follows: "And any person offending against or violating any of the provisions of this section shall forfeit and pay a penalty of dollars." (See Chapter CLV., Sec. 5, Laws of 1882; Circular LIV., page 11.)

Be it ordained by the Board of Health of the township of ———.

### ADULTERATED AND UNHEALTHY FOODS.

SEC. 1. That no person shall manufacture, have, offer for sale or sell any article of food or drugs which is adulterated within the meaning of "An act to prevent the adulteration of food or drugs," approved March 25th, 1881, and the supplement thereto approved March 23d, 1883. And any person offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars, to be recovered in an action under the provisions of the aforesaid law and the supplement thereto.

SEC. 2. No meat, fish, bird, fowl, vegetable, fruit or milk, not being healthy, fresh, sound, wholesome and safe for human food, nor the meat of any fish, bird, fowl or animal that had died from disease or accident shall be brought into this township or offered for sale or sold. And any person offending against or violating any of the provisions of this section shall forfeit and pay a penalty of dollars.

SEC. 3. No decayed or unwholesome fruit or vegetables shall be brought into this township, sold or offered for sale. And any person, etc.

SEC. 4. That no calf, pig or lamb, or the meat thereof, shall be brought into this township, held, or offered for sale, or sold, at the date of its death, being a calf, was less than four weeks old, or being a pig, was, when killed, less than five weeks old, or being a lamb, was, when killed, less than eight weeks old. Nor shall any meagre, sickly or unwholesome fish, bird or fowl be brought into the township, held, sold, or offered for sale. And any person, etc.

SEC. 5. When any meat, fish, bird, fowl, fruit or vegetable is found by any inspector or member of this Board offered or exposed for sale, and which is in a condition unwholesome or unfit for food, he shall

order the same to be removed, and it shall be the duty of the owner or person in charge of such matter or substances to immediately remove the same from any market, street or place, and such articles shall not be sold or offered for sale, nor in any way disposed of for human food. And in case the owner or person in charge shall fail or neglect or refuse to remove said articles within three hours after having been notified to do so, the same may be removed by the inspector or any member of this Board, the owner or person in charge paying all expenses therefor. And any person, etc.

### DEFINITION OF NUISANCES.

SEC. 6. That nuisances within the township are hereby defined and declared, and shall include and embrace, the throwing, placing or depositing in or on any place, public street, alley, sidewalk, gutter, open lot or public grounds, within the township, any dead animal, fish, bird, or any part of the same, or any carrion, putrid meat, manure or compost; also any foul or offensive or obnoxious matter or substance whatever, whether composed wholly, partly or jointly or entirely of animal or vegetable matter; also any thing, matter or substance, of any nature, kind or composition, in or upon any private land, lot, building, tenement, cellar, pit, well or other structure, whether said matter or substance is mixed or unmixed, compounded or otherwise, composed wholly, jointly or partly of liquid or solid matter or substance, which shall cause or produce, or from which there shall arise or be cast off, any impure or obnoxious or offensive or foul odor, smell or gas, annoying or hurtful or dangerous to any person; also any full or leaky cesspool, or any full or leaky privy vault; allowing or permitting any liquid or solid matter taken from any cesspool or privy vault to be placed or deposited in or upon any lot, place, street, road, alley, gutter or lane in the township; allowing or permitting any of said substances to leak or ooze out of the cart, wagon or vessel or other thing in which the same may be placed, while upon or passing along any of said roads, streets, alleys or lanes; also conveying said substances along any of said roads, streets, alleys or lanes of the township, except in air-tight tanks or vessels; also the burning of any thing, matter or substance, within the township (other than coal, wood, charcoal, gas or oils), which shall emit into the air, or cause or produce or cast off any foul or obnoxious or offensive or



hurtful or annoying or repulsive gas, smoke or odor of any kind whatever. Any and every nuisance as above defined is hereby prohibited and forbidden within the township, and any person making, causing, maintaining or permitting any of said nuisances shall forfeit and pay a penalty of dollars.

SEC. 7. Whatever is dangerous to human life or to health, whatever building, erection or part or cellar thereof is not provided with adequate means of ingress and egress, or is not sufficiently supported, ventilated, drained, cleaned or lighted, and whatever renders the air, food or water unwholesome, are declared to be nuisances and are prohibited. And any person who shall aid in erecting or contributing to the same, or who shall continue to retain or maintain any of them, shall forfeit and pay the penalty of dollars.

### CONTAGIOUS DISEASES.

SEC. 8. Every physician shall report to the township physician of this Board in writing, the name, age, and address of every person having scarlet fever, diphtheria, small-pox or varioloid, cholera, typhoid fever, typhus fever or yellow fever or any other contagious or infectious disease publicly declared by this board to be dangerous to the public health, whom such physician shall have professionally attended or prescribed for, said report to be made within twenty-four hours after such physician has first professionally attended such sick person. And any person, etc.

SEC. 9. Every physician shall report in writing the name, age and address of any person who shall have died of any of the diseases mentioned in the foregoing section, within three hours after he shall have been informed of said death, and such report shall be independent of the regular certificate of death required by law. And any person, etc.

SEC. 10. No person shall, without a permit from this Board, carry or remove from one building to another any person sick with any contagious disease; nor shall any person, by any exposure of any individual sick of any contagious disease, or of the body of any such person, or by any negligent act connected therewith or in respect to the care or custody thereof, or by needless or careless exposure of himself, cause or contribute to or promote the spread of disease from any such person or from any dead body. And any person, etc.

SEC. 11. No principal, teacher or superintendent of any school, and no parent or guardian of any child attending any school, shall permit any child sick with any contagious disease, or any child residing in any house in which such disease shall exist, to attend any school until this Board shall have given its permit therefor. And any person, etc.

SEC. 12. In case any infectious or contagious disease shall occur, the persons affected thereby shall, at the discretion of this Board, be isolated, quarantined or removed to such locality as the Board may order and direct; and all buildings, clothing, property and premises which may become infected by the presence of persons affected by contagious or infectious disease shall be disinfected, and said disinfection or fumigation shall be done in such manner and with such materials as this Board may direct. And this Board may establish such separation and isolation or domestic quarantine of the sick from persons not necessary as attendants, and also provide and effect such special care, disinfection and cleaning of property and premises as shall be needed in order to prevent the spread of such diseases.

SEC. 13. No public funeral of any person dead of any contagious disease shall be held in this township and no person shall be allowed to enter the premises or view the body except those attendant on the dead, but immediately after death the corpse shall be placed in an air-tight coffin or otherwise prepared for burial with such precautions as this Board may direct, and shall be buried as speedily as possible. And any person, etc.

SEC. 14. The terms "contagious disease," or "infectious disease," or "dangerous disease" shall be taken to mean scarlet fever, diphtheria, small-pox or varioloid, typhus fever, cholera and yellow fever, and such other diseases as shall be publicly declared by this Board to be dangerous to the public health.

### SLAUGHTERING AND THE KEEPING OF CATTLE.

SEC. 15. The slaughtering or killing of cattle, swine or sheep shall not be allowed within the limits of this township without a permit granted for that purpose by this Board. And no slaughter-house or place where cattle, sheep or swine are slaughtered or killed shall be allowed within the township unless a permit for that purpose shall be granted by this Board. And any person, etc.

SEC. 16. No cattle, swine or sheep shall be killed for human food



while in a diseased, overheated, feverish or exhausted condition; nor shall cattle, swine or sheep for human food, be killed within twenty-four hours after driving or transportation, nor until rested and properly fed and watered, nor shall any meat from any diseased animal be sold or offered for sale in the city. And any person, etc.

SEC. 17. No person shall allow any cattle or swine to run at large in the township, nor shall any person keep any swine without a permit so to do granted by this Board. And any person, etc.

### TO PROHIBIT THE ACCUMULATION OF OFFAL, ETC., AND TO PROHIBIT AND REMOVE NUISANCE.

SEC. 18. No person shall throw, place or deposit, or allow to collect on or flow over any sidewalk, street, road, alley or place, any slops, dirty water, or filth of any kind. And no person shall throw, place or deposit on any street, road, alley or place, any dead animal, fish, or any part of the same, or any putrid meat, compost, or any foul or offensive substance whatever. And any person, etc.

SEC. 19. No person shall throw, cast, place or deposit, or allow to flow or run into any stream, river or brook, in the city, any dead animal, putrid meat, garbage, offal, manure, compost, or any foul or offensive substance whatever. And any person, etc.

SEC. 20. It shall be the duty of any owner, tenant, lessee, or occupant of any lot, ground, building, house or stable, in the townships, on notice from this Board, to forthwith remove from said lot, ground, building, house or stable, any rubbish, garbage, offal, or any offensive matter or thing; and it shall be the duty of any person, on notice from this Board, to abate any nuisance existing on any premises of which he may be the lessee, owner, tenant or occupant. If any person shall refuse or neglect to remove any foul or obnoxious, or hurtful matter or thing, or if any person shall refuse or neglect to abate any nuisance, then this Board may proceed under the provisions of "An act concerning the protection of the public health, and the record of vital facts and statistics," approved March eleventh, one thousand eight hundred and eighty, and the supplements thereto; and shall remove said nuisance, source of foulness, or cause of sickness, and shall recover, by action of debt, the expense incurred by said Board by such removal.

VITAL STATISTICS.

SEC. 21. Every person having authority to solemnize marriage shall transmit to the township assessor a certificate of every marriage solemnized before him, within thirty days next thereafter, and said certificate shall be made out on the blank forms furnished by this Board for that purpose, and shall include all facts required by said forms. And any person violating the provisions of this section shall forfeit and pay the penalty provided by section 24 of this ordinance.

SEC. 22. It shall be the duty of the physician or midwife present at the birth of every child born in this township, but in case there is no physician or midwife present it shall be the duty of the parent, to report in writing to the township assessor all particulars called for on the blank forms furnished by this Board for that purpose, and said report shall be made within thirty days next after the date of said birth. And any person, etc.

SEC. 23. That in the case of any person dying within this township it shall be the duty of the physician who may have attended during the last illness, to furnish the undertaker, or any member of the family, a certificate of death, which certificate shall be made out on and shall comprise all the facts stated in the blank forms furnished for that purpose. And any person, etc.

SEC. 24. Any person violating any of the provisions of sections 21, 22 and 23 of this ordinance shall be liable, in an action at law, to a penalty of fifty dollars, said action being in the form of an action of debt.

PRIVY VAULTS AND CESSPOOLS.

SEC. 25. No person shall build, make, erect or maintain any privy vault or cesspool unless the same shall be made or constructed of brick and cement, and said vaults or cesspools shall be not more than four feet deep and the sides and bottom thereof shall be at least eight inches in thickness and made of well-burned brick, well laid in hydraulic cement (*provided, however*, that in lieu of bricks the bottom may be constructed of one piece of flagstone laid in cement), and said vaults and cesspools shall be water-tight.

SEC. 26. No owner, tenant, agent, lessee or occupant of any premises shall allow the contents of any privy vault or cesspool to flow therefrom, or to rise within one foot of the top thereof; nor shall any



privy vault or cesspool be allowed to become offensive to sight or smell; nor shall any privy vault or cesspool be filled with sand or earth until the contents shall have first been removed; nor shall any person throw, cast, place or deposit in any privy vault or cesspool any dead animal, swill, ashes, garbage, rubbish, offal or any substance not appropriate to the purpose for which structure was intended. And any person, etc.

PUBLIC WATER-SUPPLY.

SEC. 27. No person shall throw, cast, place or deposit, or allow to flow into any river, stream, brook, reservoir, cistern or well, the water of which is used for drinking purposes, any dead animal, or any part of the same, or any carrion, putrid meat, manure, compost, slops, or any foul or offensive substance whatever, or any substance or thing that will in any way pollute or render hurtful or unhealthy the water of said river, stream, brook, reservoir, cistern or well. And any person, etc.

SEC. 28. Whenever this Board shall have satisfactory evidence that any well or cistern, the water of which is used for domestic purposes, has become polluted and rendered unsafe for use, notice to discontinue the use of said polluted water shall be sent to the owner, agent or person in charge of said well or cistern, and said owner, agent or person shall, on receipt of such notice, close said well or cistern and fill it up with fresh earth or discontinue the use of the water thereof And any person, etc.

BURIALS AND DISINTERMENTS.

SEC. 29. No person shall bury or disinter the body of any person without a certificate from this Board, and all human bodies when buried shall have at least four feet of earth on top of the coffin in which is said body. And any person, etc.

OFFENSIVE TRADES.

SEC. 30. No person or persons shall carry on any trade, manufacture or business within the township which may be obnoxious or offensive to the inhabitants of said township, or any part thereof, and which may be attended by noisome and offensive odors, without having

first obtained a permit from this Board; such permit to be granted only on such terms and conditions as shall be from time to time prescribed by said Board, to which terms and conditions the applicant or applicants for such permit shall subscribe before receiving said permit, and such permit shall not be transferable in case of sale or transfer of the business, in which case a new application must be made in the name of the parties who propose to conduct the business; and the said trade, manufacture or business may be at any time summarily abated in case of failure or neglect to comply with the terms and conditions of the permit; and any such trade, manufacture or business which may be established within the township without having first obtained the permit hereinbefore provided for, shall be summarily abated, as provided in the act of March 11th, 1880, and such acts as may be amendatory thereof and supplementary thereto; and any person offending against any of the provisions of this section shall forfeit and pay a penalty of twenty dollars for each day in which such trade, manufacture or business may be carried on.

If complaint shall be made to this Board of any nuisance or nuisances, or if the Board shall come to know of any other nuisances, foulness, or cause of disease or risk to the public health, not specified in the ordinances herewith published, the nuisance or risk to the public health thus occurring shall be dealt with as provided for in the other ordinances herewith published. And any person offending against or violating in any such case, in a way regarded by this Board as a nuisance and a risk to the public health, shall, according to the provisions of this section, forfeit and pay a penalty of dollars.

Some townships may see fit to omit the ordinances relating to adulterated and unhealthy foods, and those as to the slaughtering and keeping of cattle. Each code or series of ordinances should, at its close, have the section named in the note at the beginning.

The chief laws relating to public health passed by the Legislature of 1885 are referred to in Circular LIV. of this Board, a copy of which can be had on application by postal.

The most important principles involved in the authority and administration of our health laws this year came before the Court of Errors and Appeals on appeal from decree made on the advice of Vice Chancellor Bird. The opinion, as delivered by Justice Magie, is here given in full.



"MAHLON HUTCHINSON et al., appellants,

*v.*

"THE STATE, EX REL. THE BOARD OF HEALTH OF THE CITY OF TRENTON, respondent.

"1. No power exists in the common council of Trenton, under its charter, to license an individual to lay a private sewer in public streets or to discharge filth into an open watercourse not a public sewer. One who thus uses a private sewer laid under permission of an ordinance of the council, cannot claim to be exempted from proceedings to abate or restrain a public nuisance created thereby, on the ground that such use is an act authorized to be done by public authority.

"2. A board of health organized under the "Act concerning the protection of the public health, and the record of vital facts and statistics relating thereto," approved March 11th, 1880, (*P. L. of 1880, p. 206,*) may file a bill in the court of chancery as relators, in the name of the State, for an injunction to restrain the continuance of any nuisance hazardous to the public health of the locality. In this respect the remedy to restrain such a nuisance, which formerly was required to be in the name and at the instance of the attorney-general, has been extended so that a proceeding in equity for an injunction may be taken by such a board.

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"On appeal from decree made on the advice of Vice-Chancellor Bird, whose opinion is reported in *Trenton Board of Health* v. *Hutchinson, 12 Stew. Eq. 218.*

"*Mr. W. M. Lanning* and *Mr. B. Gummere*, for appellants.

"*Mr. James Buchanan* and *Mr. G. D. W. Vroom*, for respondent.

"The opinion of the court was delivered by

"MAGIE, J.—The bill in this case was filed in the name of the State, on the relation of the Board of Health of the city of Trenton. It charged the appellants (one of whom was the owner and the other the occupant of a hotel in Trenton) with causing and maintaining a public nuisance injurious to the health of the inhabitants of that city, by discharging into Petty's run, through a pipe or sewer laid in West Hanover street, filth and offensive matter from the sinks and water-closets of the hotel. It sought an injunction against the continuance of the nuisance.

"Appellants, by their answer, denied that the discharge from the hotel caused the nuisance complained of, and insisted that they had acquired a right to lay and maintain the sewer, which right was such as to bar any proceeding against them for a public nuisance. They further denied the right of relators to file this bill in the name of the State, and asked that they might have the same benefit of the objection thus raised as if they had demurred to the bill.

"The cause came to hearing before Vice-Chancellor Bird, and on his advice a decree was made perpetually enjoining appellants from discharging into Petty's run, through the pipe, the filth and offensive matters from the hotel.

"The proofs taken below afford, in my judgment, ample justifica-

tion for the conclusion there reached that the discharge complained of was a public nuisance, hazardous to the public health.

"Nor can I find any ground to dissent from the conclusion of the learned Vice-Chancellor, which denied to appellants the protection they claimed against proceedings to abate or enjoin the nuisance.

"Their contention was (and it has also been urged in this court) that they had acquired a right to maintain this sewer and to empty the waste of the hotel into Petty's run, by the act of the public authorities of the city of Trenton, and that while exercising the right so acquired they were shielded from indictment, injunction or other proceeding founded on the ground that the permitted act caused a public nuisance.

The pipe was laid by Edmund Bartlett, then owner of the hotel. Just before it was laid, the common council of Trenton had passed an ordinance giving Bartlett power to lay a ten-inch drain-pipe or sewer from the hotel through West Hanover street to Petty's run. The ordinance provided that the pipe or sewer was to be constructed so as to prevent its becoming a nuisance, and that if it should become a nuisance or injurious or dangerous to the public, on which the opinion of the common council was to be final or conclusive, then it was to be removed by Bartlett, and, if he failed to remove it, by the council at his expense.

"The ordinance was accepted by Bartlett, as required by its terms, and he laid the pipe and used it, as appellants have since done, under such authority as was acquired by and under this ordinance.

"At the time this ordinance passed, the common council had power to cause sewers to be constructed in any part of the city, when, in their judgment, the public good required, and to assess the cost of such sewers on property benefited. *P. L. of 1874 § 25 pl. VIII., § 76 pl. II.*

"The ordinance did not expressly permit the pipe when laid to be used to carry off offensive matters. When it is understood that the point of discharge at Petty's run is in a thickly-settled part of the city, and that the run (which is a natural water-course) traverses a thickly-settled region before it empties into the Delaware, and when it is noted with what care the ordinance requires it to be constructed and used so as not to become a nuisance, some ground is afforded for the argument urged on our attention, that it was never intended to authorize its use to discharge what might reasonably be expected to create a nuisance. But I think the language used in the ordinance requires us to consider it a grant of whatever power the council could thus grant, to use the pipe in the mode sewers are ordinarily used.

"In the case of *Hunt* v. *Lambertville, 16 Vr. 279*, power granted to a municipal corporation to lay public sewers at public expense, was held to include by implication a power to permit such sewers to be built at private expense. But the case differed from the case in hand. The sewer in that case, though built at private expense, was to become



a public sewer. It was to be used not only by those who built it but by others. In this case the sewer was to be used only by the party building it, and was plainly to remain his private property.

"Under the authority to lay sewers for the public good and at the public expense, I am unable to discover authority, by grant or license, to permit the use of public streets for a private sewer.

"It is not the case of a connection with a public sewer. Petty's run was not such a sewer, but an open, or partially open, water-course. Connections with public sewers are necessary incidents to their use, and the power to permit them to be laid is implied from the power to lay the sewers.

"Nor has my examination of the Trenton charter enabled me to find any grant of power broad enough to justify a grant or license to an individual to occupy public streets with private sewers. Beside the authority to lay public sewers, there is nothing giving more extensive rights in the streets than the charter considered by Chancellor Zabriskie in *Glasby* v. *Morris, 3 C. E. Gr. 72*, and held not to justify a license to maintain a private sewer in a public street.

"My conclusion is that there was no authority in council to pass this ordinance permitting this private sewer to be laid and its contents discharged into Petty's run.

"It is urged that the court ought not to examine the authority of council to pass such an ordinance, but appellants invoke the ordinance as a protection, and it is necessary to determine its legality and sufficiency.

"The conclusion thus arrived at disposes of this contention on the part of appellants, for it is only when the act which has caused a nuisance has been done by virtue of authority derived from the supreme legislative power, that the public, which has granted the authority, is estopped from pursuing the actor by remedial or primitive proceedings for the resulting public injury.

"Although I put my conclusion on the ground above stated, I do not wish to be understood as implying that if council had authority to permit appellants to discharge the filth of this hotel through the public streets, the result would necessarily be favorable to them.

"When exemption from proceedings as for a public nuisance is claimed, on the ground that the nuisance was the result of an act authorized by public authority, it must appear that the public injury was the necessary or probable result of the permitted act, when performed with the utmost care to prevent injurious results. *Wood on Nuisances Chap. 23; King* v. *M. & E. R. R. Co., 3 C. E. Gr. 397; State* v. *M. & E. R. R. Co., 1 Dutch. 437.*

"Nor would I be considered as implying that if council had, under the authority actually vested in them, built a public sewer discharging in a thickly-settled part of the city and there creating a nuisance, indictments would not lie or injunctions would not issue to punish those who maintained the nuisance or to restrain its continuance.

When that case arises, it will be necessary to decide whether authority to construct public sewers includes authority to create a nuisance.

"The next objection made by appellants questions relator's right to file this bill in the name of the State.

"When the ground on which a nuisance is attacked is the injury to the public, the ordinary and proper remedy is doubtless by bill or information on the part of the Attorney-General. *Wood on Nuisances § 811; Attorney-General* v. *D. & B. B. R. R. Co., 12 C. E. Gr. 1.*

"Relators properly admit that their right to institute this proceeding must be derived from statute. They claim to have such right under an act entitled, 'Supplement to an act entitled, 'An act relating to local boards of health,' approved March 22d, 1881,' which supplement was approved March 22d, 1883. *P. L. of 1883 p. 119.* By the tenth section of this act, power is given to certain local Boards of Health to file a bill in equity as relators in the name of the State, for an injunction to prohibit the continuance of nuisances hazardous to public health. Relators insist that they are within the provisions of this section.

"This insistment requires us to determine the *status* of relators, and incidentally to examine various acts on the subject of the protection of the public health.

"By the charter of Trenton, heretofore referred to, the common council was empowered to establish a Board of Health, to define its powers and duties, and to provide for the protection and maintenance of the health of the city. *P. L. of 1874 p. 344 § 25 pl. XXII.*

"Under this power a Board of Health was organized and established, and such a Board was in existence in 1880.

"By the 'Act concerning the protection of the public health and the record of vital facts and statistics relating thereto,' approved March 11th, 1880, (*P. L. of 1880 p. 206,*) it was enacted that every city, borough, incorporated town, or a town governed by a commission, should have a Board of Health, to be organized in the manner set out in the act. By a proviso contained in the eleventh section, the act was, however, excluded from operating on Boards of Health then organized in any city under its charter. The act was, therefore, not operative in the city of Trenton.

"The obvious intent of this legislation was to provide for a Health Board in every municipality; where such Boards were already organized, they were left to act under their respective charters. But where no such Boards existed, the act required them to be created.

"The next act to be considered was entitled 'An act relating to local Boards of Health,' and was approved March 22d, 1881. *P. L. of 1881 p. 160.*

"The second section of this act is expressed in language which is most unfortunately obscure and ungrammatical, but it may, in my judgment, be construed as enacting that any Board of Health organized in any city under the provisions of its charter, may, by the



order and direction of the mayor and common council of such city, be organized in accordance with the provisions of the act of 1880.*

"The plain intent of the section is to give authority to those cities in which the act of 1880 was not operative, to organize their Boards of Health in the manner prescribed by that act.

"But it it insisted that, in this respect, the legislature has failed to effectuate its design, and that the act, or at least the section in question, is unconstitutional.

"It is said that the title of the act does not express the object aimed at in this section. But it is sufficient if the object is, by fair intendment, included within the title. *Walker* v. *Union, 4 Vr. 350; Snipe* v. *Shriner, 15 Vr. 206; Payne* v. *Mahon, 15 Vr. 213.* Legislation respecting local Boards of Health would fairly include legislation respecting the organization of such Boards.

"It is further urged that this section amends the act of 1880, and so becomes obnoxious to the constitutional prohibition against revising or amending any act by reference to its title only. But, while this act incidentally extends the operation of the act of 1880, it is not amendatory legislation within the meaning of this constitutional prohibition. The section in question does not amend the act of 1880 in terms, or by implication. Its effect upon that act is not direct, but incidental, and such legislation is not prohibited. This view of this clause of the constitution has been taken in the supreme court in *Van Riper* v. *Parsons, 11 Vr. 123; Evernham* v. *Hulit, 16 Vr. 53,* and in *Campbell* v. *Board, 16 Vr. 241.* The last case has, at this term, been approved by this court.

"These are the only constitutional objections to the act of 1881 which have been urged upon us. No other objections were made, or have been considered.

"The act, therefore, not being objectionable on those grounds, must be considered as giving opportunity to the city of Trenton to organize its Board of Health in accordance with the act of 1880.

"By an ordinance of the common council, approved by the mayor on July 12th, 1882, it was ordained that a Board of Health should be organized under the act of 1880. The ordinance repealed the ordinance establishing a Board of Health under the charter.

"Under this ordinance relators were organized, and have since acted as the Board of Health of the city.

"Appellants further urged that the organization is not such as the act of 1880 required.

"If the Board has been organized, and is in existence *de facto* under this act, I apprehend that this objection could not be considered. Their title to office could no more be contested in this proceeding than could the title of an attorney-general, acting in his office, upon an information filed by him.

* This act has since been amended.

"But examination shows that the ordinance does provide for an organization in accordance with the act of 1880. It prescribes the number of members, and the mode of appointment, as the act requires. It directs that one city physician and one health inspector shall be members, and the act requires them to be members if there are such officers in the city. It prescribes a term of service, within the act, for all the members, except the physician and inspector. It fixes the term of those members at the term of their respective offices. It is in this respect that the ordinance is attacked, and it is contended that these members are required, by the act of 1880, to hold office for at least three years. But this is not, in my judgment, the true meaning of that act. When its requires existing officials to be members of the Board, it implies, of necessity, that they are to be members during their official term. The prescription of the act respecting the term of members of the Board, is manifestly to be limited to such members as are not such *ex officio*.

"Having reached the conclusion that this Board was properly organized under the act of 1880, it follows that they have power to initiate this proceeding. The ninth section of the act of 1883, above referred to, provides that any Board of Health so organized may inquire into the existence of nuisances hazardous to public health, and the tenth section provides that any *such* Board may file a bill in the Court of Chancery, in the name of the State, for an injunction to prohibit the continuance of such nuisances.

"It was further urged that the court below erred in not receiving pertinent evidence offered to show that the discharge of the waste from this hotel through the sewer complained of, occasioned less hazard to health than any other practicable method of disposing of it, until the city of Trenton built public sewers, into which it could be discharged.

"The argument was that hotels are public necessities, and, as such, licensed to entertain guests; that the waste matter from every human being tended to create a nuisance; that when many were collected, the disposal of such waste was necessarily at the risk of creating a nuisance, and that a court of equity would not enjoin one method of disposal of such waste, if shown that other practicable modes were more injurious.

"But this contention cannot prevail, and the evidence offered was rightly rejected. No business is so necessary as to justify those conducting it in creating a nuisance within the thickly-settled parts of a city. If a hotel cannot dispose of its necessarily accumulating filth without creating a nuisance, and happens to be erected in a populous city which will not or cannot provide sewers or other facilities for disposing of such filth without injury, it is plain that its business must cease in that locality until it can be conducted with due regard to public safety and comfort.

"The decree should be affirmed, with costs.

"*Decree unanimously affirmed.*"



At the next term of the same court the decree of the Court of Chancery in the case of Butterfoss against the Board of Health of Lambertville, was affirmed without written opinion.

Reference may also be made to the Health Officers of Newark, Paterson, Vineland and Asbury Park as to cases which have occurred under their complaint.

Cases before the district courts, such as the case given, page 29 of the Secretary's Report, give additional light as to the law.

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## CIRCULAR LI.

## TO LOCAL BOARDS OF HEALTH OF CITIES AND TOWNSHIP.

TRENTON, April 1st, 1885.

The question is no longer raised in this State as to the need of local Boards of Health in all our cities and townships. So soon as it came to be asserted by physicians, and to be proven by statistics, that a large number of diseases result from local causes, or from errors that can be prevented, so soon the care of health and life became a public and a local duty. The value of a local Board consists in its ability to instruct the people as to the causes of disease; to warn them of the serious results of avoidable evils; to prevent nuisances, or abate those that exist; to be ready to meet any sudden peril from epidemics, and to bring to bear the prompt action of law where other means fail. The Boards of Health as now constituted in most cities under the general law of the State, and the township Boards, made up of the township committee, the assessor and a medical member, are capable of being greatly useful in their respective localities. Where there has been failure to maintain these Boards, as required by law, we have many instances, even in sparse townships, which show the consequences of neglect. In many more instances, where such Boards have been active and efficient, there is the most satisfactory evidence of good results. Circular XXXIX., herewith sent, gives full instructions as to the duties and privileges of such boards.

The anxiety this year as to the invasion of cholera surely must help to incite such Boards to thorough vigilance, although the avoidable

sickness and deaths from other causes should be a constant motive to proper oversight. Each year a copy of our annual Health Report for the use of the Board of Health has been sent to each assessor. Reference to these will show the scope of the work, and the various directions in which your Board can be of service. So long as we have them, we will also send copies to each member of a Board, if requested to do so by postal. Each Board should have all the Reports, and make these the beginning of a small health library.

Experience has shown that in townships and villages there should be, early, each spring, a sanitary inspection of houses and their surroundings, in order that defects may be known and remedied. Frequently those who desire to be careful are not aware of the dangers to water-supply, to cellars, and to house-air from defective drainage, cesspools, or other sources of disease. Cow-yards, hog-pens and slaughter-houses are often in too near proximity to houses, or water is used from wells situated near them. We have prepared a plan for house inspection and sanitary survey, which can be had on application.

Cellar drainage and airing is not enough attended to, or roof-water is allowed to fall around the house so as to dampen the cellar and its walls. Each spring *everything* should be removed from the cellars. Even the boxes and barrels that are to be returned to it need airing and cleaning.

It is important that cesspools and closets and wells connected with railroad stations be carefully examined, as in times of epidemic they are often the starting points of specific contagions. The same is true of hotels and places of public assembly.

Water and milk as well as the meat-supply must be carefully guarded. Other points are referred to in Circular XXXII. of this Board (Sixth Report). In summer many of our cities have found it advisable to issue directions as to the care of children. In times of cholera they fall early victims if their summer disorders are not promptly met by proper diet and medicine.

Local Boards should fully acquaint themselves with all prompt methods for isolation and disinfection of communicable diseases. The circulars of this Board are at their command by postal.

The attention of parents and school trustees should be called to the need of vaccination for all children, so that small-pox may never be caught in any town or township. The return of marriages, births



and deaths must be carefully made. In every intelligent community there are now those who are studying the laws and conditions of health, and who are availing themselves of the reports and circulars of this Board and of other sources of information. If local Boards fail to recognize of how much service they can be, it will not be the fault of the State, or because of the need of more health laws on the statute books. We ask of all Boards that they be thoroughly alive to the duty and privilege of aiding in the securement of health and the prevention of the avoidable causes of disease. We hope to have for the present year some Special Sanitary District Inspectors who will be sent to aid local Boards and Inspectors when desired. *Examine carefully enclosed slips of important laws just passed.*

E. M. HUNT,
*Secretary.*

P. S.—If in any township the Board of Health, as required by the law, has not met, the assessor will, on receipt of this, please send us postal containing name and P. O. address of the members of the township committee.

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## CIRCULAR LII.

## SANITARY INSPECTION OF HOUSE AND PREMISES.

### INSTRUCTIONS FOR FILLING OUT RETURN.

Number the Inspection Returns consecutively in the space No....., at head of each blank.

In entry No. 1 describe the *location* by street and number, or otherwise, *so that it cannot be mistaken.*

No. 2. Give the *full* name of the owner or owners, or tenant.

No. 3. Give the *aggregate* area of all out-houses, sheds, privies, stables, etc., and indicate their positions on the *Plan of the Premises.* (See back of the blank.)

No. 4. If the site of house is *above* level of adjoining land, strike out the words "same as" and "below;" if the *same,* strike out "above" and "below;" if *below,* strike out the other words. Write in the proper word before the entry "drained before building"—*not* or *tile,* as the case may be. State character of *soil*—gravel, sand, clay, loam, etc.; wet, damp or dry. If *made ground,* state character of

filling. Also, state whether the site was *originally* springy, swampy, old water-course, dry ravine, pond, and how roof-water is disposed of.

No. 5. State as to mode of *heating* and *ventilation—painted or papered walls.* If school, assembly rooms or tenement, state as to *fire-escape.*

No. 6. State whether *yard* is paved—drained—clean—amount and kind of garbage, filth, animals, etc.

No. 7. Describe *ventilation* and *lighting* of cellar or basement. State whether occupied for *living purposes—dry* or *damp,* or at times *water in it*—for what used—note *condition* and *kind* of articles stored, and kind and amount of *refuse, filth,* etc. Condition of rooms in house.

No. 8. Note condition of *sinks*—odor—leakage—traps—waste-pipes. Of *drains*—covered—open—foul—clogged—unventilated. Of *cesspools*—construction—covered—leaky—full—overflowing.

No. 9. As to *vault,* note construction—leaky—offensive—too full. As to *water-closet*—state whether pan, plunger, hopper or washout, or other—traps—ventilation of soil-pipe—ventilation of room.

No. 10. State whether water used for *drinking and cooking* is cistern, well or hydrant—hard or soft—its general character—whether *sickness* has ever been attributed to it—what probable source of pollution, if any exists.

No. 11. If more than one family of occupants, letter each. Example: (*a*) *James Guire,* (*b*) —— (*c*) —— (*d*) ——; and gives names of head or on memorandum.

No. 12. Note *over-crowding*—occupancy of inner, unventilated rooms, cellars, etc.

Nos. 14, 15 and 16. Inquire especially concerning the following diseases: *Bowel disorders, Typhoid Fever, Scarlet Fever, Small-Pox, Diphtheria, Measles, Erysipelas, Consumption, Pneumonia.* In No. 14 state how many cases and what diseases are found at date of inspection—*adults, children* and *sexes* specified. In No. 15 the same for the past twelve months. In No. 16 specify the *causes* of any deaths during the past twelve months—giving ages and sexes.

No. 17. Mention any conditions which are *Nuisances,* either public or private—on the premises or adjoining, in street, gutter, sewer. Make suggestions as to the important sanitary *defects* and their *remedy.* If more space is needed for remarks, use a *memorandum* marked same *number* as Return, with street and house number also. State facts plainly but never exaggerate.

See diagram "Plan of Premises," with explanation.



[Sample Blank Filled Out.]

[SEND FOR ONE.]

## SANITARY INSPECTION OF HOUSE AND PREMISES.

### INSPECTION RETURN NO. 1.

See Instructions and Filled Blank. See Diagram.

State, *N. J.* County, *Essex.* Township, ..... City, *Newark.*

1. Ward, *4th.* Street, } *Spring, E. side, 4th s.* No. *26.*
2. Owner: *John Smith. Lessee 4 tenants.*
3. Size of lot: *25* ft. by *100* ft.; area of lot *2,500* sq. ft.; covered by house *1,250* sq. ft.; by out-houses *200* sq. ft.
4. Site of house: Level { same as } adjoining land. *Not* drained before building. *Soil, 2 ft. rubbish and clay. Damp. Part of roof-water runs off by leaders on the ground.*
5. Heating and ventilation: *No* Fire-escape.
6. Yard: *Plank walks to out-buildings. Often wet. Garbage and manure heap near stable and pig-pen.* Animals: *1 horse, 1 cow, 2 pigs, poultry.*
7. Age of house: *20* years; Material: *Wood on brick foundation.* Basement or Cellar: *Both. 2 living rooms.* No. of stories: *3.* Light and ventilation *by 4 windows, front and rear. No drainage. Vegetables in one corner. Air stagnant. Not* cemented *and very damp.*
8. Cesspool— Sink—Drain: } *Kitchen sink not trapped—connects by unventilated pipe with covered cesspool, brick laid so as to leak. Cesspool overflows by open drain to alley. No disconnection by air vent. A drain runs to privy vault.*
9. Privy vault: } *Wooden box—no bottom—very offensive. 40 feet from well. Cleaned 2 years since. Too near the well.*
10. Water-supply: *Well-water. Cistern in cellar for laundry use. Too near privy and cesspool (see Diagram).*

.....

11. No. of families: } *2.* Names of heads of families: } *1 Mrs. West; 2 James McGuire.*
12. No. of occupants: } Adults, *3.* White, *9.* Children, *8.* Colored, *2.* No. Native, *7.* Foreign, *4.*
13. Vaccinal status: Adults vaccinated, *2*; not vaccinated, *1*; Children vaccinated, *6*; not vaccinated, *2*; Had small-pox: Adults, *1.*

14. Sickness now: *1 Child. Cholera infantum. 2 years old.*

15. Sickness during past twelve months: *2 Children, dysentery. 1 Adult, typhoid fever.* United length of time: *2 months.* (*Much sickness in same house previous years.*)

16. Deaths during past twelve months: *1 Child, dysentery. 1 Adult, typhoid fever.*

17. Nuisances and suggestions. (See Memorandum and Diagram attached as to 1, 5, 6, 7, 8, 9, 10, 11, 13, 15, 17.)

.....

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Place and Date: *Atlas, April 4th, 1885.* *Robert Jones*, Inspector.

**Sample in Accord with Inspection Return No. 1.**

## EXPLANATION.

The spaces in the diagram represent areas of five feet square, or a total area of 20,000 square feet—the dimensions of the block being 100 feet by 200 feet.

Taking the bottom line for the front of the lot, indicate by a pencil line the size and shape of the lot—leaving a margin on each side if there be room.

Next, outline the size and location of the house and other buildings.

Then indicate by letters the location of the well (by *W*), cistern (by *C*), privy (by *P*), cesspool (by *Cp*), garbage (by *G*), stable by *St*), pig-pen (by *Pp*).

Also the course of drain or pipe from the house by a dotted line with the letter (*d*) at the waste pipe of dotted middle if it is a Drain to cesspool, or by the letter *S* if it be to a Sewer.

Strike out the unnecessary points of the compass. Example: if the house fronts *North*, strike out E. S. W., or if northwest, strike E. and S.

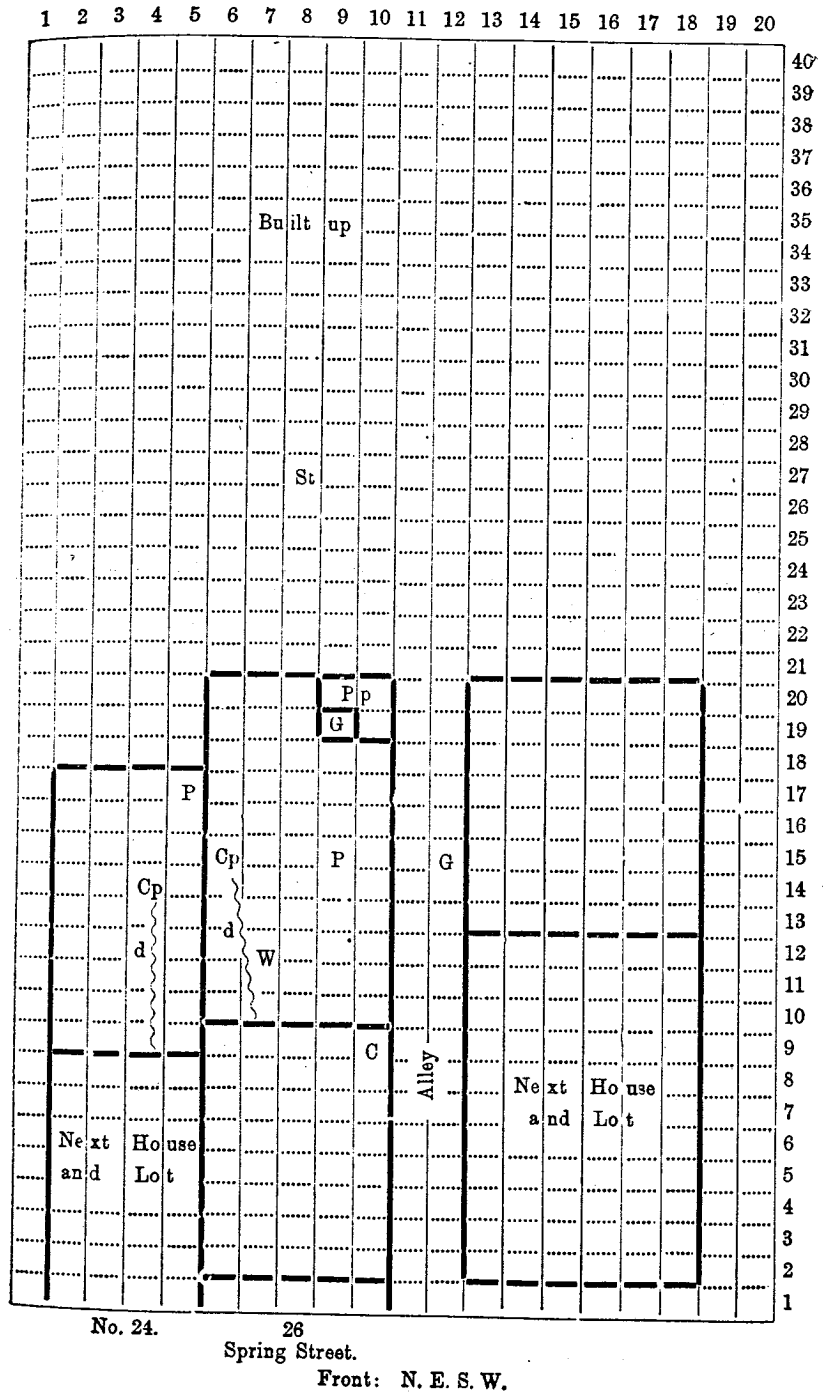
On either side of the outline of the lot indicate location of adjoining buildings, wells, privies, etc., so far as there may be room.

If necessary, the proportions of this Diagram may be increased by estimating the area of each space at ten feet square. If this be done, note the fact.

Part of the Diagram may also be used to show size of rooms, ventilating, heating, etc., if the lettering is explained.

NOTE.—Keep all these sheets as permanent records filed for reference.

## OUTLINE ON WHICH TO MARK PLAN OF PREMISES.



SAMPLE OF ADDED MEMORANDUM OF INSPECTOR'S RETURN.

Inspection Return No. 1. 26 Spring Street, Newark.

4. The surface of the lot has the *same level as the surrounding land.* The best that can be done will be to make surface drains to the gutter in the front of the house. Any natural drainage—as by a water-course—with which the lot can be connected, should be utilized by surface drain thereto. This should be kept open and free from any accumulation of filth, garbage, etc.

5. The furnace in cellar is very open jointed and has no fresh air box. There is much dust from it. Two of the papered walls are in bad condition. There are four tenants and no fire-escape—or double stairs.

6. The yard should be thoroughly cleaned; wet places covered with fresh stone lime; the manure and garbage removed; stable and pig-pen cleaned.

7. The brick cellar is used for storage purposes, and two rooms are occupied as a basement. The cellar should thoroughly be cleaned—the decaying vegetables removed, all refuse and dirt gathered up, and the walls and ceiling whitewashed. If there are any moist places they should be covered with fresh-burned lime, and the windows, front and rear, should be kept open as much as possible to secure fresh air and sunshine. Cistern should be changed from cellar.

8. The kitchen sink connects by an *untrapped waste-pipe,* through a *wooden box drain,* with a *covered cesspool.* There will, consequently, be a flow of foul air—greater in winter than in summer—from the cesspool into the kitchen, and thence into other parts of the house. The waste-pipe should have an **S** trap, and the box drain should be replaced by a metal one, and ventilated by an opening between the house and cesspool. This cesspool *leaches* or leaks, and is too full. It should be emptied, and then made tight by cement—or, better still, filled up with clean earth, and a new one made farther away from the well, provided with a ventilating cover.

9. The privy vault should be emptied, disinfected and filled up with clean earth, and a new vault dug farther from the well. If the present one is used after cleansing, the dry earth system should be adopted.

10. The well, located for convenience about ten feet from the kitchen door, has a leaking cesspool within fifteen feet, and a privy vault about as near. Its water is *suspected.* Sink drain from kitchen to cesspool runs too near well. Another source of supply should be provided as soon as practicable.



11. The Sanitary Inspector should visit this house frequently and secure thorough house-cleaning.

15. The sickness and death record of this house for the last six years has been so bad that it should have in all details expert sanitary inspection. The plumbing is bad. House scarcely tenantable.

17. *Nuisances* caused by the condition of the *gutter in front of house and of the alley in the rear,* call for immediate attention from the local authorities. The gutter along this street should be cleaned out, and a suitable depth and slope be secured so as to afford proper drainage. The livery stable owner should be notified to abate the nuisance caused by him in the alley.

The Inspector, after pointing out what requires to be done by the owner and occupant, should soon make a re-inspection to see whether the defects and evils have been remedied. If found necessary, formal notice should be served, and compliance should be enforced by such measures as the law provides.

In all this work very much will depend upon the tact, discretion and good judgment of the Inspector.

NOTE.—Samples to be had on application by postal to E. M. Hunt, Secretary, Trenton, N. J.

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## CIRCULAR LIII.

## PURE DRINKING-WATER—HOW TO SECURE IT.

The importance of having a pure drinking-water is such that every care should be taken to secure a good water-supply, and then to keep it pure.

Impurities are either animal, vegetable or mineral. Where the organic matters are animal, they tend to become putrescent, and when taken into the system may produce fever or other disorder. When the matter is introduced in smaller quantities, it undergoes decomposition more or less rapidly according to the condition of the air or temperature. In such cases no smell or taste may be perceptible.

The constant use of such water sometimes causes disease, even where the quantity is small. Some persons seem more susceptible than others, and their own systems either cause or accelerate changes which had not been noticeable before. Vegetable impurities also tend to decomposition under favoring conditions. These disorder the system or cause malaria or other special forms of disease. Mineral impurities are owing to the suspension or solution of mineral particles in the water. Some of these, as sulphur or iron, give taste to water, but do not injure it unless present in too large quantities. Others, as lead, may in small quantities seriously affect the human system. Others, as lime, are chiefly injurious by producing too great hardness of water. The taste of water fresh from the well is not by any means a perfect guide as to its purity. If it has much organic matter in it which is already undergoing decomposition, there may be taste and odor, or its organic impurities may have been so far destroyed as to yield no unpleasant taste or odor, and yet there may remain some dangerous contamination. Its being an agreeable drinking-water to those accustomed to its use does not prove its purity.

Water, as it comes from the clouds and is strained through the ground, is so nearly pure that it is generally good, except where wells and springs are in some way fouled by nearness to houses or pits of decayable material. In cities, where the soil is likely to become filled with decomposable matter to a degree that the ground, the air, the sunlight and vegetation cannot rapidly remove it, the water generally becomes impure.

The usual supply of drinking-water naturally divides into public water-supply, cisterns and wells or springs. Where there is public water-supply, the only way is for companies to have, from time to time, proper examinations made, and, if the quality is not what it should be, to know the cause and to apply the remedies, so many of which are now available. The general water-supply, which has been good, may come to be impure. It may have too much sewage put in the river, or the pipes may become fouled, or these or the reservoirs may have growth of minute forms of plant-life, or water long impounded and in great quantities may become deadened by want of oxygen or air in the water. Thus water, from a good source, may become fouled in its distribution. Proper reservoirs and filtering basins and the introduction of compressed air into the impounded water, will do much to correct any temporary deterioration.



Where cistern-water is relied upon, the first care must be exercised to receive it from a clean roof, to see to it that the first water of a rain does not go into it, and that the main supply is derived from long and heavy rains, rather than from occasional showers. If a leader ends in a hogshead or tank proportioned in size to the water capacity of the roof or its single leaders, and is arranged with an overflow tube to the main cistern, or with an automatic float, it will, when nearly full, divert the purer water into the main cistern, and leave the former to be used for non-drinking purposes. Cistern-water, unless collected and kept with care, may be charged with organic matter. The cistern should in size bear proportion to the needs of the family, so that it can be empty enough to be cleaned twice a year. If in the ground, it should be tightly cemented and kept so well covered that small animals and foul gases cannot enter it. The pump fitted in it should be of metal. When it is claimed that air should be admitted to the cistern, it is best to have an upright shaft of a few feet, in the top of which there is a wire gauze to protect from leaves, etc.

Wells and springs must be most carefully protected from any possible defilement. To this end, it must be remembered that it is not safe to place any well within one hundred feet of any cesspool, privy, cow or pig-pen, or other deposit of foul matter. Sometimes, without knowledge of where these have been before, wells are dug in too close proximity. The well should be carefully stoned or bricked, and for at least four feet from the top the bricks should be laid in cement, and come up higher than the surrounding ground. The soil should not be rich just about the well. The cover of the well and its pump should be such as not to admit any foul matter. People are too often careless in rinsing vessels about a well. Even a cistern may be defiled by the soil or spillings about it, and wells often are. The cistern may have crevices, or may have something fall into it, or may have its water become dead by long standing. The well may have its surrounding soil so saturated with decaying material as finally to become unable to oxidize it. Some new crack or underground rill may let into it foul liquid from sources that have never reached it before, and which are especially liable to reach it in dry weather. The same may, more or less, happen to springs. Therefore, it is not enough to say that a water-supply has been good, as it may have suddenly become bad from causes not visible. Where,

because of sickness or for other reasons, there is suspicion as to the purity of the water, resort should be had to some simple tests, or at once to chemical or biological examination.

Here are a few tests which, without all the appliances of a chemist, may much aid in indicating whether further examination is necessary, or whether it is wise to cease using the water until fully examined:

*Color.*—Fill a clean, long bottle made of colorless glass with the water; look through the water at some black object; the water should appear perfectly colorless and free from suspended matter. A muddy or turbid appearance indicates the presence of soluble organic matter, or of solid matter in suspension.

*Odor.*—Empty out some of the water, leaving the bottle half full; cork up the bottle, and place it for a few hours in a warm place; shake up the water, remove the cork, and critically smell the air contained in the bottle. If it has any smell, and especially if the odor is in the least repulsive, the water should be rejected for domestic use. By heating the water to boiling, an odor is evolved sometimes that otherwise does not appear.

*Taste.*—Water fresh from the well is usually tasteless, even though it may contain some putrescible organic matter. Water for domestic use should be perfectly tasteless, and remain so even after it has been warmed, since warming often develops a taste in water which is tasteless when cold. If the water at any time has a repulsive, or even disagreeable taste, it should be rejected.

As some waters of dangerous quality fail to indicate their impurity either by smell or taste, what is known as the Heisch test is of value: Fill a clean pint bottle three-fourths full with the water to be tested; add to it a half-teaspoonful of clean granulated or crushed loaf sugar; stop the bottle with a glass stopper or a clean cork, and let the bottle stand in the light in a moderately warm room. If in twenty-four or forty-eight hours the water becomes cloudy or milky it is unfit for domestic use. While cloudiness in the water after standing certainly indicates unfitness for use, yet a negative result does not *prove* the water to be good; because the test often fails to indicate organic matter really present, if phosphates are absent.

CHLORINE IN WATER.—The following test for chlorine is also available in the hands of some physicians. It is distinctly understood that the results are approximate. A larger proportion than two grains to the gallon in well-waters is a just cause for suspicion of the



character of drinking-water. Therefore, if you find more than that proportion, examine the well and its surroundings, and in case of sickness forbid use until examined more in detail by other tests. It may happen that less than one grain to the gallon is the normal quantity of chlorine in certain localities, so that it would be well for the examiner to acquaint himself with the normal proportion for the various districts under his care. Any chlorine in excess of the normal amount is suspicious.

CHEMICALS REQUIRED.—Nitrate of silver (pure crystallized), chromate of potash (not *bi* chromate; its color YELLOW, not *red*); distilled water, that from condensed steam of factories, or furnished by druggists, or, better, collected from the domestic tea-kettle by simple device into clean glass bottles.

NOTE.—Always test your distilled water by a drop of the nitrate silver solution. It should give no cloud.

APPARATUS.—A glass-stoppered colored bottle, or one covered closely with dark blue paper for your nitrate of silver solution, capacity, one pint; another ordinary 16-ounce glass-stoppered bottle for chromate potash solution; a white porcelain evaporating dish of 8 ounce capacity, or smooth, white china bowl, or deep soup plate will do as well; a drachm measure divided into minims.

To prepare the solutions:

"SILVER SOLUTION.

"Nitrate of silver, (cryst.) grains, 50; distilled water, 13 ounces; in colored or covered glass-stoppered bottle, as above.

"One drachm of this solution is equal to one-tenth (.1) grain of chlorine. *Weight and measure must be accurate.* Remember, in collecting and testing water, all containers must be clean and then rinsed in the water in question.

"CHROMATE SOLUTION.

"Chromate of potash, 4 drachms; distilled water, 16 ounces.

"Label your solutions and provide 4 ounce glass-stoppered bottles, prepared as above, for use, refilling as required from the larger ones.

"To apply the chlorine test: Pour in the clean dish or bowl, 8 ounces of the water. To that add a drachm of the chromate solution and mix, with a clean broken thermometer tube or other clean glass

rod. The water will have the bright yellow color of the chromate. Into the clean drachm measure put exactly 1 drachm of nitrate of silver solution. Pour it, drop by drop, into the colored water, stirring well after each drop. So long as the red color produced by the silver disappears entirely on stirring, continue dropping, but the moment it gives a permanent reddish tinge, however faint it may be, to the water, your test is made. Read the number of minims you have used. The drachm represents the tenth of a grain in 8 ounces, or 1.6 grains per American gallon. Therefore, 30 minims = .8 grains per American gallon; 15 minims = .4 grains per American gallon, and so on. A water which takes more than 1 drachm of the silver solution contains more than 1.6 grains per gallon. You can tell how much more, by taking another drachm of the silver solution and proceeding as before, on the same sample, till the red color is permanent. Suppose it takes 30 minims more, you would then have used 1.5 drachms = .15 grains chlorine in 8 ounces of the water, or 2.4 grains per American gallon. Figure the same way for any other proportion.

"FORMULA.—Multiply .1 by the amount of silver solution in drachms and fractions of a drachm which are required for the test; this gives the number of grains of chlorine in 8 ounces of the water. That, multiplied by 16, expresses the chlorine in grains per American gallon.

"NOTE.—Grains of *chlorine* per American gallon can be reduced to grains of *salt* per American gallon by multiplying by 1.65."

Water thus found impure should not be used until further tested either by the usual chemical methods, or the additional gelatine method proposed by Koch. Even where water is suspected, it is much better not to use it for drinking purposes until it has been boiled and poured several times from one vessel to another to aerate it. Or if boiled and passed through a filter, similar aeration takes place. Alum has considerable power as a purifier of water, as it combines with albumen, etc., and removes or settles the organic matter. As, when taken in much quantity or continuously, it affects the health and causes disturbance of the digestion, its popular use has been generally discouraged. But good authorities claim that even if an amount of two grains to the gallon be well stirred through the water and it be allowed to stand a few minutes, it will do much not only to clear it but to dispose of the organic matter, and that this amount can have no ill effect.



Where it is found desirable to have further chemical testing of the water, two or three quarts of it should be put in a new bottle, which has been thoroughly rinsed several times with the same water that is being collected. The bottle should be plugged with an *absolutely new*, clean cork, previously well washed in the same water, and this bound over with a strong string, sealed with sealing-wax so that it may not be disturbed in transit. When the water is taken from a river or open spring, it should be dipped out below the surface; if taken from a pump or faucet, the water should first be allowed to run, so as to fully cleanse the pump or pipe. The sample should be sent to some chemist who has full laboratory facilities, and who has a reputation for correct analysis.

Hardness of water is so fully treated in the eighth report of this Board (1884) that we shall not consider it here. It must be remembered, however, that this and other mineral conditions are injurious to some persons.

Refer to the index of each State Report of the Board of Health as to water.

## FILTERS.

Water which is discolored or impure in some form which may not be injurious, often needs to be filtered. Also water which contains organic matter can be much improved by passing it through filters.

Cisterns are often well provided with filters of their own, by having a partition of brick, so that the water is passed into one side and drawn through the other. A solid brick wall laid carefully in cement mortar, makes a good filter. The bricks should be rather underburned, and extending through from one side of the wall to the other, and the faces of the partition wall not covered with mortar. Water will filter through such a wall fast enough for the supply of a family, and if the rain all enters the cistern upon one side of the wall and is drawn out upon the other side, the water is clean and sufficiently pure. Such cisterns should be occasionally cleaned out and the partition wall scrubbed. If, by an ordinary bellows, air is blown through the brick septum from the side opposite to that on which the roof-water comes in, it helps to restore its straining power.

There are various forms of house filters, some of which are cheap and valuable. Flannel tied on the faucet of the water pipe will greatly improve the appearance of drinking-water, and will strain out

much organic matter. A tube or box with sponge in it will also be satisfactory in clarifying turbid water, and it is easily and quickly washed and replaced. A sheet of filtering paper as used by druggists and a glass or tin funnel furnishes a good means of filtering water on a small scale. A fresh sheet of filtering paper will be generally needed each day. Granulated animal charcoal, in boxes or vessels where the water can filter slowly through it, improves its appearance and quality. The chief idea of a filter is well illustrated thus:

Take any common vessel perforated below, such as a flower pot, and put a small, clean piece of sponge over the hole. Fill the lower portion with gravel stones, over which place a layer of finer gravel and on these a layer of clean, coarse sand, the proportion of each being about the same.

On the top of this place a lid of unglazed clay, either very porous or perforated with small holes, and on this a stratum three or four inches thick of well-burnt, pounded animal charcoal. A filter thus formed will last for a long time, is easily cleaned, and will be found to act both by mechanical and chemical purification.

The following are good directions from so good an authority as Dr. Parkes:

"The filtration of water is not difficult, even if you cannot afford to buy a regular filter. The compressed charcoal blocks are cheap and good; if they clog, rub them gently with a towel, or, if that does not clear them, with a hard brush; if they are still clogged, they must be gently scraped with a knife. But if the charcoal block is too expensive, a simple filter can be made as follows: Get a common earthenware garden flower pot; cover the hole with a bit of zinc gauze or a bit of clean-washed flannel, which should be changed from time to time; then get some rather small gravel, wash it very well and put it into the pot to the height of three inches; then get some white sand and wash it very clean, and put that on the gravel to the height of three inches; then buy two pounds of animal charcoal, wash that also by putting it into an earthen vessel and pouring boiling water on it, then, when the charcoal has subsided, pour off the water, and put some more on for three or four times. When the charcoal has been well washed, put it on the sand and press it well down. Have four inches of charcoal if possible. The filter is now ready, pour water into the pot, and let it run through the hole into a large glass bottle.

"After a time the charcoal will get clogged; take off a little from the top and boil it two or three times, and then spread it out and let it dry before the fire. It will then be as good as ever. From time to time all the charcoal and the sand also may want washing. The sand may be put over the charcoal, and not between it and the gravel; but this plan sometimes leads to the charcoal being carried with the water through the gravel and out of the hole. The sand stops it.

"By filtering in this way, and by boiling the water, many dangers are done away with."



Another similar suggestion is as follows: It is that of a simple glazed earthenware jar, holding five gallons, or even less, having a double bottom. The upper bottom has a small hole closed by a bit of sponge; the space of four inches or so between the two bottoms is packed with clean gravel, above which is fine clean sand; the lower bottom is perforated with very fine holes through which the water slowly passes to an earthenware vessel below, into the top of which the filtering vessel tightly fits. The water is drawn off from the lower vessel by a faucet. If this lower vessel is unglazed it will serve at once as a cooler and reservoir. Such filters and reservoirs are now largely made, except that the reservoir is also glazed, necessitating in summer the use of ice, for such filtered water is very flat at first.

Another form of filter, as suggested in the last report of the State Geologist, is as follows:

"The most practical form of filter for household use, and one that will easily filter a pitcher full of water in a short space of time, can be made out of a bottle. The best form is the long kind in which sweet oil is sold, although almost any kind of glass or earthenware bottle will answer. The bottom of the bottle is cracked off, and the sharp edge removed by rasping with a file. The cracking can be done by tying a thin, soft string, soaked in turpentine, around the place where it is intended to crack, leaving as small a knot as possible, then setting fire to the turpentine, holding the bottle bottom up. After allowing the oil to burn for an instant, the end of the bottle is placed quickly in cold water, when, if the operation has been rightly conducted, an even crack will be produced, and the bottom of the bottle will come off easily.

"A layer of cotton is now placed in the bottle. The cotton must be worked in water, preferably warm water, in order to remove the adhering air, and to wet it well. A wad of the wet cotton is dropped into the bottle and covers the mouth of the neck. Other pieces are dropped in, care being taken to build the layer up evenly, and to add the cotton in rather small pieces. After dropping them in, they

should be pressed down and arranged by means or a rod. In this way a layer is made which should be from two to three inches thick. It should not be pressed down too tightly, else it may filter too slowly; neither should it be too light, or water may form channels through it. After a little use the plug generally adapts itself. Particular care should be taken to be sure that the cotton is snug against both sides, since the water is liable to escape there. The plugs, however, are easy to make, and a few attempts will soon teach one all the necessary manipulations.

"This bottle filter can be suspended or supported in any convenient way. Perhaps the simplest support is a block of wood having an auger hole bored through the center, and the edges of the hole reamed out. In this hole the bottle sits securely, and the bevel of the hole catches the shoulder of the bottle, thus holding it upright."

It is advised that the water to be filtered should be well stirred with alum added in the small amount heretofore named (two grains to a gallon, or one-quarter of an ounce to fifty gallons), and this poured through this filter pipe. It will run through in a considerable stream from the bottom, and can be caught in any convenient vessel, or a water holder both above and below can be combined with a filter thus made so as to be movable. The cotton used is simply the usual cheap white cotton batting. It makes a coherent filtering layer, and when clogged by use can be cleansed by boiling up in water and rinsing, or, as it is so cheap, can perhaps as well be thrown away and replaced by new.

Such precautions, and even boiling of water before such filtering, are worthy of thought, not only when any wide-spread epidemic prevails, but also when there is any good reason to suspect impurity of water-supply. It is to be remembered that wells once found good generally remain good, unless they receive foreign matter from errors on the part of their owners, which is too often the case.

Where there is the least suspicion of the well-water it is best first to consult the family physician, who may aid in the more simple tests; but if there is good reason for suspicion he will advise you not wholly to rely upon these approximate results, but direct you to those who have more experience in the work, and the advantages of laboratories with all appliances needed.

May, 1885.

Copies of this and other circulars can be had for distribution by addressing postal to E. M. Hunt, Secretary, Trenton, N. J.



LAWS RELATING TO PUBLIC HEALTH AND REFERENCES THERETO.

## CIRCULAR LIV.

OF THE

STATE BOARD OF HEALTH OF NEW JERSEY.

## AS TO LAWS RELATING TO PUBLIC HEALTH.

This circular contains all the laws or references thereto, relating to the public health, with notes and explanations attached thereto. Any Boards of Health or individuals not yet furnished therewith, may have the same by sending postal, with name and post office address, to State Board of Health, Trenton, N. J.

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## CIRCULAR LV.

OF THE

STATE BOARD OF HEALTH OF NEW JERSEY.

## SANITARY SURVEY OF SCHOOL-HOUSE

*In District No.*.....

*Township*.....

*County*.....

*By*.....

*Date*.....

TO THE TEACHERS OF THE STATE.

TRENTON, N. J., September 1st, 1885.

The interest which has been manifested by teachers in former school circulars of the State Board of Health, and the essential relation which the condition of school-houses and the physical care of school children

bear to the public health, have led to the preparation of this circular. Please fill out carefully, keep one copy on file for the trustees, and send the other by October 15th, in wrapper, to the address of the State Board of Health, Trenton, N. J. By order of the Board.

E. M. HUNT, M.D.,
*Secretary.*

This circular has been sent in small book form to every school in the State, with space for answers and remarks.

QUESTIONS.

1. Building, how located as to elevation and drainage?
2. Size of house?
3. Is it brick or wood?
4. Has it a cellar or basement?
5. If so, state its condition—whether wet, damp, dirty, dark, unventilated, cemented or floored, etc.
6. Size of school-room? Give number, length, breadth and height, that the cubic space may be computed. (See diagram, last page.)
7. Is there an entry?
8. Is room wainscoted? Kind of wall?
9. Number of doors? Correct answers to 9 and 10 are necessary to ascertain lighting surface.
10. How many windows?
11. Size of windows and glass?
12. Distance from ceiling?
13. Are the windows to the right or left, behind or in front of the scholars?
14. What is the size of the yard?
15. Is it fenced?
16. Does water ever stand in the yard or beneath the house?
17. Is it well heated, and how? Is there dust? Is water supplied to stove or furnace?
18. Do you register by thermometer? Is temperature even?
19. Is it well ventilated, and how? If by ventilating registers, state whether they are in ceiling overhead, or in flues at bottom or top of room, or both. Also, if there is any provision for allowing fresh air to enter the room?
20. If by windows, have you ways of preventing draught?
21. Are the blackboards placed between the windows? Blackboards, if possible, should be on side where there are no windows, on account of less reflection of light.
22. Are the surfaces in good condition?
23. What is the source of water-supply?
24. If from wells, give depth. Is there any privy vault, stable, sink-drain, or cesspool near? See diagram, and mark, as nearly as possible, the distance in feet from such sources of pollution.
25. Is the well protected from all surface pollution?



26. Is the condition of the well carefully looked after? (See Circular LIII., of Board, as to water-supply.)
27. Are there two privies belonging to the school-house?
28. How many feet from school-house?
29. Are the buildings kept in good order?
30. Have they vaults?
31. How often cleansed or disinfected?
32. How is it done?
33. Do trustees or others inspect buildings and school monthly? Have you a janitor?
34. If water-closets are in use, in what condition are they kept?
35. Are they always flushed with an abundance of water?
36. Are they odorless?
37. Are there any offensive or dangerous nuisances near the school-house, such as barn-yards, slaughter-houses, stagnant pools, etc.?
38. Is the law providing for vaccination attended to?
39. Are pupils from families where infectious or contagious diseases are prevailing excluded from school?
40. Are all the doors hung to swing outward, as the law requires?
41. In what year was the school-house built?
42. Is it a suitable house for the district? If not, state reason why. Has it proper places for hanging garments, hats, etc.?
43. Are seats and desks fitted to the size of the scholars?
44. How many pupils can be comfortably seated in the building? Is any room too crowded?
45. What is thus far the average daily attendance this quarter?
46. How many of your pupils are near-sighted?
47. Have you known pupils to become near-sighted while attending school?
48. Are there curtains, or inside or outside blinds to the windows?
49. How and to what extent is either physiology or hygiene taught?
50. Is there provision for hand and face-washing?

General remarks as to needed improvements.

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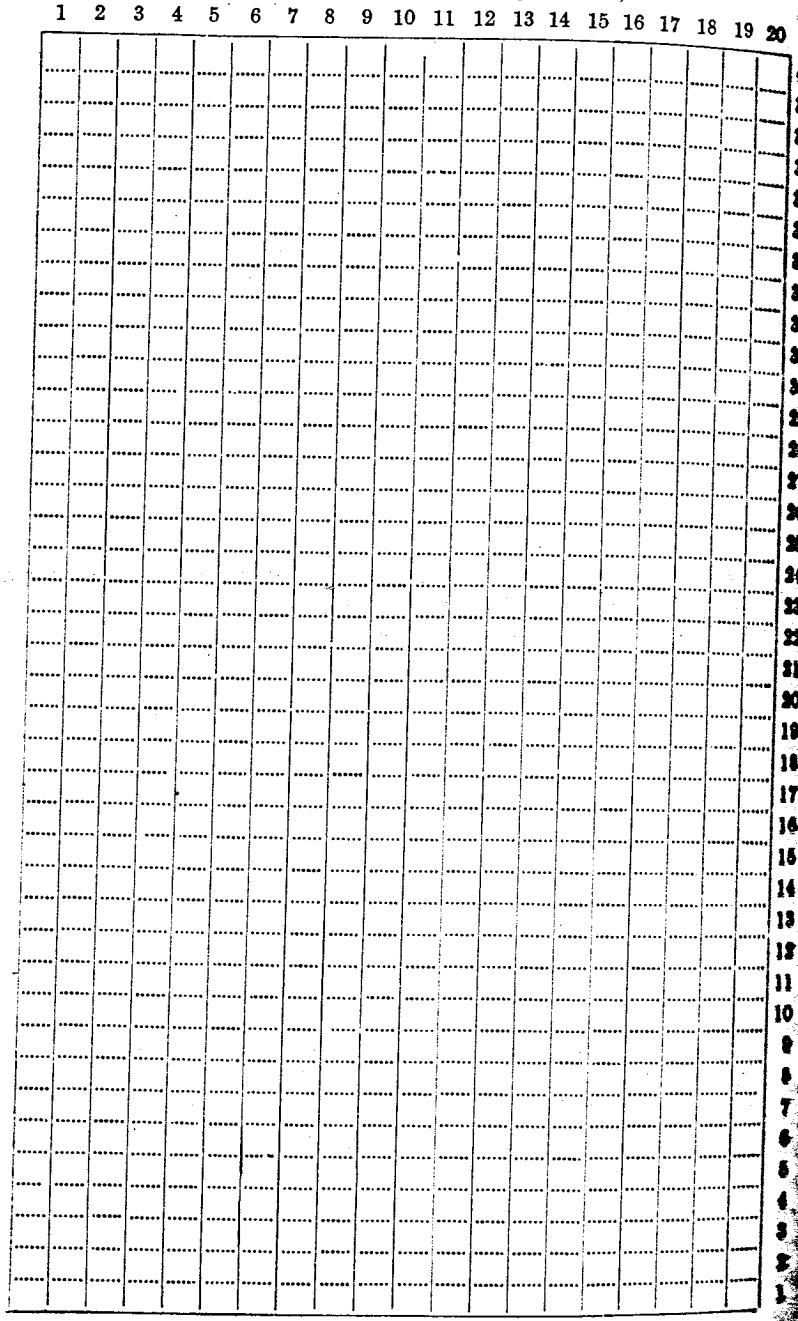
[For explanation of the following diagrams, see page 320.]

## PLAN OF PREMISES.

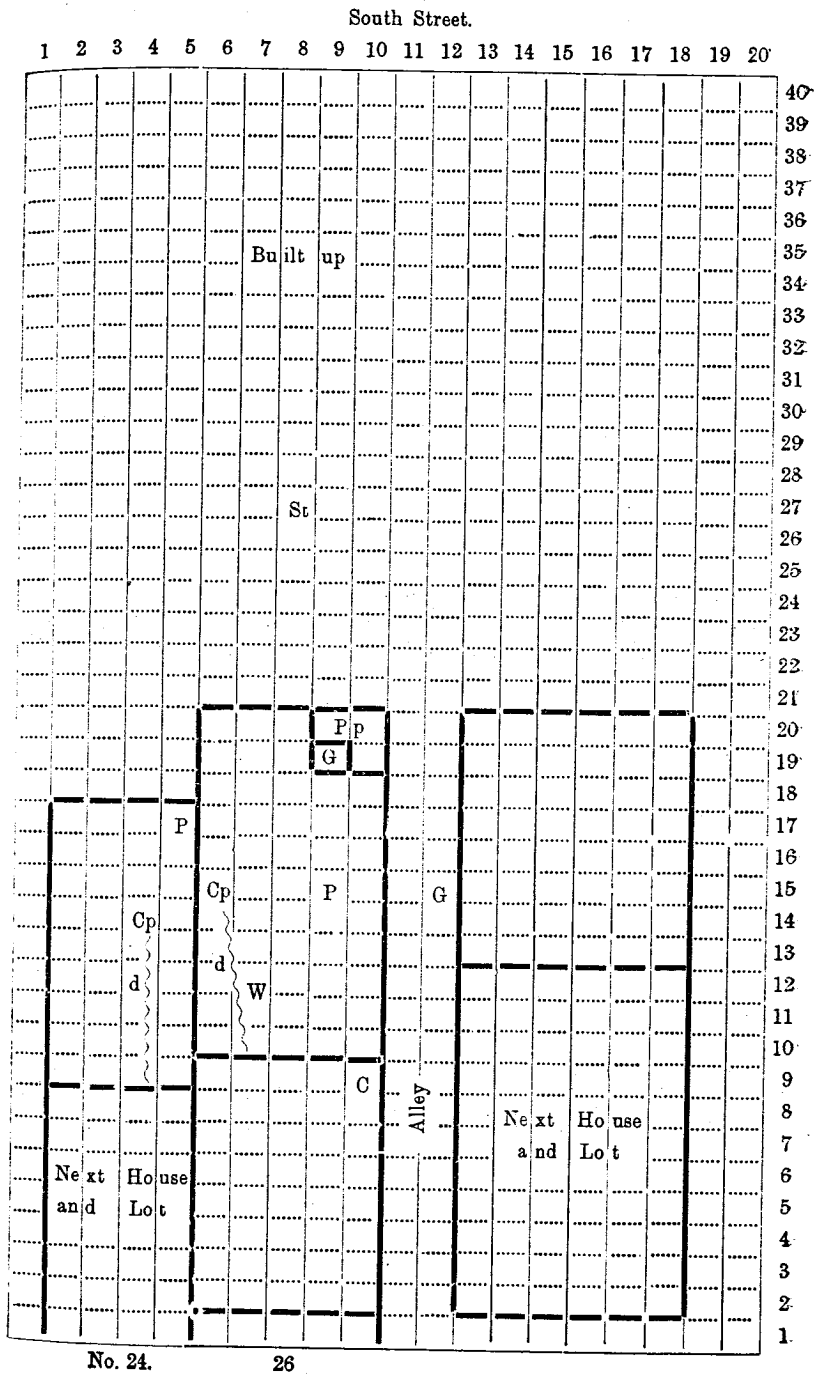
(See Illustrative Plan and Explanations.)



Scale, 5 feet to square.

Front: N. E. S. W.

## SPECIMEN OF MARKED PLAN OF PREMISES.




No. 24. 26 Spring Street. Front: N. E. S. W.

Opposite Bone Crushing Factory.

EXPLANATION.

These spaces in the diagram represent areas of 5 feet square, or a total area of 20,000 square feet—the dimensions of the block being 100 feet by 200 feet.

Taking the bottom line for the front of the lot, indicate by a pencil line the size and shape of the lot—leaving a margin on each side, if there be room.

Next, outline the size and location of the house and other buildings.

Then indicate by letters the location of the well (by *W*), cistern (by *C*), privy (by *P*), cesspool (by *Cp*), garbage (by *G*), stable (by *St*), pig-pen (by *Pp*).

Also the course of drain or pipe from the house by a dotted line with the letter *d* at the waste-pipe of dotted middle if it is a Drain to cesspool, or by the letter *S* if it be to a Sewer.

Part of the Diagram may also be used to show size of rooms, ventilating, heating, etc., if the lettering is explained. Thus the location of desks and stove may be shown.

The frontage is designated by crossing out the points of compass toward which the building does not face.

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STATE OF NEW JERSEY,
DEPARTMENT OF PUBLIC INSTRUCTION,
TRENTON, September 1st, 1885.

*To the Teachers of New Jersey:*

I desire to express my appreciation of the importance of this sanitary inquiry, and to ask for a careful, accurate and punctual response thereto. In our work of training the minds of our children we should not overlook their physical health and welfare. In this effort to secure information, and in all their efforts to remedy existing sanitary evils connected with our schools, the State Board of Health has my hearty co-operation.

*These reports are not for publication, but for the information of this office as well as of the Board of Health.*

EDWIN O. CHAPMAN,
*Superintendent of Public Instruction.*



## CIRCULAR LVI.

OF THE

NEW JERSEY STATE BOARD OF HALTH.

TRENTON, October 1st, 1885.

*To Local Boards of Health:*

Enclosed herewith please find an outline for the annual report for the year ending with this date.

In addition to the name and post office address of each member of the Board, give also the same as to the Sanitary Inspector. The law now requires that each city, town or borough of over two thousand inhabitants shall have a *competent* Sanitary Inspector. In all the larger townships, or in those which have villages of several hundred persons, it is provided by law that the State Board may require a Sanitary Inspector to be appointed, if in its judgment such an appointment is needed. Also, where there is no such distinct office or officer as a township physician in a township, the State Board appoints the medical member of the Board of Health whenever notified of a vacancy.

Under the schedules of subject for report in the case of cities and townships which have had Boards of Health and reported in previous years, it will not be necessary to repeat as to *A*, *B*, *G*, *O* and *P*, as most of the facts are on file.

In every case of report from a township, the name of any city, town or borough in it which has a separate Health Board should be given.

Under *A*, in the case of all cities, towns or boroughs, it is desirable to give the number of acres included in the incorporation.

*C.* Under *C* state exact source of water-supply. If a public supply, is it by the city or a private company? How many houses take it? Is the water ever discolored? Has it an iron or other taste? Is it hard or soft? Is it bad at any one season of the year? Are reservoirs or water-pipes cleaned? Does the source or stream from which it is taken receive any sewage above the point of supply? If from a stream, is there any examination made each year, or oftener, as to modes of pollution? Any other facts as to source,

quantity or quality. How many depend on wells? How many on cisterns?

*D.* As to drainage, state whether any system of drainage for the ground is used as distinct from sewerage. Is the usual water-level such as to secure dry cellars? If there are swamps near you, or malaria is frequent, give particulars.

As to *sewers*, state their construction, their grade or fall per one hundred feet, their size, their outfall, their flushing and ventilation, and whole length.

*F.* State whether houses generally have basements or cellars. If a city, whether the basements are occupied; if country, whether largely used for storage of vegetables. How many tenement-houses of more than two families? Is there a yearly house-to-house inspection?

*H.* State how far sewers are used, and what proportion of houses connect with them. If cesspools, state whether they are cemented, or whether built with open bottom or sides. How are they emptied? What is done with the contents?

*J.* State any known or prevalent diseases this year, and what month. Does the assessor inquire each year as to losses of animals, and as to contagious diseases? If a city, is there a register of all persons keeping horses, cows, hogs, etc.?

*K.* Are slaughter-houses inspected, so as not to be a nuisance to neighbors?

*L.* State as to any manufactories, and any evil to health therefrom.

*S.* State who neglect returns, and their post office address.

Look carefully at each heading and state what you know.

Under *W*, do not put down a disease as prevalent unless you have personally known of at least ten cases. Often the physician of the Board should make out or aid in the report, and add such suggestions as occur to him; but let there be no delay to make return during October. We must trust chiefly to the assessor, the physician and the inspector to keep the other members of the Board acquainted with health conditions, and with the rights and duties of the Board. Any neglects reported to us will be inquired into. Refer to Circulars XXXIX. and LIV., before sent you, for further suggestions.

We send also, occasionally, blanks for lists of physicians and undertakers, to be carefully corrected and promptly returned to this office. Cross off any deceased or removed, or who have ceased to practice. Add all new ones who have settled for practice within the



city or township for which you make return. Give name and post office address plainly.

Keep informed as to the laws, and distribute the various reports and circulars of the Board. One or more members of your local Board should attend the meeting of the New Jersey Sanitary Association, held in November in each year, at Trenton. Local Boards now have nearly or quite all necessary power. Even in small and very healthy townships, the local Board should confer at the time the township committee meets, and keep so informed as to prevent nuisances or deal with any outbreak of epidemic. On receipt of postal, a copy of laws and references, or other circulars, is sent to each member of the local Board whose post office address is given.

Let the Schedule, carefully filled out, be mailed to us in envelope herewith sent, by November 1st.

E. M. HUNT, M.D.,
*Secretary.*

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## CIRCULAR XLV.

OF THE

NEW JERSEY STATE BOARD OF HEALTH.

## CHOLERA.

Whenever the possibility of an outbreak of cholera is threatening, all methods for thorough cleanliness should be applied with renewed vigor. For it is a mistake to suppose that cholera falls like a thunderbolt and accomplishes widespread destruction without regard to locality. On this point the Cholera Commission of the German Empire, convened in 1873, which has met from time to time since and reported (1882), is full and explicit. "The most important part is played by the locality itself to which the disease germ is brought." It depends in part on "the saturation of the soil with the decomposition of certain substances, and a condition of soil which favors such decomposition." Part VI., pages 314–318, says: "The commission expresses the united opinion of all the most experienced physicians when it says that the strictest attention to all the measures demanded by public general hygiene, offers the best protection against cholera."

Along highways of travel, as wherever else it lights, with occasional

apparent exceptions, an analysis of the facts shows the rule to be that its virulence is in proportion to the neglect of sanitary conditions. "It is spread more by infecting localities than by infected persons."

For these reasons city and village officers and all householders should see to it that no form of decomposable matter is kept on or about the premises, that all pipes are thoroughly flushed and ventilated, that there be close inspection of dwellings and surroundings, that pure water and wholesome foods are used, and where soil or cesspools are already filth-sodden and cannot be removed, that the disinfecting solutions herewith recommended be thoroughly and frequently sprinkled.

But because "all measures for the cleansing of the soil and its better drainage are too often too late when begun, at the time of the outbreak of an epidemic, all places should institute close sanitary inspection and proper cleansing in advance, so as to prevent an outbreak and limit its extent."

In dealing with epidemics which come from without, a great secret of success is in doing beforehand all that can be done to prevent the settling and spread of the disease, and in deciding just what you will do with the first case or cases that occur.

Whatever may be the differences of opinion, we are safe in acting on the basis that the following facts are settled as to cholera:

I. Although the view of direct contagion is not supported, transmission of the disease takes place, without doubt, in two ways: (*a*) From the patient, particles or secretions are thrown off which are not capable at once of acting as cholera poison, but which in a few hours are so changed as to become the specific poison; and (*b*) so, also, in the presence of such a center of infection, material for disease may attach itself to soil, locality and surroundings, and "whenever it finds appropriate conditions for its reproduction, it may light up an epidemic."

While these facts need not cause attendants to fear catching the disease, they are reasons why the patient should be isolated, why only persons needed should be in attendance, and why all in charge lose not the opportunity of dealing with materials and surroundings which, although not cholera-poisons, are quite sure to become so, or to be carriers of them, if nothing is done. Dirty persons with dirty clothing invite disease, and so personal cleanliness must be secured.

As persons may unavoidably be brought in contact with infected localities, such are advised to use, at time of exposure and before each meal, two grains of quinine, four drops of aromatic sulphuric acid,



and four drops of the tincture of chloride of iron, in a half tablespoonful of water which has been boiled.

In necessary visits to infected premises "consume nothing while there but the air you breathe, and carry nothing home."

*What to do with the first case that occurs:*

Consider that the wise management of it may not only determine the welfare of the patient, but of the whole community.

1st. Get the history of the case as soon as possible, and take care of all baggage and clothing and all that appertains to the patient. If you can control where the sick person is to be taken, seek isolation from other houses, if possible; if not, an isolated room, and avoid taking the patient into a notoriously unhealthy locality. In many cases we need to leave the sick where they are, and remove the well ones. Carry out a thorough system of disinfection, both in the treatment and as regards all surroundings of the patient. All laundry material should be placed in a disinfecting solution previous to removal or washing. Some things are best burned if soiled. With this memorandum before him, the health inspector or physician will direct as to what to do with each. He seeks to prevent the locating and transmission of the disease, as well as to save the patient. Read carefully Circular XLIV. on Communicable Diseases.

*What to do with premonitory symptoms or with any purging disorder of the digestive tract:*

Resolve at once to attend to it and control it, not because it is cholera, but because few who attend to such symptoms ever die of cholera, and because such attacks, if uncared for, seem often to invite the disease. If there is diarrhea, take a recumbent posture, apply a mustard plaster over the abdomen, and if there is a recurrence of the discharge, use the following prescription until you have time to seek medical advice:

Laudanum, } each *one* part.
Spirits of Camphor, }

Tinc. of Ginger, } each *two* parts.
Tinc. of Capsicum, }

Dose, for adults, one teaspoonful in a wine-glass of water. Or,

Compound Solution of Opium (Squibb's), }
Spirits of Camphor, }
Spiced Syrup of Rhubarb, } of each, equal parts.
Tincture of Capsicum, }

Dose, for adults, one teaspoonful in a tablespoonful of water.

*How to take care of yourself and family during a cholera summer:*

Practice a close adherence to all the ordinary rules of health. Most persons are best off where they can control all the circumstances of their condition, so as to be able to have good surroundings, good housekeeping, good, well-cooked foods, and conveniences for bathing, exercise, etc., and for immediate rest or care if there is sickness. Avoid cholera districts unless duty calls. Avoid public water-closets. Make no special change of diet, except to avoid those articles of food which you have found to occasionally disagree. Anxiety of mind, overwork, over-heating, and any irregularity of habit or of life seem to invite epidemic influences. The more we analyze facts, the more we find that epidemics do not fall on places or persons at random. While here and there the most correct and those best situated fall victims, with rare exception the imprudent, the exposed, the poor, are the chief sufferers. Be particular as to the use of water, unless you know its source. Tea, hot or cold, or coffee, or boiled milk can be used instead. If you have any suspicion of your own drinking-water, boil what is used for drinking.

### DISINFECTANTS—HOW TO USE THEM.

Fresh air has no substitute. In order to cleanse places already infected, or being made so by sickness, there is need of *draught* through the room or building.

*Hot Air.*—Clothing or bedding is thus cleansed by being put in a furnace of dry heat of from 230° to 300° F. It should be subjected to the heat for about one hour.

*Hot Water.*—Very hot or boiling water is applicable to the cleansing of all garments, utensils, &c., admitting of such a method. Put them in when the water is quite hot, and allow it to come to a boiling point. Where garments have been soiled, it is well to throw them first into a tub containing a disinfectant solution, and from it transfer them to the water. They should never be removed from the room for washing before being placed in a disinfecting solution or boiling water.

(A.) *Iron Sulphate*, called, also, green vitriol, copperas, green copperas (2 cents per pound).—Stir in water until well dissolved, in proportion of one pound to a gallon. A teacupful of this solution should be in the utensil before using, or twice as much added to the water-closet each time of use. For use in sprinkling foul premises make it of double strength.



Carbolic acid solution (Squibb's No. 2) may be added to it in the proportion of one-tenth, or used alone.

(B.) *Solution of Corrosive Sublimate.*—One ounce to eight gallons of water; add four drams of permanganate of potash, or a little indigo, to give color to the solution, and so avoid mistake. Use the same as A.

(C.) *Chloride of Lime.*—A valuable disinfectant, chiefly because it contains from 25 to 30 per cent. of chlorine, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. The usual wholesale price is five cents per pound. It is not overrated as a disinfectant, if only its quality is known, and its mode of use is judicious. It needs slight moistening, frequent stirring, and sometimes the addition of an acid, as vinegar or common spirits of salt. The test of its efficiency is that the odor of it be kept constantly perceptible.

One-half pound to a gallon of soft water for utensils, sinks, water-closets, drains, &c. One ounce to a gallon of water for all linen, which must not be left long in the solution, but wrung out in fresh water. During an epidemic sprinkle dry chloride of lime over the contents of privy vaults, sinks and cesspools, etc., daily.

*Chlorinated Soda*, Usually known as Labarraque's solution, is a convenient liquid preparation, valuable for use in saucers in the sick room or in utensils. Its odor should be perceptible to strangers entering.

The chlorides are not to be used with carbolic acid.

(D.) To disinfect a room, ship or building so needing disinfection that its contents and surfaces cannot be easily dealt with singly, close the room or building, its windows, doors and chimneys, so as to exclude the outer air as far as possible. Vacate the house. Break roll sulphur in small pieces, place it on an iron plate or other metallic dish, and set this on a pair of tongs, or other crossbar, over an iron pot in which there is water, or over a large box of sand, so as to avoid danger of fire from small particles of burning sulphur. Light it by a few hot coals or some alcohol poured around the sulphur and lighted. Then leave and shut the door after you. Three pounds of sulphur is sufficient for 1,000 cubic feet of space. The sulphur will convert all the oxygen of the air into sulphurous acid, and all organic

particles are likely to be changed. Keep closed three hours after the burning has ceased, and then air well six hours before occupying. Clothing and bedding needing disinfection may be hung on lines and left in the room. Most furniture is not permanently injured, but needs dry wiping and then washing off afterwards.

(E.) *Lime—Plaster—Charcoal—Dry Earth—Sifted Ashes.*—All these have value, chiefly to be tested by the rapidity with which they correct odors. Fresh slaked lime should be scattered in all places of foul odor. It or charcoal or plaster may be scattered over heaps emitting foul odors. Calx powder is made by pounding one bushel of dry fresh charcoal and two bushels of stone lime, and mixing them, and is of great practical use.

All these substances absorb foul gases and dry up moisture, and so help to retard decomposition, or else absorb its results. Where lump charcoal is used it may be refitted for use by reheating it. Quick-lime and ground plaster should not be used where they may be washed into pipes and form lime soap or obstruct by hardening. Whitewash is always desirable where it can be applied to walls; woodwork and hard walls may be washed with the chloride solution.

(F.) One-half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sulphate of copper (blue vitriol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water—any one of these is available for neutralizing discharges or for sinks, used in quantities sufficient to cover the bulk they are intended to disinfect. Where any articles are to be moved from one place to another for airing and disinfection, as trunks, clothing, etc., they should be put in a bag or sheet like a pillow case, which is yet moist from having been wrung out in one of these disinfecting solutions.

*To sextons and others in charge of the unburied dead:*

Use any of the solutions named under F of fourfold strength for washing. Under and around the body (which should be early placed in the coffin, even if not closed,) use dry chloride of lime or the zinc chloride or the iron sulphate. The body may be wrapped in a solution of these or be placed in a solution in a water-tight coffin. When dry disinfectants only are used, fine shavings, or oakum, or tow, or



sawdust, mingled with the disinfectant, or with tar, should be placed beneath and around the hips. A plug at the lower bowel prevents after-purging.

Burial should be within thirty hours after death, and the coffin should not be closed early and *then reopened*, since this lets out concentrated and confined foul air.

For copies of circulars, send to E. M. Hunt, M.D., Secretary, Trenton, N. J.

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## CIRCULAR XXXIV.

BUREAU OF VITAL STATISTICS, TRENTON, N. J.

## MARRIAGE, BIRTH AND DEATH RETURNS.

Copy of sections of laws defining the duties of Clergymen, Coroners, Physicians, Midwives, Undertakers, etc.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That every minister of the gospel, justice of the peace, and other persons having authority to solemnize marriages, and the clerk or keeper of the minutes of every religious society in this State, before which any marriage shall be solemnized, shall transmit to the proper officer, as hereinafter designated, a certificate of every particular marriage solemnized before him, within thirty days thereafter, which certificate shall show the name, age, parentage, birthplace, occupation and residence of the parties married, the time and place of the marriage, the condition of each of the parties, whether single or widowed, the name of the clergyman or magistrate officiating, and the names and residences of the witnesses; any clergyman or magistrate neglecting to send such certificate shall be liable to a penalty of ten dollars.

Neglect on the part of those solemnizing marriage to report the same, not only incurs the penalty, but often causes great inconvenience in securing evidence as to questions of legal validity. It is the right of each married person to have this recorded evidence, besides the need of these returns in the study of social conditions and of the moral as well as the civic welfare of society. Those in charge of the various religious bodies at their annual, semi-annual or quarterly meetings should not fail to call attention to this duty of monthly report, and to the breach of law and ethics which the oversight involves.

2. *And be it enacted*, That it shall be the duty of the physician, midwife, or other person present at the birth of every child born, and in case there be no physician or midwife present, it shall be the duty of the parent to report in writing to the proper officer within thirty days thereafter the following particulars as far as known: the day of the month and year of the birth, the precise place of residence, the names of both

parents, and the maiden name of the mother, the birthplace, residence and occupation of the parents, and the sex and color of the child, and its name, if it be named, also the name of the attending physician, under a penalty of thirty dollars; *and it is also provided*, that any assessor of a township at the time of his annual assessment, in case he finds any return of a birth not made as herein provided, may fill out the certificate of the same on the usual blank, signed by himself as assessor and marked "special return," and said return shall be valid as a record of the birth, but shall not excuse the attendant for neglect of return.

The decisions of the medical profession (see English Registrar-General and Privy Council Reports and article on Vital Statistics, Vols. I. and II., Report of New Jersey State Board of Health, and Transactions of Medical Society of New Jersey, 1878,) and of the courts, (see Supreme Court, Iowa, Robinson *v.* Hamilton; Report of Iowa Board of Health, 1883, and New Jersey Board of Health Report, 1884, page 284,) authenticate it as a part of our duty to make these reports, besides the obligation which law and the general interests of society imposes. If physicians will carry a few blanks in the pocket-case or visiting record, there is but little inconvenience. Books also are now provided with birth and death blanks in such a form as to be handy. The fact that in townships the assessor is allowed to make special return in neglected cases will not be allowed to take the place of the requirement of return from the attendant, but is used as the means of informing the Bureau of Vital Statistics of any cases of neglect of return. Assessors should inform those concerned of the penalty for such neglect.

3. *And be it enacted*, That no sexton, undertaker or other person shall hereafter bury within this State, or bring into or remove from this State, the body of any deceased person, without having first received a permit from the proper authority of the county, city or township wherein such person may have died, and, if so doing, said sexton, undertaker or other person shall be liable to a penalty of fifty dollars; *provided*, that in burying any deceased person who died in any township in this State outside of city limits, or county health board limits, the certificate of any regularly graduated physician of the township wherein the person died shall be held by the sexton or undertaker as the only necessary burial permit, to be disposed of by him as hereinafter provided.

4. *And be it enacted*, That in case of any person dying within this State, it shall be the duty of the physician who may have attended him during his last illness to furnish the undertaker, or any member of the family applying therefor, a certificate of the death of said person, which certificate shall show the name, age, sex, color, nativity, occupation, last place of residence, place of death and the cause of death, according to the best of his knowledge; and said certificate shall constitute all the necessary burial permit in any township of the State, outside of city or incorporated or county health board limits, and the undertaker shall, within five days after said burial, send the same, by mail or otherwise, to the assessor of the township in which the deceased died, under a penalty of fifty dollars, as herein provided; *and furthermore it is provided*, that any undertaker residing in an incorporated city or town may present the certificate of death, in case of any burial which he is superintending, to the city clerk or other proper officer of said city, and receive the usual permit as issued by it, on condition that said clerk shall at once transmit said certificate to the assessor of the township in which the person died; *and in case there has been no physician in attendance*, some member of the family, if there be any present, if not, any one present,



shall notify a physician of the death at once, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of death, grant the township certificate for burial, and, if not satisfied, shall send at once for the county coroner, or county physician, or justice of the peace, who shall take charge of the body and investigate the same, and if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting a burial certificate, provided said physician has not been in regular attendance on the deceased, if so, no extra charge shall be made by said physician.

5. *And be it enacted*, That in any case where, on account of the absence of the proper officer, or for any other sufficient reason, it may be impossible to obtain from said officer a permit in time for burial, it shall be lawful for any judge of the court of common pleas, or any justice of the peace of the county in which the person died, on being satisfied as to the correctness of said certificate, to issue a permit for burial in the following form: "It being impossible to obtain a burial permit from the proper officer on account of [here stating the reason], I hereby grant this special permit for the burial of ———, whose death has been duly certified to me;" the said judge or justice of the peace shall at once copy upon the back of said certificate the permit as granted, and mail the same to the office of the secretary of state at Trenton, marked on the envelope "burial permit;" and the undertaker or other person, on the receipt of such special permit, shall pay to the said judge or justice granting the same the sum of fifteen cents.

6. *And be it enacted*, That any person who shall knowingly make any false certificate, statement or receipt, relative to any marriage, birth or death, under the action of this law, shall be judged guilty of a misdemeanor, and on conviction shall be punished by fine or imprisonment, or both, at the discretion of the court.

7. *And be it enacted*, That the proper officer to receive the certificates of marriages, births and deaths, and to grant permits for burial, shall, in any incorporated city or borough, be the city clerk or other officer charged with these duties, and in any county having a similar officer appointed by a county board of health now organized, be such person or persons as said incorporated city or county board of health has authorized or may authorize, and in townships the assessor; but in townships outside of city or incorporated borough or county health board limits, the burial certificate given by any regularly-graduated physician shall constitute the burial permit as herein provided.

These sections are so explicit as to only need enforcement rather than explanation. The burial of a person in this State without Certificate or Permit, or the failure of a person in charge of a burial to return the same according to the city law or according to this law as provided in townships, is so hazardous that it is not likely to occur. There is only need to ask of physicians and others in making out certificates that they be as exact and full as possible in the statement of facts, and that the returns of cause of death be such as the Leaflet to Physicians indicates. Such terms as general debility, dropsy, old age, sore throat, etc., are rarely defensible. On the other hand, cholera, typhus and typhoid fever, diphtheria, cerebro-spinal meningitis, should not be attached as names unless the specific character is clear. As the best practitioners are sometimes the least positive as to the immediate cause of death, where there is doubt "Ap" for approximate, may be marked after the disease named.

In the interest of Public Health it is often well for the physician to state how

prevalent the disease is at that time, if it is at all endemic or epidemic, and to note on the back of any certificate the prevalence of any disease which has been so mild as not to cause death. No physician should report a disease prevalent in his own practice unless he has had at least ten cases during the month.

*In case of death, physicians will save undertakers trouble by leaving the certificate at the house of the deceased, or by having it ready at their own offices, so that it may be had when called for in their absence.*

When in case of sudden death for which a physician finds he cannot give certificate, a coroner or county physician, or a justice of the peace acting as coroner, is called, said officer gives the certificate of death as would the physician in other cases, and signs his official title. Where a physician, as provided for in section 4, *views the dead body*, the one dollar which he is entitled to is not regarded as including a proper fee for mileage or any detention, and is payable by the same board or disbursing officer as would pay the coroner in whose stead he thus acts.

NOTE TO CITY CLERK AND ASSESSORS.

This copy of the printed sections of the act, etc., may be sent at any time by assessors or city clerks to any persons neglecting their duties under the law, or to any new physicians or ministers, etc., moving within their bounds. None, however, can plead ignorance of the law from not having received such special reminder. The names of physicians, ministers, undertakers, and all required to make returns, should be kept by each assessor or city clerk in a small book. This Bureau should be notified especially as to changes of physicians and undertakers. In the case of the death of an assessor, the collector acts in his place until the vacancy is filled. See Chapter CLV., sec. 5, Laws of 1880.

It will always occur that some are negligent in making their reports. It is now the duty of all assessors and town clerks, at least each three months, to closely note those who fail to make returns, or whom they have reason to believe overlooked some. When this is done full returns are obtained. In case of continued dereliction, we have not failed in a single case reported to us to secure the returns.

*Assessors and city clerks will send on the 15th of each month the certificates up to the 1st of the month, and place on the outside of the envelope memoranda of contents, so as to compare accounts.* When an assessor goes out of office he should include in his monthly return all certificates in hand at that time, together with the name and address of his successor. As the time of administering oaths to officers after the March election varies from the middle of March to April, we close the fiscal year as soon as returns up to April 1st are received, so as by May 1st to send order for amount due, unless asked for sooner. All clerks of incorporated cities may have their receipt for returns twice a year if they prefer.

Payment is due on the presentation of the certificate for returns from the secretary of state as thus provided in the law:

*And be it enacted*, That such assessor, clerk or other officer, upon receiving a certificate rom the secretary of state as to the whole number of marriages, births and deaths returned as aforesaid, shall be entitled to receive from the collector of the township or other proper disbursing officer, ten cents for each marriage, birth or death so returned, the receipt for which shall be attached to the said certificate, and no payment shall be made unless the certificate be produced. This allowance includes postage.



In cities the "proper disbursing officer" is the one *who pays the usual city bills.*

A question as to disinterment and reburial is answered in a former circular, as follows:

"In such cases the following written certificate, signed by the undertaker conducting the reburial, and presented to the assessor or city clerk, will be sufficient for the issue of permit:

[FORM.]

"We, the undersigned, by the consent of the proper persons, request that a permit be issued for the disinterment of the body of ——— ———, who died about ———, and for reburial at ——— ———. We assure that in said removal no other grave shall be disturbed, and that the transfer of the body shall be so made as not to endanger the public health.

Signed, ——— ———,
——— ———."

May physicians, etc, make their returns of the births of other townships in the township or city where they reside? This would lead to confusion, as then the assessor cannot know whether proper return has been made from his district. When the practice of a physician is much outside of the township or city in which he lives, it is easy for him to leave returns with parents at his first visit, and direct them to hand to the assessor, or himself to arrange with the assessor as to sending them.

With the returns made October 15th, of each year, all city clerks and assessors are requested to send us the names and P. O. address of any new physicians who have commenced practice since the report of the former year, and of any who have removed or have died. Designate, as far as you can, the sect of practice—those of the Prevalent, or Old School, being marked (A), those of the Botanic (B), those of the Eclectic (E), those of the Homeopathic (H), and Midwives (M). We may thus know whether those signing their names to birth and death certificates have somewhere received education or license, and have registered their diplomas as required by law.

All persons who have to do with obtaining or furnishing the various blanks and returns will, on request by postal directed to this Bureau, receive a copy of the annual report of the State Board of Health as issued in January of each year, unless the supply has become exhausted. Books for pocket use, containing 50 Birth and Death blanks or 50 Birth blanks alone, are now furnished to all physicians requesting them, through the assessor or city clerk or by postal. Persons out of blanks may send for same by postal directed to E. M. Hunt, M.D., Med. Supt, or Dallas Reeve, Registrar, Trenton, N. J.

# MEDICAL REGISTRY.

By an act approved March 12th, 1881, and the supplement thereto, approved March 22d, 1883, it is made the duty of every person pursuing the practice of medicine and surgery in this State to record his diploma, with date and place of graduation, or in case of twenty years' practice a certificate thereof in the office of the County Clerk of the county where the practitioner settled. While the law was not suggested by this Board, it is believed to be somewhat in the interests of the public health. It is right that the public should know how those who claim to be practitioners of medicine have been authenticated. Then if they employ incompetent persons they do it with less excuse. The errors of physicians are not so easily detected as those of druggists, and yet law is much more ready to protect against risk from the latter than from the former. Educated medical practitioners may suffer from the audacity of patronized ignorance, but the people are the chief sufferers. This Board has not felt itself charged with the duty of seeking more stringent laws as to medical practice, but has too much evidence that there should be severer limitations upon the assumption of so responsible a calling. There should not be a discrimination between different sects or schools, but between knowledge and ignorance, between adequate preparation and unskilled pretense. Until legislation in the general interests of the people shall give better protection it will be wise for the people to inquire more fully into the sources of authority for medical practice. Under the present law every form of diploma presented is placed upon file and is subject to the examination of those whom it may concern. Hence, foreign certificates, imperfect diplomas, and even persons with no other claim to medical practice except that they have prescribed for some one disease for over twenty years, have offered papers for file. These records are valuable for information although not indicating the fitness of each person registered. They also point to others who, without even the semblance of authority, are imposing upon the credulity and the health of citizens. The lists furnished this year are as follows:

## ATLANTIC COUNTY.

| NAME OF PHYSICIAN. | P. O. ADDRESS. | DATE OF DIPLOMA. | INSTITUTION CONFERRING DIPLOMA AND LOCALITY. |
|---|---|---|---|
| Cadwallader, Willis D. | Atlantic City | Mar. 5, '80 | University of Penna., Phila. |
| Filomena, Carolinaia | Hammonton | June 10, '79 | University of Naples, Italy. |
| Smith, H. M | | Apr. 2, '82 | Jefferson College, Phila. |
| Shippard, H. C | | Mar. 12, '78 | Hahneman College, Phila. |
| Snowden, John W | Hammonton | Apr. 4, '84 | University of Penna., Phila. |
| Walker, Mahlon W | Atlantic City | Mar. 2, '67 | |
| North, Edward | Hammonton | —— —, '68 | Jefferson Med. Col., Phila. |

## BERGEN COUNTY.

| | | | |
|---|---|---|---|
| Flynn, Percival H. J | Fort Lee | Mar. 9, '82 | Univ. of the City of N. Y. |
| Jehl, Eugene | Park Ridge | June 28, '66 | Long Island Col. Hospital. |
| Tygert, Martin | Carlstadt | Feb. 4, '79 | Albany Med. College, N. Y. |

## BURLINGTON COUNTY.

| | | | |
|---|---|---|---|
| Beattey, Henry M | Florence | Apr. 2, '85 | Jefferson College, Phila. |
| Davis, John W | | Mar. 10, '81 | Phila. College of Pharmacy. |
| Goble, Leon | | Feb. 26, '85 | Penna. Col. Dental Surgery. |
| Gibbs, B. Frank | Pemberton | Apr. 3, '85 | Hahneman College, Phila. |
| Hammell, Walter G | Riverton | Apr. 2, '85 | Penna. Col. Dental Surgery. |
| Kughler, George W., Jr | Burlington | Apr. 2, '85 | Jefferson College, Phila. |
| Stokes, Joseph | Moorestown | Apr. 13, '83 | University of Pennsylvania. |
| Small, Alexander H | Riverside | Mar. 15, '81 | University of Pennsylvania. |

In order to secure more efficiency in the Township Health Boards of the county, Dr. Wm. C. Parry, of Mt. Holly, has been appointed District Medical Inspector.

## CAMDEN COUNTY.

| | | | |
|---|---|---|---|
| Wescott, E. Seymour | | Apr. 2, '83 | Jefferson College, Phila. |
| Walker, Mahlon M | | Sept. 6, '67 | Homeopathic, Phila |
| Forgey, Avinton | | Mar. —, '73 | Medical College, Ohio. |
| Artz, Gerome L | | Mar. 10, '81 | Hahneman College. |
| Henry, George W | | Apr. 2, '85 | Jefferson College, Phila. |
| Richardson, James | | Apr. 2, '85 | Jefferson College, Phila. |
| McAlister, Alexander | | May 1, '85 | University of Pennsylvania. |
| Glover, Lawrence L | | Mar. 30, '82 | Jefferson College. |
| Marcy, John Whilliden | | May 1, '85 | University of Pennsylvania. |
| Carpenter, Robert | | Mar. 29, '84 | Jefferson College. |
| Brown, H. M | | Mar. 10, '69 | Howard College. |
| Long, William S | | | University of Pennsylvania. |
| Powell, William R | | Mar. 10, '77 | Jefferson College. |
| Long, S | | | University of Pennsylvania. |
| Comly, Ezra, Jr | | Mar. 15, '62 | University of Pennsylvania. |
| Tegtmeier, C. T | | | Hahneman. |
| Jones, S. Preston | | | University of Pennsylvania. |
| Clausen, Joseph Robert | | | Jefferson College. |
| Shannon, J. H | | | Jefferson College. |
| Stroud, Frank G | | Apr. 2, '85 | Jefferson College. |
| Richie, Robert W | | Mar. 6, '— | Jefferson College. |



## CAPE MAY COUNTY.

| NAME OF PHYSICIAN. | P. O. ADDRESS. | DATE OF DIPLOMA. | INSTITUTION CONFERRING DIPLOMA AND LOCALITY. |
|---|---|---|---|
| Urquhart, George W | Sea Isle City | Mar. 10, '76 | University of Pennsylvania. |
| Urquhart, David C | South Seaville | Mar. 14, '79 | University of Penna., Phila. |
| Way, Julius | Sea Isle City | Apr. 2, '85 | Jefferson Med. Col., Phila. |

## CUMBERLAND COUNTY.

| | | | |
|---|---|---|---|
| Blackwell, E. T | | June 14, '48 | Vermont Medical College. |
| | | Mar. 13, '68 | University of Pennsylvania. |
| Brown, Henry N | | Mar. 10, '69 | Howard Med. College, Mass. |
| Brown, Lewis W | Vineland | Feb. 27, '65 | New Col. of Hom. Med., N. Y. |
| Carr, Henry H | | Apr. 3, '85 | Hahneman College, Phila. |
| Davis, Theodore G | Bridgeton | Apr. 2, '85 | Jefferson College, Phila. |
| Hubbard, Charles H | | Mar. —, '83 | Hahneman College, Phila. |
| English, Wm. A | Vineland | Mar. 26, '66 | Hygeio Therapeutic College, N. Y. |
| Jackson, Moses J | | Mar. 1, '84 | Eclectic Med. College, N. Y. |
| Judson, Andrea Rice | Dividing Creek | Apr. 2, '85 | Jefferson Med. Col., Phila. |
| Wheaton, Joseph C | Millville | Apr. 2, '83 | Jefferson Med. Col., Phila. |
| Swinney, John G | Shiloh | Mar. —, '79 | Hahneman College. |
| Taylor, William | Vineland | Apr. 3, '47 | University of Pennsylvania. |

## ESSEX COUNTY.

| | | | |
|---|---|---|---|
| Adams, John Lincoln | | May 12, '85 | Col. of Phy. and Surg., N. Y. |
| Bradshaw, John H. | | Oct. 2, '83 | Medical College, New York. |
| Brown, Phœbe Day | | Apr. —, '85 | Med. Col. for Females, N. Y. |
| Brown, Jacobus S | | May 1, '85 | Columbia College, N. Y. |
| Burn, Lucilla L | | May 20, '85 | Elec. Theropathic Col., Phila. |
| Clossen, William Henry | | May 12, '85 | Col. of Phy. and Surg., N.Y. |
| Fubricius, Julius A | | Mar. 13, '73 | St. Louis Medical College. |
| Frankendorff, H. von | | Mar. 21, '60 | Med. and Surg. Col., Munich. |
| Fonda, Edw. Stanley | | Mar. 9, '85 | New York Col. of Dentistry. |
| Grube, Charles Henry | | July 12, '78 | University of City of N. Y. |
| Glatzmeyer, Guilielmun | | Mar. 1, '85 | University of City of N. Y. |
| Hinkley, Livingston S | | Mar. 1, '78 | Bellevue Hosp. Med. College. |
| Hitchcock, Harlyro | | Mar. 11, '78 | Medical College, New York. |
| Heberton, William | | Apr. 16, '85 | Homeopathic College, N. Y |
| Hood, Bruno | | May 2, '85 | Col. of Phy. and Surg., N. Y. |
| Harman, George W | | Apr. 2, '84 | Hahneman Med. Col., Phila. |
| Jemison, Alcinous B | | —— —, '78 | Medical College, Ft. Wayne. |
| Kelly, Getrude Bride | | May —, '84 | Med. Col. for Females, N. Y. |
| Mulholland, John K | | Oct. —, '78 | Hahneman Med. Col., Phila. |
| Van Metzradt, Hans | | Feb. 26, '78 | Rush College, Chicago. |
| Mieran, Charlotte S | | Apr. 4, '85 | College of Midwifery, N. Y. |
| Pennington, Byron G | | Mar. 22, '81 | Pennsylvania Med. College. |
| Stoll, Catharine | | Aug. 19, '67 | Acad. of Strasbourg, Germ'y. |
| Schurman, Margaret B | | Sept. 19, '85 | College of Midwifery, N. Y. |
| Welch, Durant Clark | | Mar. 8, '77 | N. Y. Homeopathic Med. Col. |

## GLOUCESTER COUNTY.

| NAME OF PHYSICIAN. | P. O. ADDRESS. | DATE OF DIPLOMA. | INSTITUTION CONFERRING DIPLOMA AND LOCALITY. |
|---|---|---|---|
| Brown, H. N. | ..... | Mar. 10, '69 | Harvard College. |
| Carr, Henry H. | Five Points | Apr. —, — | Hahneman College, Phila. |
| Hilligass, Eugene Z. | Mantua | Mar. —, '80 | Jefferson Med. Col., Phila. |
| Luffberry, M. Jones | Glassboro | Mar. —, '84 | Jefferson Med. Col., Phila. |
| Reading, George E. | Woodbury | Apr. 2, '85 | Jefferson Med. Col., Phila. |
| Stillwagon, Philip E. | Bridgeport | Mar. —, '84 | Jefferson Med. Col., Phila. |

## HUDSON COUNTY.

| | | | |
|---|---|---|---|
| Atwell D. R. J. | ..... | Apr. 16, '85 | Hom. Med. Col., N. Y. City. |
| Brockway, Millard | ..... | Mar. 6, '81 | Eclectic Med. College, N. Y. |
| Baumann, Louis | ..... | Mar. 10, '84 | Univ. of the City of N. Y. |
| Converse, Charles Bell | ..... | Mar. 1, '71 | Bellevue Hosp. M. Col., N. Y. |
| Fulken, Alex. E. E. | ..... | Mar. 6, '81 | United States Med. College. |
| Guerin, Lawrence V. | ..... | May 22, '85 | Columbia Med. Col., N. Y. |
| Herzog, Sophie (midwife) | ..... | July 4, '84 | ..... |
| Hoffman, Jacob | ..... | Apr. 3, '85 | Hahneman Med. Col., Phila. |
| Jones, Eli Grellet | ..... | Nov. 1, '71 | Dartmouth College. |
| Loomis, Albert J. | ..... | Sept. 1, '84 | Bellevue Hosp. M. Col., N. Y. |
| Luck, John T. | Weehawken | Feb. 28, '68 | Columbia Med. Col., N. Y. |
| Lutz, F. H. | ..... | Mar. 16, '72 | Hom. Med. Col., N. Y. City. |
| Muzzy, Arthur Thomas | ..... | Feb. 8, '79 | Columbia Med. Col., N. Y. |
| Nevins, J. Lawrence | ..... | Feb. 28, '78 | N. Y. Hom. Med. College. |
| McKenzie, M. V. | ..... | May 13, '84 | Col. of Phys. and Surg., N. Y. |
| Owens, William Henry | ..... | July 13, '79 | Univ. of the City of N. Y. |
| Opdyke, Levings A. | ..... | Apr. 16, '83 | Hom. Medical College. |
| Pearson, John Clifton | ..... | July 3, '85 | Agricultural Col. of Vermont. |
| Peffer, Henry | ..... | —— —, '83 | Univ. of the City of N. Y. |
| Simon, Charles Irving | ..... | Feb. 8, '79 | Columbia College, New York. |
| Spring, Frederick | ..... | Aug. 3, '83 | Univ. of the City of N. Y. |
| Steadman, Evan T. | ..... | Mar. 6, '85 | Univ. of the City of N. Y. |
| Schlemm, Richard | ..... | Mar. 9, '85 | Bellevue Hosp. Med. Col. |
| Sanborn, Josiah Lane | ..... | Mar. 1, '35 | Univ. of the City of N. Y. |
| Searing, Harry W. | ..... | Mar. 9, '85 | Bellevue Hosp. Med. Col. |
| Van Deventer, Johann L. | ..... | May 13, '81 | Columbia College, New York. |
| Weeks, James E. | ..... | Mar. 6, '85 | N. Y. Medical University. |
| Wolf, Charles Frederick | ..... | Mar. 9, '85 | Bellevue Hosp. Med. Col. |
| Kreckler, F. (midwife) | ..... | Sept. 28, '69 | Midwife Institute, Hanover, Germany. |
| O'Grady, John F. | ..... | —— —, '80 | Long Island Col. Hospital. |
| Phelan, Jeremiah D. | ..... | June 9, '83 | Collegii Hoscomii Insulæ Longæ. |
| Winges, Conrad | Jersey City | May 16, '83 | Columbia College. |

## HUNTERDON COUNTY.

| | | | |
|---|---|---|---|
| Alpaugh, William C. | High Bridge | Mar. 1, '68 | Bellevue Hosp. Med. Col. |
| Brown, Henry N. | ..... | Mar. 10, '69 | Harvard College. |
| Carey, Thomas H. | Junction | Mar. 29, '84 | Jefferson College, Phila., Pa. |
| Exton, H Louisa | Clinton | Mar. 23, '79 | Women's Med. Col. of Pa. |
| Hackett, William Y. | High Bridge | Mar. 14, '67 | University of Pennsylvania. |
| Huffnagle, John | Lambertville | Mar. 14, '66 | University of Pennsylvania. |
| Jacobus, Atwood E. | ..... | Oct. 2, '83 | Col. of Phys. and Surg., N. Y. |
| Knight, William | Clinton | Mar. 14, '71 | University of Pennsylvania. |
| Larison, Francis W. | Lambertville | Mar. 13, '85 | Col. of Phys. and Surg., Md. |
| Leidy, Edwin D. | ..... | Apr. 14, '85 | Jefferson College, Phila., Pa. |



## MERCER COUNTY.

| NAME OF PHYSICIAN. | P. O. ADDRESS. | DATE OF DIPLOMA. | INSTITUTION CONFERRING DIPLOMA AND LOCALITY. |
|---|---|---|---|
| Stewart, Hiram A. | ..... | —— —, '63 | Penna. Med. Univ., Phila. |
| Brown, Henry Nelson | ..... | —— —, '79 | Harvard Med. Col., Mass. |
| McStruble, William | ..... | —— —, '85 | University of Penna., Phila. |
| Thomas, Richard | ..... | Mar. 13, '62 | University of Penna., Phila. |
| Shaw, Jos. B. | ..... | —— —, '85 | University of Pennsylvania. |
| McIlwaine, Charles H. | ..... | —— —, '77 | University of Penna., Phila. |
| Hunt, Ellsworth E. | ..... | —— —, '78 | Col. of Phys. and Surg., N. Y. |
| Encke, Joseph R. | ..... | —— —, '85 | Phila. Electropathic Inst. |
| Jones, E. G. | ..... | —— —, '71 | Medical College, N. H. |
| Cantwell, Frank V. | ..... | —— —, '85 | University of Pennsylvania. |
| Rogers, Elmer W. | ..... | —— —, '85 | University of Pennsylvania. |
| *Field, Isaac | ..... | —— —, '56 | Receipt for cure of cancer and other affections from Dr. William H. Norris in 1856. |

*Affidavit that he has practiced for the treatment and cure of cancer and other affections for thirty-six years in one locality.

## MIDDLESEX COUNTY.

| | | | |
|---|---|---|---|
| Baldwin, Frederick A. | New Brunswick | Mar. 10, '81 | Bellevue Med. College, N. Y. |
| Davis, Irenaeus P. | Milltown | Mar. 1, '71 | Bellevue Med. College, N. Y. |
| Edwards, Thomas P. | New Market | Mar. 6, '85 | Univ. of the City of N. Y. |
| Freeman, Charles M. | Washington, D. C. | May 13, '84 | Col. of Phys. and Surg., N. Y. |
| Harned, Samuel P. | Woodbridge | Mar. 5, '68 | Univ. of the City of N. Y. |
| Phillips, Howard W. | ..... | Feb. 28, '68 | Col. of Phys. and Surg., N. Y. |
| Shannon, Patrick A. | New Brunswick | Jan. 27, '74 | Royal Col. of Surg. in Ireland |
| Titsworth, Abel S. | New Market | Mar. 1, '67 | Bellevue Med. College, N. Y. |

## MONMOUTH COUNTY.

| | | | |
|---|---|---|---|
| Betts, William A. | Red Bank | Mar. 14, '61 | Columbia College, N. Y. |
| Beach, Edward M. | Eatontown | Mar. 7, '85 | Maryland Academy. |
| Buckmaster, A. H. | Ocean Beach | June 19, '83 | College, Long Island. |
| Bradford, T. Hewson. | ..... | Mar. 11, '84 | Jefferson College, Pa. |
| Booth, M. A. | Ocean Grove | Apr. 15, '51 | Winchester, Va. |
| Gunning, Josephus H. | Ocean Grove | Mar. 10, '73 | University, New York. |
| Lazarus, Solomon D. | Seabright | Apr. 2, '83 | Jefferson College, Phila. |
| McKenzie, William V. | Asbury Park | May 13, '64 | Columbia College, N. Y. |
| McGinnis, E. L'H. | ..... | June 19, '83 | College Hosocomii, L, I. |
| Scotland, Alexander | ..... | Mar. 9, '85 | Bellevue Hosp. Med. Col. |
| Taylor, Joseph William | Ocean Beach | Mar. 11, '84 | University, New York. |
| Walker, Mahlon M. | Ocean Grove | Mar. 2, '67 | Hom. Med. Col. of Penna. |
| Wythe, W. W. | Ocean Grove | June 6, '51 | Philadelphia Med. Col. |

## MORRIS COUNTY.

| | | | |
|---|---|---|---|
| Bennet, Robert A. | ..... | Mar. 5, '74 | Hom. College, New York. |
| Frazer, Samuel H. | ..... | Mar. 7, '79 | Eclectic College, New York. |
| Taylor, John L. | Succasunna Plains | Mar. 1, '80 | Bellevue Med. Col., City N.Y. |
| Wolfe, W. J. | ..... | May 5, '85 | Univ. Med. Col., N. Y. City. |
| Woodruff, Marietta H. C. | Boonton | Mar. 17, '74 | N. Y. Med. Col. for Women. |
| Yarnall, James H. | ..... | Mar. 1, '83 | Eclectic Med. Col., N. Y. |

## OCEAN COUNTY.

| NAME OF PHYSICIAN. | P. O. ADDRESS. | DATE OF DIPLOMA. | INSTITUTION CONFERRING DIPLOMA AND LOCALITY. |
|---|---|---|---|
| Bennett, Henry Allyn | ..... | ——, '83 | ..... |
| O'Hara, John | Island Heights | ——, '85 | Hahneman Med. Col., Phila. |
| Hewson, A | ..... | ——, '79 | Jefferson College, Phila., Pa. |
| Ketchenbach, Wm. H | Barnegat City | ——, '71 | Bellevue Medical College. |
| Hawley, B. F., Jr | ..... | ——, '82 | Jefferson College, Phila., Pa. |
| Ecroyd, Henry, Jr | ..... | ——, '83 | University of Pennsylvania. |
| Paxton, Rutherford H | ..... | ——, '84 | Med. Chirurg. Col. |

## PASSAIC COUNTY.

| | | | |
|---|---|---|---|
| Armstrong, Samuel E | West Milford | Mar. 4, '85 | Albany Univ. Med. Col. |
| Bachman, Fred | Paterson | Aug. 21, '56 | Med. Inst., Weimar, Saxony. |
| Buchanan, Rebecca R. M. | Paterson | May 21, '77 | Amer. Eclectic Col., of Ohio. |
| Brown, M. Belle | Passaic | Apr. 10, '79 | N. Y. Med. Col. for Women. |
| Carroll, William H | Passaic | Mar. 5, '84 | Univ. of the City of N. Y. |
| Dittmer, Wilthelm C | Paterson | Sept. 16, '54 | Hospital Col. |
| McFarland, David Walter | Paterson | Mar. 6, '85 | Univ. of the City of N. Y. |
| Peters, Charles H | Passaic | Mar. 16, '82 | Col. of Phys. and Surg., N.Y. |
| Rink, Walter S | Passaic | Apr. 3, '85 | Hahneman Med. Col., Phila. |
| Utter, Sylvester | West Milford | Mar. 6, '85 | Univ. City of New York. |

## SALEM COUNTY.

| | | | |
|---|---|---|---|
| Brown, Henry N | ..... | Mar. 10, '69 | Harvard College. |
| Smith, William Scott | Hancock's Bridge. | June 27, '74 | Brooklyn and Cincinnati, Ohio. |
| Wescoat, E. S | Quinton Bridge | Apr. 2, '83 | University of Pennsylvania. |

## SOMERSET COUNTY.

| | | | |
|---|---|---|---|
| Follett, William Mann | ..... | Mar. 1, '83 | Eclectic Med. Col. of N. Y. |
| Edwards, David J | Liberty Corner | Mar. 8, '82 | Univ. of the City of N. Y. |
| Kenney, Arthur | Somerville | Mar. 13, '84 | Hom. Med. College, N. Y. |
| Utzinger, Anna Weis | Plainfield | Apr. 4, '85 | College of Midwifery, N. Y. |
| Brown, H. N | ..... | Mar. 10, '69 | Harvard College. |
| Creveling, Philip G | Raritan | Mar. 6, '58 | College of Penna., Phila. |
| Matthewson, William B. | Somerville | June—, '81 | Col. of L. Island, Brooklyn. |
| Anderson, J. E | Neshanic | Mar.—, '84 | ..... |
| Costil, H. B | Rocky Hill | Mar.—, '82 | University of Pennsylvania. |

## SUSSEX COUNTY.

| | | | |
|---|---|---|---|
| Clark, Jeptha C | Andover | Apr. 16, '85 | Homeopathic Col. of N. Y. |
| Cusack, Thomas G | Newton | Feb. 13, '85 | Univ. of the City of N. Y. |



## UNION COUNTY.

| NAME OF PHYSICIAN. | P. O. ADDRESS. | DATE OF DIPLOMA. | INSTITUTION CONFERRING DIPLOMA AND LOCALITY. |
|---|---|---|---|
| Alexius, Aurora | Elizabeth | July 1, '43 | Bromburg Inst., Posen, Ger. |
| Beckwith, Seth B | Elizabeth | ——, '53 | Cleveland Hom. College. |
| Beckwith, John Tifft | Elizabeth | ——, '84 | Cleveland Hom. College. |
| Boseo, Otto | Rahway | Mar. 23, '67 | Rush Med. Col., Chicago, Ill. |
| Carman, George Pell | Plainfield | Mar. 5, '79 | U. S. Med. Col., N. Y. |
| Colford, Henry | Plainfield | Sept.—, '82 | Med. Col. of Baltimore. |
| Grier, E. B | Elizabeth | ..... | University of Pennsylvania. |
| Kiengle, Agathe, now Keller | Elizabeth | May 5, '80 | Donaneschingen, Prussia. |
| Korthaus, Caroline, now Jacobs | Elizabeth | Apr. 24, '71 | Barrnen Institute, Germany. |
| Livengood, Theodore F | Elizabeth | Mar. 12, '75 | University of Pennsylvania. |
| Miller, David M | Elizabeth | Sept. 26, '82 | Col. of Phys. and Surg., N. Y. |
| Morse, Willard H | Westfield | Mar. 5, '80 | Albany Medical Col., N. Y. |
| Morton, Edward K | Elizabeth | May 13, '84 | Col. of Phys. and Surg., N. Y. |
| Manning, Andrew J | Plainfield | ——, '83 | Columbia College, New York. |
| Schmidt, Charles J | Rahway | July 9, '84 | University of Vermont. |
| Waelchli, Anna | Elizabeth | Aug. 30, '84 | Columbia Col. of Mid., N. Y. |

## WARREN COUNTY.

| | | | |
|---|---|---|---|
| Brown, Henry N | ..... | ——, '69 | Harvard College, Mass. |
| Dalrymple, Edward S | Vienna | ——, '85 | Univ. of the City of N. Y. |
| Johnson, Samuel H | Hackettstown | ——, '84 | Col. of Phys. and Surg., of Baltimore, Md. |
| Jacobis, Peter Nelson | Belvidere | ——, '85 | University of Vermont. |
| Tunison, Geoffrey O | Oxford | ——, '85 | Jefferson Med. Col., Phila. |

# REPORT

OF THE

# BUREAU OF VITAL STATISTICS

OF THE

## STATE OF NEW JERSEY

FOR THE

*Statistical Year from July 1st, 1884, to July 1st, 1885,*

WITH CENSUS TABLES AND CLIMATOLOGY.

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DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

By EZRA M. HUNT, M.D., Sc.D.,

Medical Superintendent of Vital Statistics.

# INTRODUCTION TO THE REPORT OF THE BUREAU OF VITAL STATISTICS.

The progress made in the oversight and tabulation of vital statistics in this State is such as to encourage all those who recognize that the care of pupulation and the prevention of preventable disease is a material concern and duty of the State. While there is much yet to be desired, and while it is only by the accumulation of facts over a large number of years, and by the comparison of all localities, that we can arrive at safe conclusions, already much light is being thrown on the localities and causes of disease. What has thus far been attained is due to the inquiry of many physicians of the State, and to the wise coöperation of legislative action. It is well to recall the steps of progress.

Halley, of England, the mathematician and astronomer (1693), who first ventured to predict the return of a comet which appeared on time in 1759—seventeen years after his death, so satisfied himself of the uniformity of the laws of nature, and of the possibility of determining events as to human beings by a close study of nature and the causes of deviation therefrom, that he invented the "Life Table," and became the author of a system on which has since been successfully predicated great mercantile, vital and scientific transactions. His investigations are to be found in the early records of the Royal Society. Taking the city of Breslau as a basis and noting the additional data needed for a more complete result, he prepared a table which gave a more just idea of the state and constitution of mankind than any one then extant, showing among other things the chances of mortality at all ages, and likewise how to make certain estimates of the value of annuity for lives, which had been previously done by an imaginary valuation. These are the materials on which must be based life annuities, life insurance, and the rules of friendly societies in the interest of the working population. The French table of Deparcieux

(1746), the Northampton table of Dr. Price, which he applied in the Equitable Insurance Society, and far better his life table of the populations and deaths in Sweden and Finland (1783), and the Carlisle table of Milne (1815), marked great advances in method, accuracy and the modes of allowance for defects.

In 1819 the English government found it best to extend aid in securing more perfect data. Under its sanction Mr. Finlaison labored for ten years, and in 1827 made a report to the Lords of the Treasury, in which he recommended "an accurate and extensive collection of facts whereby may be facilitated the solution of all questions depending upon the duration of human life." Since then vital statistics and life tables have been multiplying, and it can be said with more emphasis than it was said by the Registrar-General of England forty years ago, that "a system has been carried into effect which conduces to the amelioration of the condition of society, and especially of the working classes, and each year's accumulation will increase the value of such records, by augmenting the number of facts upon which calculations may be brought to bear." Sources of error are distinctly traced, methods of tabulation are closely questioned. The fact that vital statistics are yearly assuming more and more importance, is itself the assurance that the science rests on an exact basis; that it is attainable, even if precise and resting upon profound mathematical relations; that as an art it is indispensable and practicable in life studies and a great assistance in studying those causes of disease which admit of prevention or limitation.

The relation of these statistics and the facts as to their record, are detailed as follows, in a report made by Dr. J. L. Bodine, to the New Jersey Sanitary Association several years since, before the present system was inaugurated:

"The object of sanitary science is to prevent disease and to prolong human life. It is essentially a science of observation, a science founded upon statistics. It necessarily makes use of the numerical method of observation, a method widely open to fallacious conclusions, but which, rightly used, is the basis of all sanitary reform. The necessity of some statistical records as a means of comparison of the condition of a people at different periods has been recognized from the earliest ages. The books of Moses give an account of the numbering of the children of Israel at several different periods, and the Roman census was taken every fifth year. A registration of births, marriages and deaths was a part of the old English parochial organization, and a voluntary



registry of such facts was provided for in several of the colonies of this country in connection with their township or other local organizations. In 1836 the English registration law was passed, and from that time in England a registry of births, marriages and deaths became general, and was made a special governmental function. The reports of the Registrar-General of England have furnished the groundwork for the great development of sanitary science which the last forty years has brought about in England. This movement in England made an impress on this country, and in 1842 a registration law was enacted in the State of Massachusetts. As a part of this same movement, and influenced by the work of the English Towns Commission, a special commission in Massachusetts in 1850 made an exhaustive report of what statistics had done to inform and to educate communities in regard to the avoidable sources of disease and what they could be made to do. This public interest once having been awakened in regard to vital statistics in their connection with public health, it has not been allowed to die out in Massachusetts. Their returns have become more complete, accurate and universal and present a much nearer approximation to accuracy than those of any other State. The past history of disease and its present history as shown by statistical returns prove that some epidemic diseases have ceased upon the surrender of the habits of life and the avoidance of the causes which gave rise to them, that others have been diminished in their frequency and their severity, and that the average duration of life in civilized communities has greatly increased. Dr. Richardson states, on the authority of Heberden, that in England from 1790 to 1810 the general mortality had diminished one-fourth. He quotes from the French statistics that in 1780 out of 100 new-born infants 50 died the first two years. From 1817 to 1827, only 38 of the same age died, an increase of infant life of 25 per cent. The black death, the sweating sickness, the plague, Devonshire colic, jail fever and other scourges, which once prevailed, have ceased their ravages; and small-pox, once the most terrible and fatal of diseases, has almost ceased to destroy and to deform. For the triumphs of enlightened observation, based upon the statistical or numerical method, the world is indebted, especially to Sir George Baker in regard to the lead poisoning of Devonshire, to Howard for the disappearance of jail distemper and the black assizes, to Capt. Cook for the mode of prevention of scurvy among seamen, and to Jenner for the immortal discovery of vaccination. Statistical records for a series of years in Massachusetts, led Dr. Bowditch to a recognition of the causal association of consumption, the great source of mortality in this climate, with conditions of soil moisture; and the same method led Dr. Buchanan, in England, independently of any knowledge of Dr. Bowditch's researches, to reach the same conclusion in regard to residence upon a wet, undrained soil being a cause of consumption. The transmission of cholera by means of drinking-water, as proved by Dr. Snow, and the propaga-

tion of typhoid fever in the same way, are instances of the triumphs of the statistical method in the progress of sanitary reform. For the successful use of the numerical method statistics should be accurate, for, if they are not so, they are misleading and afford no ground for reliable comparison.

"In New Jersey the old law for vital statistics is practically a continuation of a law enacted in the last century or a compound of two such laws. One of these provided for a registration of marriages in the office of County Clerk, and the other recognized the importance of a registry of births and deaths as affording evidence of legitimacy and furnishing a means of tracing descent. It provided that the Township Clerk should keep a registry of any birth or death reported to him. It was merely a continuation of the old English parochial registry. The act of 1848 and its supplements consolidate these two enactments and gives the Secretary of State supervisory power of these returns, authorizing him to issue blanks and instructions and to prepare from the returns a tabular statement. The result is that for more than twenty-five years annual volumes of statistics have been published by authority of the Legislature, and a vast amount of money has been expended in gathering, arranging, tabulating and circulating such annuals, which have no practical value and are hopelessly misleading for any statistical comparison. The numerical traits not being faithfully gathered, the aggregate results are hopelessly confusing. Many townships made no returns, in others they are incomplete; nearly half the causes of deaths are unrecorded. In a very large number they are not given in the returns, and they are stated in the reports in such a way and upon such a system of nomenclature as would astonish any one who had not his attention called to these records."

At the meeting of the association in 1877 a committee again reported upon the subject. It had been asked to treat of three points, viz.: The history of legislation in New Jersey on the subject of vital statistics; a presentation of the methods of obtaining these statistics elsewhere; suggestions of improvements desirable or obtainable in the registration of these statistics in New Jersey. The following is the historical account thus given:

"From the earliest printed volume of the laws of New Jersey, the volume of Leaming and Spicer, it appears that at the session of the Legislature of East New Jersey at Elizabethtown in the year 1675, more than two hundred years ago, it was enacted that the Clerk of each town within the province should record in a book provided by the town, all births, marriages and deaths within the compass of the aforesaid towns, and to have for his care and pains three pence a name. This enactment was made less than a hundred years after the earliest



registration of vital statistics in England; for the parish records date back no earlier than the time of Queen Elizabeth, and the London bills of mortality only appear at the time of the plague in the 17th century. The great plague in London in 1665 is said to have killed 80,000 people and to have continued its harvest of death into the year of that work of destruction and sanitation, the great fire of London in 1666. These events are only a few years earlier than the legislation in New Jersey intended to secure a registry of births, marriages and deaths. The legislation of West New Jersey was a little later, but in 1682 an act was passed providing for a public register of marriages, births and deaths in that province. The earliest legislation in New Jersey and its earliest volume of laws recognized the importance of a record of the facts of the social history of her people, and in some of the published letters of instruction to the Governors of the provinces orders are given that the names of those born, married or deceased in the provinces shall yearly be transmitted to the city of London.

"After the Revolution and the attainment of the independence of this colony from Great Britain, an act was passed in 1790 for the registry and proof of marriages, births and deaths, when required. A law in regard to marriages was passed in 1795 and an act for the register of births and deaths when required in 1799.

"The act of 1795 concerning marriages makes up the first eleven sections of our present act concerning marriages, births and deaths, and the act of 1799 for a register of births and deaths reappears in the sections from the 13th to the 20th inclusive of the same law. The 12th section of the law passed in 1848 provided that the Secretary of State shall have general supervision of the registry of marriages, births and deaths in the State; that the records obtained by the clerks and assessors of the townships and cities of the State shall be returned to his office, and that he shall prepare from these returns such tabular results as will render them of practical utility. These returns are by the law directed to be made once a year. The assessor is entitled to ten cents for each marriage, birth and death obtained by him, and the clerk of the township to a like sum for making return to the office of Secretary of State. The history of legislation in New Jersey in regard to vital statistics shows that no real progress has been made in two hundred years, and that although the instructions issued by the Secretary of State truly declare that the value of these statistics collected at great expense depends almost entirely on their *accuracy*, their *completeness* and their *universality*, it appears from the annual printed volume that the returns were made without regard to accuracy or system; that they were made in less than fifty per cent. of the cases, and that in many of the townships the law is entirely disregarded. Accuracy, completeness and universality cannot be said to characterize the registry and return and tabular digest of vital statistics in New Jersey as made before the law of 1878.

"The second point of this report involves a discussion of methods adopted in other States for securing the facts of the vital history of their people.

"In the year 1836 the English parochial registry of births, marriages and deaths not proving satisfactory, a general registration law was enacted in England. The law went into operation in 1837. An act evidently worded after the English law was passed in Massachusetts in 1842. Our law was enacted in 1848 as a result of the legislation in Massachusetts, and probably because the Secretary of State at that time, Dr. McChesney, was a member of the medical profession. The act of the State of Michigan was passed in 1867. It has seemed best to the committee to refer only to the registry in England and in the States of Massachusetts and Michigan in this country.

"The registry in England from its commencement 40 years ago has been under the supervision of Dr. Wm. Farr. Dr. Guy in discussing the origin and progress of sanitary reform in England thus speaks of the English registry: 'But happily we are not equally destitute of facts, for the Registrar-General had been for some time at work, heaping up materials to serve as the bricks and hewn stones of a scientific edifice, and furnishing periodical returns which had a direct practical value both through the interest they created and sustained and the wholesome warnings they administered.'

"The English registry is a continuous one. Parents are required to record births and the nearest relatives deaths in the civil register books under penalty. The last Report of the Registrar-General states that very few deaths escape registration and that the registry of births is becoming more complete. Marriages are necessarily recorded as they are performed only upon license granted. The registry is based upon parish and town organizations, and the returns are made to the Registrar-General in London. In the last report of the Massachusetts State Board of Health, in a paper on registration of deaths, it is said that 'to such a high degree of perfection has registration of deaths now arrived in England, that on each Tuesday a printed pamphlet of ten pages is prepared and sent over the kingdom, giving the cause of deaths, etc., with the conclusions and warnings to be drawn from them for the week ending the previous Saturday and collected from twenty-three towns, containing over eight millions of inhabitants. Of course even these statistics are open to fallacious and misleading conclusions, for all the assigned causes of death do not represent the same diagnostic skill; the average age of the inhabitants of a district will feebly influence its death-rate, and a reputation for salubrity in a place may attract weak and feeble persons to that locality; but these are disturbing influences which had to be eliminated by large numbers and by the gradual advancement of knowledge. Statistical knowledge is not more exact and conclusions from statistics not less susceptible to error than are the facts and influences of other sciences.'

"In Michigan the returns of vital statistics made to the Secretary of State's office are edited by the Secretary of the State Board of Health, and the system in Michigan, while claimed by Dr. Baker, the Secretary of the Board of Health, to be 'one of the best in actual operation on a large area in the United States,' is by no means what he wishes it to be. He insists the great 'difficulty in the way of obtaining reliable vital statistics is a lack of appreciation of the importance of the subject by the people.'



"The third point assigned to the committee, was suggestions of improvements desirable or attainable in the registration of vital statistics in New Jersey. In a report made to the New Jersey State Medical Society in 1869, the chairman of your committee was at that time of opinion that no modifications were practicable in our system, and he is not sure that eight years has witnessed so great an improvement in knowledge in this State that wise and efficient, and at the some time costly, legislation on this subject can be secured. The collection of accurate, full and trustworthy statistics and their intelligent analysis is necessarily costly work. An efficient health organization in every township and city in the State, with the executive officer of the organization a local registrar of vital statistics, and the supervision of these statistics by the State Board of Health would be desirable reforms, but not attainable from a legislature which represents a constituency unenlightened upon the importance of health questions, and the dependence of these questions on statistical records. The acceptance of a return of causes of death only from registered and competent physicians would be a desirable reform, but not attainable as long as so large a number of the people adhere to charlatans and pretenders in medicine. Your committee believe that improvement in our system of vital statistics can only be progressive, and as possible steps in the line of progress they would suggest a closer association of the work of securing vital statistics with the organization of the New Jersey State Board of Health, and that proper blanks be furnished to the assessors and town clerks to facilitate the procurement of these records. Blanks will be filled up when the information otherwise would not be obtained. Your committee is also of the opinion that increased compensation to assessors and town clerks would secure better returns. The State cannot secure labor without compensation any more than individuals can. They would suggest that compensation be made only for complete and satisfactory returns.

"The importance of health legislation, and its dependence upon accurate and trustworthy statistical records, has been abundantly recognized. Mr. Disraeli, now the Earl of Beaconsfield, in an address delivered in London a few months ago, says:

"'The health of the people is really the foundation upon which all their happiness and all their power as a State depend. It is quite possible for a kingdom to be inhabited by an able and active population. You may have skillful manufacturers; you may have a pro-

ductive agriculture, the arts may flourish, architecture may cover your land with palaces and temples, you may have borne material power to defend and support all these acquisitions; you may have arms of precision and fleets of fish torpedoes, but if the population of that country is stationary or yearly diminishes, that country is ultimately doomed.'

"The last Legislature of New Jersey, by the organization of a State Board of Health, has placed it in the power of that Board to educate public sentiment upon questions of health, and to carry on with greater efficiency the work for which this Association was primarily organized. When public sentiment becomes enlightened upon the importance of the subject, wise and efficient legislation will be had, and accurate, complete and full statistical records of the vital movements of her people will be had in the State of New Jersey."

This enlightened legislation has already been had to the extent of securing returns and records which will favorably compare with those of any other State in the Union. While provision has not been made for all the varieties of tabulation, which many statisticians regard as important, we are able to secure those which are at the basis of all the rest. Cities, by the facilities afforded, can, with but little additional expense, have such weekly records of the precise locality of cases of death and sickness as will greatly aid in directing Boards of Health to those localities in which nuisances are producing the most serious results.

The law operates well where city clerks and assessors keep an accurate list of those who should furnish returns, and see to it that those who are slow are reminded of their duty. The local Boards of Health can also coöperate with great advantage. As these records are constantly available to decide questions of property, of pension, of age, of life insurance, of right to vote, etc., parents and friends cannot be too particular in claiming the right of record. Clergymen, physicians and others need to remember that a single neglect may at some future time be the occasion for censure and for fines and penalties. The law is as facile as such a law can be, the books and blanks now furnished are compact and the system works well in the hands of those accustomed to system and punctuality. It is pleasant to know that many of our physicians now study the records with great interest and profit. The returns of births are incomplete, especially in cities, although, for purposes of comparison with marriages and deaths, full approximate calculations can be made.



## DEATH-RATES.

The study of death-rates furnishes a very important mode of determining the health conditions of population. Nevertheless, the modes of study must be well understood and hasty inferences must not be made. Here are some of the limiting factors which must enter into the account:

I. There must be a sufficient population to enable us to eliminate the errors to which generalizations made from small data are always liable. If two persons are taken sick with a disease and one dies, it is not safe to make an average and say that the usual mortality of that disease is fifty per cent. If, on the other hand, 10,000 persons are taken sick with a disease and one-half die, there is much greater probability that fifty per cent. expresses the average mortality of the disease. This is greatly strengthened if the same mortality has occurred in different years and in different localities. If, for instance, measles, in twenty different years, and in twenty different localities, and among a population of 20,000 people, showed this mortality, the deduction would be very safe that this was the average prevailing mortality of the disease. The law of probabilities, as it is called, becomes in such a case a very accurate law, just because of the number of the events compared, whereas, the same proportion of fifty per cent. of deaths in two cases of the disease, although mathematically correct, is worth nothing as an inference in reference to the general mortality of the disease. The illustration, therefore, adds two more considerations to our first, viz.:

II. The calculation must include a large number of cases; and

III. It must extend over a sufficient length of time. To this is now to be added a fourth.

IV. It must include some specification as to the character of the population affected. A death-rate among a community made up wholly of men, or wholly of women, or wholly of children, or in which the proportion of either materially differed from the generally ascertained proportion, would have its significance also varied. It is for this reason that birth-rate must be considered, for we must know the material with which sickness or death have to deal, if we would make comparisons and inferences.

V. Added to this must come in also a consideration of locality. This first inquires whether in city or country, since the density of

population is a most intimate factor in relation to disease. Nor is it enough to find out that one is a rural population and another a city population, since parts of the same city differ so much. There are country localities exceedingly prejudicial to health, just as there are city localities and conveniences that may even place parts of a city superior for health to the average country prospect. Besides this, three are four other incidental and modifying facts come into view. If a city is emptied of one-half of its inhabitants for four of five of the summer months, the average death-rate on the basis of its whole population does not give the correct idea. To some extent nationality, length of residence, and, still more, the occupation, modify the significance of the death-rate.

While a yearly statement of death-rates is valuable, all these facts go to show that hasty inferences will not do. Hence the facts furnished in the quinquennial tables of last year are far more important than the statement for any one year. Hence, also, every city is untrue to itself that, instead of repeating tables better kept by the State, does not expend its work in a record of death and causes of death in every house. So a city, say after five or ten years, is able to know precisely its death-dealing and sickness-producing localities. If there is only *accuracy*, it is wonderful how, ere long, the vital statistician can come to know the significance of data, how to eliminate disturbing facts, how to balance them, and so how to reason upon his statistics. The very act, too, of collecting the data is valuable as leading to close habits of observation, as to the welfare of population. As sickness and the losses by sickness, not only of those that die, but of those that recover or partially so, has a definite proportion to the death-rate, it is to be remembered that every death stands not only for industrial loss, according to the data of age in the person, but also to others who have been sick or those whose time has been occupied in care, so that a sickly household, and more significantly a sickly city or county, has a limitation on its progress and a limitation on its existence more definite and more implacable and a burden more intense than can be put upon it by any other force in the whole range of destructiveness.

So wisely and well did the Jews understand this that in their best nationality their most accurate accounts were kept with the population, and the political problems most studied were those having reference to its care. And amid all their misfortunes this attention to vital



conditions remains as their best heredity. So much so, that with all their enforced disabilities, their vitality is their greatest possession. Their death-rate in cities and in epidemics is much below that of surrounding races, and their pauperism and their crime seldom a burden upon the nations amid which they dwell.

Nearer at home and more recent is the history of the "Society of Friends," which has always kept its most accurate credit and debit account with its people, counting these as a possession and a glory, making accurate record of every vital event, having the community or society, as well as the family, look after each individual. They thus show a hardiness and thrift of stock, of health, of character, of industry and prosperity such as should teach our State what are the demonstrated possibilities, and if we would adopt their plan of population-care and in every respect husband life and health as not mere favors but as things to be secured on a plan for the blessing, prosperity and perpetuity of the State.

Again, in the study of death-rates as one of the indices by which we judge of sanitary conditions, there is need not to rely so much upon totals as upon other comparisons. Taking this as the start, it is usual next to find the death-rate from that class of diseases known as zymotic or filth diseases, and which depend much, either for their inception or fatality, upon local conditions. The percentage of deaths of children under five years of age, as also of those under one year of age, form other classes for comparison. It is by the study and comparisons of each of these for sufficient periods, and with sufficient numbers, that greatly aid us in detecting causes of family, local or personal disease. The best English authorities claim that the yearly zymotic death-rate in healthy districts ought not to exceed one to two per thousand, that the whole number of deaths out of every 1,000 births should not exceed 100, and of 1,000 under five years of age not over 175. The moment we come to compare the healthiest localities in healthy country districts we see the great increase caused by artificial conditions. If in England and Wales the general mortality were that of the healthiest districts rating them, as with a death-rate of seventeen per one thousand, it would be equivalent to an annual saving of 115,000 lives.

If for the last five years the death-rate of all New Jersey had been that of Cape May county, there would have been an annual saving of over 6,000 lives. The veteran sanitarian of Great Britain, Mr.

Edwin Chadwick, in his address at Aberdeen, in 1877, thus summed up the results shown by the statistics and experience of his own country:

1. We have gained the power of reducing the sickness and death-rate in most old cities by at least one-third.

2. In new localities, with healthy dwellings, properly constructed drainage and a pure water-supply, we may reasonably look forward to insuring a death-rate of only 10 per 1,000, or less than one-half of the present average death-rate.

3. That in well-provided and well-regulated institutions for children and in prisons and other places under effective sanitary control, the death-rate is not only enormously reduced when compared with that of the general population of the same ages, but a practical immunity can be secured against zymotic diseases.

4. That amongst the general population a reduction by full one-half of diseases of the lungs may be effected by general public sanitation.

# THE STATE CENSUS OF 1885,

## AS BEARING UPON VITAL AND SOCIAL QUESTIONS.

The relation of vital statistics to other tables as to population, is such that whenever any enumeration of the people is taken, it becomes the duty of this bureau to examine it in those respects in which it reveals the vital and social status of the people. In the taking of the semi-decennial census of this State, there was need of a consideration of the general law of Congress, which had certain provisions relating to a State census, as also of the acknowledged defects of all previous methods of securing a State census in this State. The Department of State early took the matter in consideration and called into consultation those whose duties made them familiar with studies and methods relating thereto. It was soon found impracticable to attempt to avail ourselves of any Congressional provision, since it was conditioned on the securement of a great variety of schedules and would involve a State expense far beyond that which any one felt to be needed. On the other hand, it was important to avoid the confusion into which the former State census had fallen, and to secure such data as not only would give us the fact of increase or decrease, but also acquaint us with the nationality of the people and their social condition, as revealed by the size and housing of families.

It is believed that the present census has singled out the items most important to be secured in a semi-decennial enumeration of the people, and that it has secured with an accuracy never before attained, the items of information which it has attempted to secure. These are names of persons, their sex, nationality and color, the number of families they represent, the number of families in each house, and the periods of age in which they are distributed.

The ages have been secured in divisions to conform to those used in the vital statistic tables. Although for some purposes it is desirable to know how many are represented in every year, or in every quinquennial period of life, yet the present division will be found avail-

able in most comparisons. Those five years of age and under include the age of infancy or entire dependency. From 5 to 20 embraces as near as may be the *school period* or preparation period of life, one in which comparatively few are self-supporting, but, nevertheless, one in which among the laboring population it has been shown that many, if in good health and of industrious habits, are, as a rule, no expense to their parents. It is the period for school and trade, or business education. From 20 to 60 gives the working or productive period of life in which the average individual should be able to contribute to his own support, and that of the State. Indeed, it is a poor system of social organization or of personal management, if this period does not tend so to preserve health and to exercise working power, physical or mental, as would not only be self-supporting, but to do something toward the support of the declining and less operative years of human life. While over 60 covers a wide range of age, it practically represents a period in which the majority do not make a full livelihood, and are able to contribute but little to the general increase or prosperity. So far as births are concerned, the number being under five years of age is generally found to be about equal to the number who have born and died under that age. Comparisons of these in their respective localities enable us to correct some defects of report in the birth-rate as well as to compare the birth-rate of cities and country, and see where the causes which destroy the infant population are most operative. It would have been still better to have ascertained the number living under one year of age, and to have added these to the number dying under one year, but the increase of columns did not seem to be desirable.

While it would have been desirable to know how many were actually living in married life, it was believed that the now quite complete marriage records of the State and the numbering of the *families* would acquaint us with the actual facts better than the statement as to each person, whether he or she was married or single. No one can go over any census without suggesting some facts it would have been interesting to secure, but as each additional column adds much to the work, a careful limitation has to be exercised and a selection made.

Much light is thrown upon the social condition of the people by a comparison of the number of dwellings with the number of families. In fact, a comparison of the two columns will generally show not only how many families but how many persons live in one house, while a continuation of the analysis reveals their approximate ages.



That is the best state of society in which a large proportion of the population is represented by families located in separate houses.

These few selected series of facts, as obtained in this census, admit of comparisons and deductions far more interesting and informatory than at first sight appears. The compilation and presentation of all these would require much more clerical force and expert study than has been provided for in the act authorizing the enumeration. But we call the attention of all statisticians, and all those interested in social and economic studies, to the facts that are secured in this enumeration.

Had the census come into our possession earlier or in printed from, it was our intention to follow out some of these studies more fully than can be done in so brief a period.

As it is, we shall, from time to time, be able to profit by comparisons, especially as they concern the death-rates of the various cities and country districts.

While the proportion of deaths to the living population in any given locality is informatory, it is only when we come to study more closely the material as to age, etc., with which disease has had to deal, that we arrive at a more important estimate of its significance.

A death-rate of 30 per 1,000, among the population between the ages of 20 and 60, for instance, would be far more significant of some special visitation of mortal disease than the same death-rate among the same number under five years of age. On the other hand, as it is an ascertained fact that the preventable or induced diseases, and especially those known as communicable, affect the young population more than the adult, a large ratio of such deaths among the young often points to local causes of disease which are especially operative and can be restricted.

In an article on the census of 1880, to be found in the fourth report of this Board, we instituted a series of comparisons as to population as represented in the State as a whole, at different periods, and then by townships and by cities.

By the corrected figures of the census office, and by the figures of the later semi-decennial census, the record is as follows:

| | |
|---|---|
| Entire population of the State, 1860 | 672,035 |
| Entire population of the State, 1870 | 906,096 |
| Entire population of the State, 1880 | 1,131,116 |
| Entire population of the State, 1885 | 1,278,033 |

Additional particulars as to native and foreign population are as follows:

| | 1860. | 1870. | 1880. | 1885.* |
|---|---|---|---|---|
| Native population | 549,245 | 717,153 | 909,416 | 1,027,687 |
| Foreign population | 122,790 | 188,943 | 221,700 | 250,346 |

By the census of 1880, and that of 1885, the distribution of sexes is as follows:

| | 1880. | 1885. |
|---|---|---|
| Native white males | 429,064 | 487,891 |
| Native white females | 441,633 | 497,955 |
| Foreign-born white males | 111,806 | 126,907 |
| Foreign-born white females | 109,514 | 123,439 |
| Colored males | 19,052 | 20,388 |
| Colored females | 20,047 | 21,453 |

From the present census it appears that there are 210,267 occupied houses in the State of New Jersey, and that there are 267,294 families.† In cities of over 5,000 inhabitants, there are 146,238 families and 99,215 houses. Local Boards in each township, and especially in each city, can trace for themselves the relation of houses to population. As a rule, rented houses or houses in which there are more than two families need to be looked to as to their sanitary condition more than those which are occupied by the owners. This is especially true of the class known as tenement-houses.

An undertaker, who owned and rented a large number of these, was once asked whether the rentals paid. His answer was "No, but the funerals do." This undertaker lived on the other side of the Atlantic.

As in the fourth report (1880), we here give a list of cities, towns and boroughs, or other forms of incorporated government, with corrections afforded by the present census. This is the more important because sickness bears so much relation to density of population, and because the law now requires that every city, town or borough of over 2,000 inhabitants shall have a Health Inspector. It also allows the State Board to require the appointment of a township Health Inspector by the local Health Board where, on account of density of population or other obvious reasons, such appointment is needed.

There are a few townships in which are close populations in towns, but which have not been incorporated as such. Such places as Bound

*Of the native population of 1885, 41,841 are colored.

†The return for Ocean county in this respect was imperfect, and houses are supplied on the basis of five to a family.



Brook, Somerville, Mount Holly, etc., are examples of these, although they have no other form of government than that of the townships of which they form a part. The recent law which permits the State Board to direct the local Board to have an inspector for townships, when needed, will aid in securing the general health of townships in which such villages are located.

If the local Boards will look carefully after the death-rates and the general vital and social conditions of such localities, they will find many facts bearing on the care of population and the prevention of disease. The census for each township, city, county, etc., will be found with the tables of death-rates, and can there be referred to. For fuller details we refer to the report of the census, when printed, but desire thus to lead all persons in their various localities, and especially the Health Boards in oversight of cities, to study closely the relations of age, sex, nationality, social relations, number of families and number of dwellings to the vital conditions of the population.

## FACTS AS TO CITIES OF OVER 2,000 INHABITANTS.

| | Dwellings. | Families. | Total number of inhabitants. |
|---|---|---|---|
| **Over One Hundred Thousand.** | | | |
| *Jersey City, Hudson county (city) | 16,114 | 30,707 | 153,513 |
| *Newark, Essex county (city) | 19,467 | 34,496 | 152,988 |
| **Between Seventy and One Hundred Thousand.** | | | |
| No city | | | |
| **Between Fifty and Seventy-five Thousand.** | | | |
| Paterson, Passaic county (city) | 8,686 | 13,105 | 63,273 |
| Camden, Camden county (city) | 10,524 | 10,852 | 52,884 |
| **Between Twenty-five and Fifty Thousand.** | | | |
| Hoboken, Hudson county (city) | 2,601 | 7,928 | 37,721 |
| †Trenton, Mercer county (city) | 6,546 | 6,893 | 34,386 |
| Elizabeth, Union county (city) | 4,960 | 6,404 | 32,119 |
| **Between Fifteen and Twenty-five Thousand.** | | | |
| New Brunswick, Middlesex county (city) | 2,732 | 3,682 | 18,258 |
| Orange, Essex county (city) | 2,177 | 2,904 | 15,231 |
| **Between Ten and Fifteen Thousand.** | | | |
| Bayonne, Hudson county (city) | 1,779 | 2,413 | 13,080 |
| Bridgeton, Cumberland county (city) | 2,093 | 2,273 | 10,065 |
| **Between Five and Ten Thousand.** | | | |
| Plainfield, Union county (city) (North Plainfield 3,728 additional) | 1,474 | 1,975 | 8,913 |
| Millville, Cumberland county (city) | 1,804 | 1,866 | 8,824 |
| ‡Morristown, Morris county (city) | 1,808 | 1,600 | 8,760 |
| Chambersburg, Mercer county borough) | 1,715 | 1,775 | 8,542 |
| Town of Union, Hudson county (town) | 1,225 | 1,683 | 8,398 |
| Passaic City, Passaic county (city) | 1,087 | 1,621 | 8,326 |
| Phillipsburg, Warren county (city) | 1,690 | 1,712 | 8,058 |
| Atlantic City, Atlantic county (city) | 1,725 | 1,753 | 7,942 |
| Rahway, Union county (city) | 1,345 | 1,518 | 6,861 |
| Harrison, Hudson county (city) | 1,003 | 1,335 | 6,808 |
| Burlington, Burlington county (city) | 1,583 | 1,613 | 6,653 |
| Perth Amboy, Middlesex county (city) | 921 | 1,326 | 6,311 |
| Gloucester City, Camden county (city) | 1,137 | 1,147 | 5,966 |
| Salem City, Salem county (city) | 1,293 | 1,291 | 5,516 |
| Long Branch Village, Monmouth county (town gov. by commission) | 1,015 | 1,154 | 5,140 |
| **§Cities, Towns, Etc., Between Two and Five Thousand.** | | | |
| ‡Hackensack, Bergen county (town governed by commission) | 859 | 1,016 | 4,983 |
| Bordentown, Burlington county (city) | 1,211 | 1,212 | 4,683 |
| ‡Princeton, Mercer county (borough) | 883 | 935 | 4,577 |
| Lambertville, Hunterdon county (city) | 969 | 973 | 4,067 |
| Somerville, Somerset county | 621 | 748 | 3,316 |
| Woodbury, Gloucester county (town) | 712 | 727 | 3,278 |
| Red Bank, Monmouth county (board of commissioners) | 573 | 676 | 3,186 |
| Vineland, Cumberland county | 684 | 803 | 3,170 |
| Dover, Morris county (town) | 527 | 667 | 3,170 |
| Keyport, Monmouth county | 612 | 727 | 3,063 |
| ‡Newton, Sussex county | 511 | 610 | 2,648 |
| Hackettstown, Warren county | 479 | 578 | 2,645 |
| Washington, Warren county (borough) | 556 | 578 | 2,597 |
| ‡Hammonton Atlantic county | 488 | 518 | 2,525 |
| Boonton, Morris county | 470 | 540 | 2,390 |
| Asbury Park, Monmouth county (commission) | 502 | 521 | 2,124 |
| Freehold, Monmouth county (town governed by commission) | 405 | 421 | 2,124 |

*Hoboken is so much a part of Jersey City that its close proximity must be borne in mind in all Vital Study. The same is partly true of some of the suburbs of Newark.

†In reference to Trenton, it is also to be remembered that Chambersburg joins it closely with 8,542 inhabitants.

‡Includes township.

§All of these cities, etc., are now required by law to have Health Inspectors.

# THE CLIMATE OF NEW JERSEY.

## THE RELATION OF CLIMATE TO CONSUMPTION AND OTHER LUNG DISEASES.

BY MISS E. FOSTER, NEWTON, N. J.

The climate of this State may be described as having special features. Beside the general climate caused by the latitude, there are variations of this which may be classed as sea climate, land climate, and a climate as varied by relations of land and water.

The sea climate is equal, uniform, moist; the land climate is excessive, in its sharp contrasts, and dry.

The range between these is wonderful; and it is claimed for New Jersey, that while wanting in the harsher features so peculiar to the climate of New England and our Northwestern States, and possessing all the softness of a Southern clime without its disadvantages, yet there is every variety of temperature, of dryness, and of moisture which gives to climate those pleasing characteristics so essential to individual development.

The cause for the diverse character of the climate of the State may, in general, be due to its situation on the Atlantic slope of the continent, between the ocean and the high mountain ranges.

The geological structure and the nature of the surface, which bear so important relation in modifying the general character of the climate, need to be studied in order to discover the reason for marked local peculiarities.

In giving comparative results of the study of climatic conditions, the uniform observations made at different regional stations in this State, shall be the basis from which deductions are drawn. These studies date from July 1st, 1878, and cover a period of six years. The points at which meteorological observations have been made, fairly represent the natural geological and climatological divisions of the State.

The climate of the northern part of the State is greatly in contrast with the extreme southern portion. This is in correspondence with the elevation of the northern part, and the nearness of the southern portion to the sea. Still the contrast is not so much a difference of range of temperature as in the diverse character of the seasonal changes at the north. A comparison of the climate of places in the interior of the land, either north or south, with the climate of Cape May subjected to the influence of the ocean, will bring clearly out this difference of land and sea climate.

The appended table (page 375) gives in degrees Fahrenheit the mean annual and seasonal temperatures for the different climatic divisions of the State.

Comparing Newton with Cape May, the table exhibits the difference between the mean summer and winter temperature: At Newton, 40.85°; at Cape May, 34.42°. We see that the difference between these stations, 6.4°, is not so great as the difference in latitude would lead us to expect. It is almost wholly one of winter temperature.

Next taking Vineland, in the pine-land belt, representing the climate of the southern interior, we find the difference between mean summer and winter temperatures to be 41°. Compared with Cape May it shows a difference of 6.5°. The mean temperature at Vineland is higher in summer. That of the autumn and winter is much lower than at Cape May, but not so low as compared with like seasons in the northern half of the State.

Not to multiply comparisons, we find the northern and southern interior portions of the State to possess a continental climate; that of the Kittatinny Valley and the Highlands not marked by excessive extremes of temperature, the annual range at Newton, for the series of years within our observation, running from 91° to 102.9°; while the range of temperature for the year at New Brunswick varies from 93° to 106°, and that of Vineland from 87° to 108.5°.

The average length of the period between the greatest cold and the greatest heat is seven months. In some years the minimum temperature was recorded in February, and the maximum in September, thus prolonging the hot season eight months. At the inland stations the monthly ranges from June to September are low. The very hot periods are not long continued, and the mean minima are low enough to give cool nights. The winter months have wide ranges, due to extremes in both directions from the mean temperature. Still the climate is not considered excessive.



The table (page 375) exhibits the gradual changes in the mean temperature of the seasons, and of the year, as we go from north towards the south. The slight increase of cold in the winter from Newton to Freehold, the equable warmth of summer and autumn, and the changeable spring, point to some local influences. Newton and Freehold are more nearly alike in mean temperature and in seasonal changes. The fact that Newton, representing the northern boundary of the State, should show a higher mean summer temperature than is observed at Freehold and New Brunswick, would seem to find its explanation in its situation near the mountain ranges and in the prevailing southwest winds. By reference to the charts issued by the United States War Department, showing the isothermal lines of the United States, it will be seen that, during the months of May, June, and part of July, the same isotherm passes through Barnegat, New York and Newton; from thence, taking a southwesterly course, it follows the Allegheny range from the 41st to the 35th parallel, touching the northern border line of Georgia, and, by a very circuitous route, reaching San Diego, on the Pacific coast, situated on the 33d parallel.

The observations at Newark and Paterson show very little difference in the mean seasonal temperatures between Passaic Valley and the southeastern portion of the red sandstone plain. At Paterson, the mean range of temperature is wider than at Newark, but the extremes of temperature are not so great in the warm and cold seasons as at Newark. Newark shows the influence of tide-water. It has a land climate greatly modified by its nearness to the sea. This is shown in its most equable daily range. While in winter lower temperatures are sometimes recorded than in the Kittatinny Valley, to the northeast the cold season is short, the spring opens early and advances rapidly. The record, not only for the series under consideration, but for the whole term of forty-two years since 1843, exhibits an equability of range, both barometrical and thermometrical, not exceeded by any other than the coast stations.

It is to be regretted that the data are not at hand for comparing the mean of the *daily* range at all of the stations. This would be more informatory as to the equability of temperature, and all future tables should include it.

The stations bordering the ocean are the ones clearly marked as having the uniformity of a sea climate. The coast from Sandy Hook to Cape May is directly exposed to the ameliorating influence of the

ocean's waters. The effect of this is to temper the extremes of heat and cold, to reduce the range and mean temperature of the warm months, and to give greater evenness of humidity.

It is difficult to define the limits of this climatic province, as it merges into that of the southern interior on the west. The influence of the ocean's waters is felt to a distance of four to eight miles from the outer coast-line, the increase being from north to south.

The northern coast stations agree closely. In the warmer months the average temperature of Sandy Hook runs higher than Barnegat or Atlantic City. The average for the winter is very near 32°—that of the formation of ice. There is a marked difference in the winter season between Cape May and the other coast stations. The average daily minimum at the Cape runs higher from four to five degrees than at Barnegat and Atlantic City. The more southern situation of Cape May, together with the adjacent influence of the Delaware bay on the west, seems to offer an explanation of the peculiar features of its climate, which is of a more insular type than that of Atlantic City or Barnegat. For evenness of temperature and slight daily range, this station is the most remarkable one on our Atlantic coast. It is noteworthy that the mean of the maximum temperatures for six years is a fraction below 88°—the temperature of the sea.

The winter and spring of 1884–5, which were of exceptional severity, are not included in this series, the necessary data not being at hand. These figures might be altered somewhat by them, but their relations to each other would remain unchanged.

The variations in the mean barometer in the several parts of the State are inconsiderable. The pressure being so equally distributed, we are not sensible of any existing differences that may affect human organism. The highest pressure is usually recorded in February. The winter months have the widest range. June and August show the least fluctuation in the barometric column. Newton and Vineland record the same changes. Freehold and Newark show a steady level. At the coast stations the variations are reduced to a minimum.

### RAIN-FALL.

The rain-fall is one of the measures of climate, and second only in importance to temperature. Our tables show great variations in the distribution of the rain-fall in the northern and central portions of



the State. There is an increasing rain-fall proceeding from north to south as far as New Brunswick. This station records the lowest average annual fall, amounting to 40.73 inches. Paterson, with the highest average annual fall of 59.28 inches, presents a phenomenal record. These two stations represent the extremes of excess and deficiency in the rain-fall of the State. Paterson records in 1880–1 the greatest annual fall, 83.48 inches, an excess of 24.20 inches over the mean, and this being followed by a drought in the months from July to September, during which time there were ninety-eight days on which no rain whatever fell. In 1879–80, New Brunswick recorded the lowest yearly fall, 29.33 inches. The record of the rain-fall at this place has been less than the average of former years. Newton, with an average annual fall of 42.02 inches, and Newark, 44.88 inches, have kept well up to their average.

In the southern half of the State the increasing rain-fall is observed from stations inland to those on the coast. This is more marked in the monthly falls than in the annual averages. The excessive monthly falls of the inland and coast stations occur in corresponding years. The rains at Freehold, Sandy Hook and Barnegat are equally distributed by months. Freehold has an average annual fall of 48.95 inches; Sandy Hook, 50.51 inches; and Barnegat, 51.32 inches. Freehold seems to be exceptional in the number of thunder storms by which it is visited. Though Vineland and Cape May are in close correspondence as to the monthly and yearly averages, yet in most of the seasons the interior station has received the greater amount of rain-fall. The average annual fall at Vineland is 50.60 inches; that of Cape May, 49.48 inches. As the number of days on which rain fell is one-third less at Vineland than at Cape May, it follows that the precipitation in any given storm at Vineland must be greater than at Cape May. Vineland appears to get more rain all through the year than any of the other stations in the southern interior. This is probably owing to the presence of water to the west and southwest, and to the direction of the wind, which has an intimate connection with the rain-fall.

The autumn and winter rains of Cape May are generally less than at any of the coast or southern inland stations.

The rain-fall at Paterson is phenomenal and peculiar to that locality. It is not wholly limited to the storms of the warmer months. The extraordinary rain of March, 1881, amounted to 16.11 inches,

5.44 inches of which fell in eleven hours. The memorable freshet of September, 1882, which extended throughout the State, in Paterson resulted in a rain-fall of 18 inches in less than three days, and giving a monthly fall of 25.98 inches, the largest monthly amount in our records.

"The situation of Paterson in the depression of the first mountain range, where the Passaic Valley finds its outlet across the trap rock barriers to the open country, no doubt contributes to produce the greater rain-fall." (N. J. Geological Report, 1881).

John T. Hilton, a former observer at Paterson, says that the summer storms appear to move from Paterson northeastward along the southeast of the Highlands to the Hudson, at Peekskill. It is quite probable that the saturated air as it moves northward is more suddenly cooled by the forest-covered Highlands, and its moisture is thrown down along the border land of the red sandstone plain adjacent to the Highlands.

An Indian tradition is, that the storms divide over the summit of Snake Hill, going north and south twenty-five miles in each direction, the heavier portion going northeast by way of Paterson. This is from the lips of one of the old Hoboken Indians, and simply serves to show that the peculiarity of the Paterson rain-fall has been long in existence.

The total fall of snow is measured melted, and so is included as so much water or rain. The depth varies greatly from winter to winter. There is also a variation between localities in the same winter. The average depth measured at Newton is fifty-two inches, with a range between five feet seven inches in the winter of 1883–4, and two feet nine inches in that of 1878–9. In 1880–1 the total fall of snow at Newton was fifty and a half inches; at Freehold it amounted to seventy-nine and three-quarters inches. At the coast stations the snow melts rapidly and the sandy soil hastens its disappearance. In the northern part of the State it lies for a longer time and later in the spring. Some seasons there occurs a "thaw" in February; but when the cold season continues, the snow silently and gradually evaporates without adding chilliness to the air.

The average number of cloudy days in a year is less than one-third for the whole State, Freehold having the least number. For two hundred and sixty days out of every three hundred and sixty-five it is possible to enjoy fresh air and sunshine.



In general, our State may be considered as subjected to the same atmospheric changes, which are more or less modified by prevailing winds and natural conditions of surface.

The prevailing winds in New Jersey are from the west. In the northwestern part of the State, the winds take a southwesterly direction. In winter the northwest and southwest winds are about equally divided in frequency. At Newark and all the coast stations, the most frequent winds are from the northwest. At Vineland, from the southwest. The easterly winds are, in general, our rain-bearing winds. Our local showers and the storms of the summer months come from the west. The southeasterly winds, though at first gentle and soft at the inland stations, if continued longer than twelve hours bring moisture and a rawness to the atmosphere. The mean velocity of the northwest winds exceeds that of winds from the other quarters. The effect of this is to dry the air, thus lowering the percentage of relative humidity.

The humidity of a climate is the condition of the repose and restfulness of nature and man. The influence of great humidity upon temperature, and on the healthfulness of localities, is such that its determination is necessary to a full understanding of their climates. The effect upon temperature is to make it even. Moist climates are equable. The humidity of the air generally diminishes with the elevation above sea-level.

It is unfortunate that the observations for humidity are not complete at all of our stations, since variations are considerable within very short distances. At Newton, during the warmer seasons, and to a greater or less extent in the winter season, the amount of vapor present in the air is usually greatest about sunrise, from which time the amount decreases until sunset, after which it gradually increases until the next morning. At Philadelphia, the reverse of this is true, the time the amount of vapor is least being an hour before sunrise, the increase being through the day. We are not cognizant of any peculiarities of this kind on the east side of the Delaware river. If such exist, they should be carefully noted by individual observers as having important bearings on health.

The rapidity with which evaporation takes place depends greatly upon temperature, and the nature of the soil, whether hilly or marshy land, and its condition, whether cultivated or covered with forest growth.

The surface of the northern part of the State has a natural drainage toward the south. Some of the depressions between the hills are wet and swampy, but for the most part the soil is porous and dry. The red sandstone plain has a well-drained and naturally dry soil. In the Upper Passaic Valley there are extensive tracts of wet meadows and swamps, and some smaller areas of wet lands in Union county.

The trap-rock soils are all cold and generally wet, even when cleared and cultivated. That portion of the State which is drained by the Raritan has a quick-drying shale and sandstone soil. A large area, being almost entirely destitute of forest, the soils allow of an accumulation of heat in them. The surface of the southern half of the State may be said to be generally sandy, and the soils are warm. The poverty of the soils in the pine-lands is an evidence of the dryness of the climate. The influence of so sandy a surface is greatest in the southern interior.

To the table showing the relative humidity is added another, giving the absolute moisture, or the number of grains of vapor to the cubic foot of air. Using the saturated condition of the air as the standard of comparison (100), the relative quantity of moisture is expressed by percentage. The drier the air the lower the percentage, and conversely.

MEAN RELATIVE AND ABSOLUTE HUMIDITY.

| | Relative humidity. | Grains of vapor. |
|---|---|---|
| Newton | 68.86 | 2.91 |
| Newark | 72.74 | 3.16 |
| Freehold | 76.80 | 3.20 |
| Vineland | 69.13 | 3.15 |
| Sandy Hook | 73 62 | 3.28 |
| Barnegat | 77.95 | 4.17 |
| Cape May | 77.09 | 3.71 |

In winter, the absolute moisture at the north is reduced to a minimum; farther south it is less than one-half of the average for the year. In the interior, the months of July to November are the moist ones. At the coast stations, the four months of June to September are the more humid months.

## THE RELATION OF CLIMATE TO CONSUMPTION AND OTHER LUNG DISEASES.

We have seen that "climate is itself modified by local conditions, and its effects upon us personally admit of being modified both by our mode of dealing with ourselves and our surroundings."



The prevalence of consumption is a well-attested fact. It has been shown by Dr. H. I. Bowditch, of Boston, that it is prevalent in damp soils in the United States. It is also common in countries liable to damp fogs. The prevalence of the disease is less in climates either uniformly warm and dry or uniformly cold and dry. Equally well known is the belief in climate as a cure for the disease. When for five years one-seventh of the deaths in the State have been caused by consumption, and a larger proportion in cities, and among the adult population, we are impelled to search for the causes at work in its production. If it should be found to be the outcome of any of the features of our climate, it would be folly to sit viewing with complacency the danger to which all are alike exposed. That we are in no way responsible for these conditions need not relieve us from making the effort to change them.

The study of this subject results in the conviction that there is no climatical reason *beyond human control*, why even our most populous cities should not be among the most healthful in this respect. Nature is on the side of health, and welcomes any curative influence.

In some portions of our northern counties where the surface drainage is natural and easy, the excavations for buildings are frequently made without reference to the level of ground-water. The ill effects are observed in the spring season, in the flooding of cellars and basements, giving rise to conditions detrimental to the health of the occupants of such buildings. There are cold, wet soils in our State. There is a string of swamps from one end to the other of the principal railway from Jersey City to Camden. The tide-marshes contribute somewhat to city dampness; but upon neither tide-marsh nor fog should be shifted the blame for man's neglect, which becomes criminal from being willful or ignorant. The mean temperature of certain parts of England has been perceptibly increased since the general introduction of draining marshy soils as a system of agriculture. Private enterprise in our own State has shown the possibility of removing these breeding spots of disease. Many imagine that consumption is a purely constitutional disorder, but it is now well recognized that it may be induced by overcrowding and bad ventilation, and may even become infectious under such conditions.

We have within our State certain well-recognized climatic conditions known to be favorable to the prevention and cure of consumption. What is really required is a cool, temperate climate, free from great alterations of temperature.

Our whole Atlantic seaboard, from Sandy Hook to Cape May, possesses unusual attractions of climate, especially beneficial to those suffering from pulmonary complaints. Mildness of climate, equability of temperature and recuperative properties of sea air, are found nowhere else in such pleasing combination.

This section represents a true mean between the winter rigors of the Colorado climate and the enervating and debilitating effects of the extreme south. Beyond the sea, farther inland, the vast waste of sand absorbs the atmospheric moisture and aids largely in drying and purifying the air.

Lakewood and Vineland promise to be invaluable as winter health resorts. We rely on facts deduced from years of careful observation, and upon medical testimony that cannot be controverted. It is noticeable that while during the winter and spring of 1884–5, the bay near Fortress Monroe was so filled with ice as to render Old Point Comfort a disagreeable resort, the winter cities of our own coast were delightful in their freedom from such discomfort.

The diversities of the climate of the northern part of the State afford many opportunities for that change of atmosphere which is so beneficial to the suffering. The dry winter climate of the extreme north has afforded great relief to persons afflicted with phthisis. Again, residents of the north have found the shorter winters of the central part of the State much less trying to their constitutions.

Pneumonia is so prevalent and fatal in some winters and parts of seasons as to have awakened public interest in the determination of the special conditions which cause this malady. It is of special importance to inquire whether it is due solely, or even principally, to the peculiarities of the season, or to the unwholesome condition of the atmosphere.

Scientists have endeavored to trace some connection between northwest winds and the mortality from this disease. This theory is not established. The severest gales on our high mountain ranges are from the north and west, while cases of pneumonia are rare. The "American Journal of the Medical Sciences" says:

"The relations of pneumonia to altitude are definite and marked; with increase in elevation above the level of the sea there is a steady diminution in the death-rate of pneumonia."

It has been noticed that while deaths from acute diseases of the lungs run up to high figures with every great fall of temperature,



the mortality is strikingly increased when fog or mist accompanies the sharp frosts. The cold and dampness act as an exciting cause, but these may be obviated by additional clothing and the more liberal use of fires.

Pneumonia is essentially a congestive disease, and the best preventive measures are those which avoid the causes of congestion. Overheated, ill-ventilated rooms, and the sudden transitions from these to the sharp outer air, are avoidable predisposing causes of the disease. Foulness of any sort depresses bodily vigor and renders the system more liable to attacks of acute lung diseases. Experience has proved that a bad cold is changed by impure air to a deadly bronchitis.

The relation between filth and disease is not a discovery of the nineteenth century. Epidemics of pneumonia are as old as the plague of Athens. Though modern instances are not rare, it seems necessary to call public attention to the fact that the disease owes its fatality, if not its prevalence, to filth.

It has been affirmed by Dr. Sturges, of London, that pneumonia of a most dangerous form may be the sole expression of a poison, *similar to, if not identical with*, that of *fever*.

It has been found that the larger the actual population of a locality the greater its relative death-rate from pneumonia, and increase in density of population is followed by increase in mortality from it. We may, therefore, conclude that pure air and warmth are the true prophylactics against pneumonia. Happily, an adequate supply of pure air is still one of the features of our climate, and it is within the power of most to avail themselves of it.

From the early history of our country we glean a few notes concerning the climate as it was over two centuries ago. In a description of New Netherland, published at Amsterdam in 1621–32 (Doc. Hist. of N. Y., Vol. 3), may be found an allusion to the harvest as "very abundant in consequence of the mildness of the climate;" also, a reference to South [Delaware] bay as of a "more temperate country" than either north or south of it. "There is no winter there save in January, and then but for a few days." A Journal of New Netherlands, written in 1641–6 (Doc. Hist. of N. Y., Vol. 4), describes the air as "very temperate, inclining to dryness, healthy, little subject to sickness."

The historical records of our own State bear testimony, not only to the permanency, but the healthfulness of our climate. In Whitehead's

"East Jersey under the Proprietors" may be found a copy of "Scot's Model of the Government of the Province of East Jersey," printed at Edinburgh in 1685. It was published to induce emigration to America, and contains several letters written in 1683–5, by the early occupants of the provinces. In all their correspondence with their friends in England and Scotland they uniformly expressed their delight with the climate of the country and its salubrity.

In 1683, Deputy-Governor Thomas Rudyard, writing of the changeable wind and weather, says: "Yet this Variation creates not cold, nor have we the tenth part of the cold as we have in England. I never had any since I came, and in the midst of Winter and Frosts could endure it with less cloaths than in England. * * * I never had better health nor my family." One correspondent says: "The air in this countrey is very wholesome, and although it alter suddenly, sometimes being one day hot and another cold, yet people are not so subject to catch cold or to be distempered by it as in our countrey of England."

Another, writing from Elizabeth Town, in January, 1685, remarks that "the weather here is constantly clear; the sun rises and setts free of clouds. * * * We have at present sharp frosts and a good deal of snow; three dayes of vitrefying frosts this winter; had not its match for cold these 16 years by gone, as the Inhabitants do inform us. * * * I reckon the winter to consist only of nights, for the *Sun's* appearance by day moderateth the cold and melts the Frost. I do not find the cold here to cause obstructions or coughs; the Air is ever transparent."

Charles Gordon, writing to his brother, Dr. John Gordon, says he is "not troubled with coughs and head-aikes, as in Edinburgh." He advises his brother not to come to East Jersey as a "*Doctor of Medicine*," for, with the exception of "some Agues, and some cutted legs and fingers, * * * there is little or no Imployment this way."

Although it is possible to record further evidence of this sort, enough has been given to show that the climate has not materially changed since the first settlement of this province by the whites.

The removal of forests and the upturning of soil doubtless have contributed to modification of the conditions of the climate.

Without doubt, population, by its increase and density, has a deteriorating influence upon the healthfulness of communities.

Still, the salubrity of our climate continues to be largely under human control.



TABLE OF MEAN TEMPERATURE FOR THE YEAR AND SEASONS FOR THE CLIMATIC DIVISIONS OF THE STATE.

| | Year. | SEASONS. | | | | MARCH OF SEASONS. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Spring. | Summer. | Autumn. | Winter. | Winter to Spring. | Spring to Summer. | Summer to Autumn. | Autumn to Winter. |
| Newton | 51.12 | 47.95 | 71.92 | 53.55 | 31.07 | 16.88 | 23.97 | 18.37 | 22.48 |
| Paterson | 51.77 | 48.77 | 72.35 | 54.93 | 31.04 | 17.73 | 23.58 | 17.42 | 23.89 |
| Newark | 52.44 | 50.37 | 73.57 | 54.91 | 31.03 | 19.34 | 23.20 | 18.66 | 23.88 |
| New Brunswick | 47.90 | 38.54 | 69.07 | 53.48 | 30.53 | 8.01 | 30.53 | 15.59 | 22.95 |
| Freehold | 50.76 | 47.14 | 71.80 | 54.03 | 30.08 | 17.06 | 24.66 | 17.77 | 23.95 |
| Vineland | 53.28 | 50.47 | 74.32 | 55.03 | 33.32 | 17.15 | 23.85 | 19.29 | 21.71 |
| Sandy Hook | 52.50 | 47.97 | 72.10 | 57.09 | 32.87 | 15.10 | 24.13 | 15.01 | 24.22 |
| Barnegat | 51.80 | 47.16 | 70.41 | 56.15 | 33.51 | 13.65 | 23.25 | 14.26 | 22.64 |
| Cape May | 54.80 | 50.13 | 72.00 | 59.51 | 37.58 | 12.55 | 21.87 | 12.49 | 21.93 |

# CLIMATOLOGICAL OBSERVATIONS AND RECORDS.

In the study of disease it is important that records be preserved for comparison, not only with epidemics, but also with such other diseases as are recognized to be affected by changes of climate. What are known as the summer diseases of the digestive tract are not infrequently dependent not less upon barometrical than thermometrical changes. The varied kinds of pulmonary diseases are still more influenced by climate. It is always possible, by comparison of one part of the State with another, to discern great diversity of climate, and to no small extent a corresponding influence upon these diseases.

The places selected for observation are nearly the same as before. They are intended to represent not only different localities in the State, but were chosen also with reference to geological varieties. It is somewhat remarkable that no complete records are kept at any of the colleges of the State. The following are the observers for the past year :

I. Newton, Miss E. Foster.
II. Paterson, Wm. Furgason.
III. Newark, F. W. Ricord.
IV. New Brunswick, P. V. Spader, Esq.
V. Sandy Hook, U. S. Signal Service.
VI. Vineland, C. H. Adams, M.D.
VII. Barnegat, U. S. Signal Service.
VIII. Cape May Point, U. S. Signal Service.

The tables of New York, Philadelphia and Easton are valuable for comparison.

## METEOROLOGICAL SUMMARY OF VARIOUS STATIONS, FROM JULY 1ST, 1884, TO JULY 1ST, 1885.

### STATION, DENNIS LIBRARY, NEWTON, N. J.

Latitude, 41° 2′ 45″ N.; Longitude, 2° 19′ 48″ E. Altitude, 660 feet.

OBSERVER, MISS E. FOSTER.

| | BAROMETER. Reduced to 32°. | | | THERMOMETER. | | | | Mean Humidity. | Prevailing Wind. | Rain (inches).* | Snow (inches). | Days when Precipitation equaled 0.01. | Cloudy Days. | Rain-fall on Days. | Thunder and Lightning on Days. | Snow-fall on Days. | Fog. | Hail. | Frost. | Lunar Halos. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Mean Daily Range. | | | | | | | | | | | | | |
| 1884. | | | | | | | | | | | | | | | | | | | | |
| July | 29.253 | 28.835 | 29.112 | 93.7 | 54.9 | 70.79 | 20.8 | 66.79 | S.W., N.W. | 5.31 | ..... | 14 | 6 | 15 | 8 | ..... | 2 | 1 | ..... | 3 |
| August | 29.575 | 28.965 | 29.301 | 93.5 | 44.0 | 71.24 | 20.1 | 73.66 | S.W. | 4.80 | ..... | 10 | 9 | 11 | 10 | ..... | 3 | ..... | 1 | 4 |
| September | 29.741 | 28.999 | 29.351 | 90.2 | 41.8 | 67.00 | 20.5 | 67.58 | S.W. | 1.43 | ..... | 4 | 2 | 6 | 9 | ..... | 4 | ..... | 2 | 2 |
| October | 29.805 | 29.000 | 29.368 | 79.8 | 29.5 | 53.43 | 17.9 | 67 39 | S.W., N.W. | 3.72 | Trace. | 11 | 9 | 12 | 2 | 1 | 3 | 1 | 5 | 2 |
| November | 29.680 | 28.733 | 29.281 | 61.5 | 19.0 | 41.12 | 17.5 | 63.66 | S.W. | 3.95 | 1.2 | 8 | 8 | 7 | ..... | 3 | ..... | ..... | 14 | 2 |
| December | 29.939 | 28 790 | 29.352 | 62.0 | -5.0 | 31.93 | 14.7 | 72.24 | S.W., N. E. | 5.25 | 19.0 | 14 | 21 | 10 | ..... | 8 | 6 | ..... | 22 | ..... |
| 1885. | | | | | | | | | | | | | | | | | | | | |
| January | 29.906 | 28.558 | 29.278 | 58.0 | 1.5 | 27.80 | 16.3 | 66 15 | S.W., N.W. | 5.41 | 11.5 | 11 | 7 | 9 | ..... | 7 | 1 | ..... | 24 | ..... |
| February | 29 632 | 28 403 | 29.169 | 43 0 | -4.5 | 20.15 | 16.2 | 69.02 | N.E., N.W. | 3.82 | 24.0 | 14 | 5 | 5 | ..... | 11 | ..... | ..... | 28 | ..... |
| March | 29.649 | 28 747 | 29.231 | 53.5 | 0.5 | 27.22 | 17.4 | 64.50 | N., S.W. | 1.38 | 8.0 | 10 | 4 | 5 | ..... | 10 | ..... | ..... | 28 | 2 |
| April | 29.790 | 28.726 | 29.243 | 87.4 | 22.0 | 48.73 | 23.5 | 55.23 | S.W., N. | 1.97 | Trace. | 8 | 7 | 8 | ..... | 4 | 2 | ..... | 11 | 2 |
| May | 29 492 | 28.847 | 29.207 | 87.2 | 34.9 | 59.43 | 22.0 | 58.09 | N. E., S. E. | 2.99 | Trace. | 11 | 10 | 11 | 1 | 1 | 2 | ..... | 4 | 2 |
| June | 29.522 | 28.706 | 29.235 | 96.5 | 45.7 | 69.64 | 26.9 | 58.00 | S.W. | 1.39 | ..... | 7 | 2 | 9 | 7 | ..... | 1 | ..... | ..... | ..... |
| For the year | 29.665 | 28.775 | 29.260 | 75.52 | 23.79 | 49.04 | 19.48 | 65.19 | S.W. | 41.42 | 63.7 | 122 | 90 | 108 | 37 | 45 | 24 | 2 | 139 | 19 |

* Including melted snow.

REMARKS.—July, 1884—Cold and wet. Barometer much below the mean. Scarlatina prevalent. August—Mean temperature 1.02° below the average. Rain-fall 2 6 inches in excess. Frost on the 25th. Earthquake shock on the 10th, after which the nights were cold and wet, with heavy dews. Foul odors at night. Diarrheal diseases and much dysentery developed. September—Very hot and dry. Remarkable for the absence of cloudy days Dews frequent and very heavy. Dysentery and diphtheria prevalent. October—Had wide range of temperature. Rains were equally distributed. Diphtheria prevalent and fatal. An increase of rheumatism noticed. November—Mild until the 15th, then the ground was frozen all day. Catarrhal disorders prevailed at the close of the month. Notwithstanding the exceedingly capricious weather of December and January the winter of 1884-5 was very severe, with much snow in February. There was a marked absence of high winds. The mean temperature of January, 1885, was 3.12° above the average The ground was bare of snow until the 24th. The month entered with no frost in the ground. No sickness developed until after the flooding of cellars, from the 16th to the 26th. February was continuously cold, one day only (28th) having a mean above 32°. The severe cold checked the usual flow of water in cellars. There were 24 inches of snow on the ground at the end of the month. Children, particularly, suffered from tonsilitis, with constriction of bladder; whooping-cough, complicated with pneumonia, and an epidemic of mumps. One death from peritonitis. Rheumatism prevailed. A slight epidemic of sore eyes followed a season of cold, west winds March was the coldest on record. The long continuance of winter into the spring month was enfeebling to many constitutions. Water-supply low. Pleurisy somewhat. Whooping-cough and mumps lingered. Spring, 1885—Mean temperature 3.21° lower than in 1884. Rain-fall was deficient. April, May and June had average warmth. June had low humidity. A sporadic case of measles occurred in the latter part of June. Otherwise the community was remarkably free of sickness.



### STATION, PATERSON, N. J.

Latitude, 40° 55′ N.; Longitude, 74° 11′ W. Height of Rain Gauge above Sea Level, 142 feet.

OBSERVER, WILLIAM FERGASON, CITY SURVEYOR.

| | BAROMETER. Reduced to 32°. | | | THERMOMETER. | | | Mean Humidity. | Prevailing Wind. | Rain (inches).* | Snow (days of). | Days when Precipitation equaled 0.01. | Cloudy Days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | ..... | ..... | ..... | 90 | 60 | 70 | ..... | S.W. | 6.46 | ..... | 11 | ..... |
| August | ..... | ..... | ..... | 93 | 60 | 70 | ..... | S. S.W. | 6.42 | ..... | 10 | ..... |
| September | ..... | ..... | ..... | ..... | 49 | 68 | ..... | S. & S.W. | .58 | ..... | 2 | ..... |
| October | ..... | ..... | ..... | 84 | 32 | 51 | ..... | N.W. & W. | 3.29 | ..... | 12 | ..... |
| November | ..... | ..... | ..... | 67 | 28 | 40 | ..... | N.W. & N. | 2.76 | ..... | 7 | ..... |
| December | ..... | ..... | ..... | 56 | -2 | 31 | ..... | N. E. & N. | 5.95 | ..... | 8 | ..... |
| 1885. | | | | | | | | | | | | |
| January | ..... | ..... | ..... | 60 | 4 | 30 | ..... | S.W. | 3.47 | 3 | 9 | ..... |
| February | ..... | ..... | ..... | 41 | -4 | 23 | ..... | N.E. & N.W. | 4.09 | 4 | 8 | ..... |
| March | ..... | ..... | ..... | 58 | 8 | 31 | ..... | S.W. | .55 | 1 | 4 | ..... |
| April | ..... | ..... | ..... | 85 | 29 | 47 | ..... | S.W. & N. | 1.64 | ..... | 8 | ..... |
| May | ..... | ..... | ..... | 87 | 32 | 60 | ..... | S.E. & N. | 2.27 | ..... | 8 | ..... |
| June | ..... | ..... | ..... | 88 | 54 | 67 | ..... | S.W. | 1.39 | ..... | 8 | ..... |
| For the year | ..... | ..... | ..... | ..... | ..... | 49 | ..... | ..... | 38.88 | 14 | 93 | ..... |

* Including melted snow.

REMARKS—Earthquake shock at 2:05 P. M., August 10th, 1884.

### STATION, NEWARK, N. J.

Latitude, 40° 44′ N.; Longitude, 74° 10′ W. Height of Barometer Cistern above Sea Level, 35 feet.

OBSERVER, F. W. RICORD.

| | BAROMETER. Reduced to 32°. | | | THERMOMETER. | | | Mean Humidity. | Prevailing Wind. | Rain (inches).* | Snow (days of). | Days when Precipitation equaled 0.01. | Cloudy Days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | 30.100 | 29.750 | 29 911 | 89.50 | 58.00 | 72.015 | ..... | N.W. | 5.280 | ..... | 11 | 18 |
| August | 30.375 | 29.800 | 30.088 | 91.00 | 57.00 | 71.887 | ..... | S.W. | 5.390 | ..... | 13 | 18 |
| September | 30.510 | 29.750 | 30.148 | 90.00 | 46.00 | 66.868 | ..... | N.W. | .200 | ..... | 2 | 5 |
| October | 30.510 | 29.800 | 30.164 | 82.25 | 30.00 | 54.690 | ..... | N.W. | 3.520 | ..... | 9 | 10 |
| November | 30.325 | 29.350 | 29.964 | 61.40 | 21.00 | 42.518 | ..... | N.W. | 2.920 | ..... | 6 | 6 |
| December | 30.480 | 29 515 | 30.063 | 59.50 | 2.00 | 34.545 | ..... | N.W. | 5.905 | ..... | 9 | 18 |
| 1885. | | | | | | | | | | | | |
| January | 30 800 | 29.380 | 30.072 | 62.00 | 5.00 | 31.653 | ..... | N.W. | 3.335 | 2 | 6 | 12 |
| February | 30 490 | 29.150 | 30 052 | 48 10 | 1.00 | 24.340 | ..... | N.W. | 5.850 | 6 | 6 | 7 |
| March | 30.540 | 29.600 | 30.476 | 60.00 | 7.30 | 30.855 | ..... | N.W. | 1.430 | 3 | 6 | 6 |
| April | 30.570 | 29.450 | 30.384 | 86.00 | 28.00 | 50.560 | ..... | N.E. | 2.020 | 1 | 7 | 8 |
| May | 30 260 | 29 650 | 29 815 | 88 00 | 42 00 | 59.580 | ..... | N.E. | 2.020 | ..... | 7 | 17 |
| June | 30.280 | 29.630 | 29.996 | 93.10 | 54.00 | 71.810 | ..... | W. | 1.390 | ..... | 5 | 3 |
| For the year | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* Including melted snow.

## STATION, NEW BRUNSWICK, N. J.

Latitude, 40° 29′ N.; Longitude, 74° 26′ W., or 2° 37′ E. Height, 115 feet.

OBSERVER, P. VANDERBILT SPADER.

| | BAROMETER. Reduced to 32°. | | | THERMOMETER. | | | Mean Humidity. | Prevailing Wind. | Rain (inches)*. | Snow (days of). | Days when precipitation equaled 0.01. | Cloudy days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | | | | | | | | | 4.80 | | 13 | |
| August | | | | | | | | | 5.03 | | 11 | |
| September | | | | | | | | | 0.37 | | 3 | |
| October | | | | | | | | | 3.16 | | 12 | |
| November | | | | | | | | | 3.60 | | 11 | |
| December | | | | | | | | | 5.63 | | 14 | |
| 1885. | | | | | | | | | | | | |
| January | | | | | | | | | 3.72 | | 11 | |
| February | | | | | | | | | 4.93 | | 14 | |
| March | | | | | | | | | 1.08 | | 7 | |
| April | | | | | | | | | 2.14 | | 14 | |
| May | | | | | | | | | 2.01 | | 11 | |
| June | | | | | | | | | 1.67 | | 7 | |
| For the year. | | | | | | | | | 38.14 | | 128 | |

* Including melted snow.

## STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° 0′ W. Height of Barometer Cistern above Sea Level, 28 feet.

OBSERVER, U. S. SIGNAL SERVICE.

| | BAROMETER.† Reduced to 32°. | | | THERMOMETER. | | | Mean humidity. | Prevailing wind. | Precipitation (inches).* | (Snow days of). | Days when precipitation equaled 0.01. | Cloudy days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | 29.998 | 29.563 | 29.839 | 89.9 | 59.7 | 71.0 | 73.0 | N.W. | 6.42 | | 15 | 7 |
| August | 30.329 | 29.685 | 30.032 | 91 3 | 59.0 | 71.7 | 79.0 | S. | 5.12 | | 9 | 9 |
| September | 30.475 | 29.726 | 30.085 | 94.1 | 51.7 | 70.4 | 72.6 | S.W. | 0.03 | | 2 | 3 |
| October | 30.570 | 29.707 | 30.120 | 81.1 | 35.1 | 57.2 | 69.9 | N.W. | 4.21 | | 13 | 7 |
| November | 30.452 | 29.464 | 30.060 | 62.4 | 22.1 | 44.5 | 71.9 | W. | 3.57 | | 10 | 6 |
| December | 30.671 | 29.535 | 30.147 | 61.3 | 0.8 | 36.1 | 79.0 | N. & E. | 5.64 | | 15 | 13 |
| 1885. | | | | | | | | | | | | |
| January | 30.828 | 29.317 | 30.090 | 63.4 | 6.6 | 31.0 | 76.1 | W. | 4.58 | | 13 | 6 |
| February | 30 485 | 29.075 | 29.962 | 53.2 | 1.5 | 25.2 | 74.6 | N.W. | 4.54 | | 15 | 9 |
| March | 30.486 | 29.551 | 30.028 | 56.8 | 7.4 | 30.5 | 70.2 | N.W. | 0.67 | | 7 | 7 |
| April | 30.578 | 29.470 | 30.011 | 80.5 | 28.0 | 47.2 | 68.7 | N.W. | 2.47 | | 12 | 6 |
| May | 30.256 | 29.586 | 29.959 | 83.1 | 41.1 | 54.6 | 76.8 | E. | 2.67 | | 18 | 7 |
| June | 30.282 | 29.409 | 29.981 | 90.4 | 53.3 | 67.1 | 67.8 | S.E. | 1.41 | | 5 | 8 |
| For the year. | | | | | | | | | | | | |

* Including rain, melted snow, sleet, hail, dew, fog and frost.
† Corrected for temperature and instrumental error only.



## STATION, VINELAND, N. J.

Latitude, 39° 29′; Longitude, 75° 1′ W. Height of Barometer Cistern above Sea Level, 110 feet.

OBSERVER, O. H. ADAMS, M.D.

| | BAROMETER. Reduced to 32°. | | | THERMOMETER. | | | Mean Humidity. | Prevailing Wind. | Rain (inches).* | Snow (days of). | Days when Precipitation equaled 0.01. | Cloudy Days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | 29.955 | 29.533 | 29.774 | 95 | 59 | 75.29 | 72.21 | S.W., N.W | 3 860 | | 8 | 9 |
| August | 30.141 | 29.639 | 29.925 | 91 | 56 | 72.87 | 80.43 | S.W., N. E. | 2.628 | | 9 | 10 |
| September | 30.359 | 28.925 | 30.014 | 92 | 43 | 69.54 | 77.67 | S.W. | 0.471 | | 3 | 4 |
| October | 30.439 | 28.889 | 30.031 | 89 | 26 | 58.22 | 69.24 | S.W. | 0.796 | | 7 | 12 |
| November | 30.336 | 29.026 | 29.914 | 67 | 16 | 43.22 | 78.19 | S.W. | 2.812 | | 6 | 8 |
| December | 30.498 | 29.493 | 30.096 | 64 | -4 | 37.66 | 80.12 | S.W., N. E. | 6.534 | | 11 | 16 |
| 1885. | | | | | | | | | | | | |
| January | 30.678 | 29.370 | 30.038 | 67 | 5 | 32.24 | 78.97 | S.W. | 3.670 | | 8 | 10 |
| February | 30.340 | 28.961 | 29.865 | 54 | 1 | 25.86 | 75.09 | N.W. | 3.786 | | 9 | 6 |
| March | 30.332 | 29.551 | 29.928 | 64 | 7 | 31.79 | 62.66 | N.W. | .914 | | 5 | 5 |
| April | 30.444 | 29.401 | 29 865 | 84 | 27 | 51.83 | 63.61 | N.W., N.E | 2.074 | | 6 | 7 |
| May | 30.112 | 29.531 | 29.854 | 85 | 41 | 61.97 | 73.61 | N.W., N E | 3.482 | | 6 | 8 |
| June | 30.160 | 29.486 | 29.851 | 97 | 51 | 70.03 | 69.31 | S W., N.W. | 1.312 | | 4 | 5 |
| For the year. | | | 29.929 | | | 52.54 | 73.42 | | 32 339 | | 83 | 100 |

* Including melted snow.

## STATION, BARNEGAT CITY, N. J.

Latitude, 39° 46′ N.; Longitude, 74° 6′ W. Height of Barometer Cistern above Sea Level, 22 feet.

OBSERVER, U. S. SIGNAL SERVICE.

| | BAROMETER.† Reduced to 32°. | | | THERMOMETER. | | | Mean Humidity. | Prevailing Wind. | Precipitation (inches).* | Snow (days of). | Days when precipitation equaled 0.01. | Cloudy days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | 29.985 | 29.571 | 29.843 | 88.8 | 56.1 | 70.5 | 76.2 | S.W. | 3.73 | | 12 | 7 |
| August | 30.312 | 29.716 | 30.030 | 86.3 | 60.7 | 71.1 | 85.8 | S.W. | 5.04 | | 11 | 10 |
| September | 30.445 | 29.733 | 30.088 | 85.5 | 51.7 | 69.3 | 82.9 | S.W. | 1.05 | | 4 | 3 |
| October | 30.570 | 29.733 | 30.117 | 81.1 | 32.6 | 58.3 | 81.0 | S.W. | 2.19 | | 13 | 7 |
| November | 30.457 | 29.409 | 30.054 | 65.6 | 24 6 | 46.4 | 80.9 | N.W. | 2.68 | | 7 | 6 |
| December | 30.616 | 29.601 | 30.137 | 62.1 | ‡—0.2 | 38.6 | 83.8 | N. | 7.09 | | 12 | 13 |
| 1885. | | | | | | | | | | | | |
| January | 30.802 | 29.304 | 30.092 | 58.8 | 8.6 | 33.3 | 81.1 | N.W. | 4.34 | | 12 | 6 |
| February | 30.492 | 29.088 | 29.955 | 54.2 | 4.7 | 27.0 | 80.4 | N.W. | 1.47 | | 11 | 7 |
| March | 30.477 | 29.575 | 30.029 | 54.9 | 9.4 | 32.3 | 77.7 | N.W. | 0.23 | | 7 | 5 |
| April | 30.590 | 29.444 | 30.012 | 72.0 | 28.4 | 47.5 | 76.6 | W., N.W. | 0.89 | | 10 | 4 |
| May | 30.234 | 29.520 | 29.946 | 75.2 | 39.1 | 54 6 | 85.0 | N. E. | 1.47 | | 15 | 7 |
| June | 30.286 | 29.435 | 29.987 | 89.6 | 52.9 | 66.3 | 78.7 | S. | 0.72 | | 8 | 3 |
| For the year. | | | | | | | | | | | | |

* Including rain, melted snow, sleet, hail, dew, fog and frost.
† Corrected for temperature and instrumental error only.
‡ Below zero, Fahrenheit.

STATION, CAPE MAY POINT, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ W. Height of Barometer Cistern above Sea Level, 27 feet.

OBSERVER, U. S. SIGNAL SERVICE.

| | BAROMETER.† Reduced to 32°. | | | THERMOMETER. | | | Mean Humidity. | Prevailing Wind. | Precipitation (inches).* | Snow. | Days when Precipitation equaled 0.01. | Cloudy Days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | | | | | | |
| 1884. | | | | | | | | | | | | |
| July | 30.012 | 29.616 | 29.846 | 89.0 | 62.0 | 72.4 | 80.9 | S. | 4.44 | ..... | 10 | 5 |
| August | 30.248 | 29.710 | 30 017 | 85.6 | 57.2 | 72.7 | 84.9 | S. | 5.30 | ..... | 7 | 9 |
| September | 30.513 | 29.728 | 30.084 | 84.0 | 47.9 | 70.9 | 79.1 | S. | 0.31 | ..... | 2 | 2 |
| October | 30.571 | 29.749 | 30.118 | 85.7 | 36.0 | 60.3 | 75.9 | S. | 1.33 | ..... | 9 | 4 |
| November | 30.432 | 29.373 | 30.054 | 69.0 | 22.0 | 48.3 | 77.6 | N.W. | 2.30 | ..... | 9 | 6 |
| December | 30.607 | 29.603 | 30.139 | 59.0 | 4.6 | 40.0 | 79.3 | N. | 6.87 | ..... | 10 | 16 |
| 1885. | | | | | | | | | | | | |
| January | 30.789 | 29.374 | 30.097 | 56.8 | 13.1 | 36.4 | 78.5 | N.W. | 4.98 | ..... | 12 | 4 |
| February | 30.454 | 29.2 6 | 29.950 | 53.0 | 4.5 | 29.6 | 77.8 | N.W. | 3.71 | ..... | 11 | 6 |
| March | 30.419 | 29.595 | 30.025 | 52.3 | 10.8 | 34.3 | 79.7 | N.W. | 2.29 | ..... | 14 | 8 |
| April | 30.540 | 29.441 | 30.007 | 82 5 | 31.0 | 48.9 | 79.3 | S. | 1.87 | ..... | 8 | 4 |
| May | 30.167 | 29.508 | 29.916 | 76.8 | 43.1 | 57.4 | 83.9 | E. | 5.20 | ..... | 14 | 7 |
| June | 30.239 | 29.461 | 29.983 | 85.2 | 50 2 | 67.6 | 80.1 | S., S.E. | 2.23 | ..... | 7 | 3 |
| For the year | | | | | | | | | | | | |

*Including rain, melted snow, sleet, hail, dew, fog and frost.

†Corrected for temperature and instrumental error only.

As by law this report is required to be in the hands of the Governor by December 1st, we have not considered it practicable to obtain climatological reports up to the date of January 1st, but follow the divisions of our statistical year.

# NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

## FOR THE YEAR ENDING JUNE 30, 1885.

### ATLANTIC COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Absecon | 3 | 15 | 12 |
| Atlantic City | 95 | 172 | 187 |
| Buena Vista | ..... | 22 | 12 |
| Egg Harbor City | 31 | 42 | 24 |
| Egg Harbor Township | 38 | 102 | 62 |
| Galloway | 13 | 46 | 43 |
| Hamilton | 9 | 35 | 35 |
| Hammonton | 12 | 63 | 45 |
| Mullica | 1 | 10 | 13 |
| Weymouth | 1 | 8 | 2 |
| | 203 | 515 | 435 |

### BERGEN COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Englewood | 31 | 59 | 76 |
| Franklin | 16 | 33 | 25 |
| Harrington | 15 | 20 | 35 |
| Hohokus | 16 | 42 | 43 |
| Lodi | 20 | 90 | 72 |
| Midland | 4 | 24 | 23 |
| New Barbadoes | 50 | 121 | 87 |
| Palisade | 7 | 38 | 24 |
| Ridgefield | 12 | 75 | 45 |
| Ridgewood | 11 | 32 | 41 |
| Saddle River | 4 | 23 | 20 |
| Union | 11 | 104 | 65 |
| Washington | 20 | 68 | 46 |
| | 217 | 729 | 602 |

## BURLINGTON COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Bass River | 4 | 26 | 20 |
| Beverly | 23 | 8 | 29 |
| Bordentown | 52 | 110 | 93 |
| Burlington | 70 | 132 | 188 |
| Chester | 28 | 65 | 51 |
| Chesterfield | 5 | 22 | 15 |
| Cinnaminson | 18 | 63 | 34 |
| Delran | 11 | 23 | 39 |
| Eastampton | ..... | 12 | 4 |
| Evesham | 8 | 26 | 20 |
| Florence | 1 | 59 | 22 |
| Little Egg Harbor | 12 | 58 | 30 |
| Lumberton | ..... | 6 | 6 |
| Mansfield | 10 | 42 | 30 |
| Medford | 12 | 19 | 39 |
| Mt. Laurel | ..... | 33 | 15 |
| New Hanover | 10 | 42 | 22 |
| Northampton | 54 | 96 | 112 |
| Pemberton | 25 | 49 | 45 |
| Randolph | ..... | 13 | 6 |
| Shamong | 3 | 8 | 16 |
| Southampton | 9 | 48 | 29 |
| Springfield | 1 | 27 | 28 |
| Washington | 2 | 12 | 3 |
| Westampton | ..... | 10 | 8 |
| Willingboro | ..... | 14 | 5 |
| Woodland | ..... | ..... | 3 |
| | 358 | 1,023 | 912 |

## CAMDEN COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Camden City | 532 | 860 | 968 |
| Centre | 2 | 52 | 27 |
| Delaware | ..... | 25 | 18 |
| Gloucester City | 30 | 129 | 92 |
| Gloucester | 11 | 54 | 64 |
| Haddon | 30 | 68 | 53 |
| Stockton | 12 | 64 | 94 |
| Waterford | 8 | 56 | 29 |
| Winslow | 9 | 54 | 25 |
| | 634 | 1,362 | 1,370 |

## CAPE MAY COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Cape May City | 13 | 42 | 24 |
| Dennis | 10 | 51 | 36 |
| Lower | 14 | 50 | 35 |
| Middle | 16 | 55 | 35 |
| Upper | 19 | 47 | 31 |
| | 72 | 245 | 161 |



## CUMBERLAND COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Bridgeton | 111 | 258 | 179 |
| Commercial | 15 | 22 | 31 |
| Deerfield | 11 | 21 | 16 |
| Downe | 12 | 10 | 19 |
| Fairfield | 16 | 78 | 41 |
| Greenwich | 9 | 27 | 28 |
| Hopewell | 10 | 27 | 31 |
| Landis | 64 | 154 | 127 |
| Lawrence | 5 | 18 | 12 |
| Maurice River | 25 | 47 | 41 |
| Millville | 70 | 255 | 149 |
| Stoe Creek | 7 | 17 | 11 |
| | 355 | 934 | 685 |

## ESSEX COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Belleville | 34 | 49 | 55 |
| Bloomfield | 33 | 136 | 98 |
| Caldwell | 18 | 37 | 50 |
| Clinton | 7 | 38 | 37 |
| East Orange | 34 | 180 | 141 |
| Franklin | 7 | 25 | 11 |
| Livingston | 7 | 11 | 24 |
| Milburn | 10 | 36 | 47 |
| Montclair | 16 | 144 | 70 |
| Newark | 1,274 | 3,494 | 3,729 |
| Orange | 132 | 449 | 300 |
| South Orange | 28 | 82 | 45 |
| West Orange | 11 | 60 | 55 |
| | 1,611 | 4,741 | 4,662 |

## GLOUCESTER COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Clayton | 15 | 42 | 42 |
| Deptford | 4 | 36 | 26 |
| East Greenwich | 9 | 24 | 24 |
| Franklin | 10 | 46 | 54 |
| Glassboro | 21 | 73 | 39 |
| Greenwich | 5 | 52 | 43 |
| Harrison | 6 | 32 | 32 |
| Logan | 12 | 38 | 24 |
| Mantua | 8 | 40 | 22 |
| Monroe | 14 | 34 | 37 |
| South Harrison | 14 | 11 | 5 |
| Washington | 8 | 29 | 17 |
| West Deptford | 2 | 23 | 13 |
| Woodbury | 36 | 70 | 51 |
| Woolwich | 22 | 43 | 32 |
| | 186 | 593 | 461 |

## HUDSON COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Bayonne | 59 | 196 | 243 |
| Guttenberg | 7 | 28 | 33 |
| Harrison | 14 | 168 | 159 |
| Hoboken | 315 | 816 | 843 |
| Jersey City | 877 | 1,661 | 3,442 |
| Kearny | 2 | 30 | 46 |
| North Bergen | 12 | 86 | 225 |
| Town of Union | 101 | 216 | 217 |
| Union | 4 | 35 | 37 |
| Weehawken | 2 | 32 | 36 |
| West Hoboken | 64 | 191 | 128 |
| | 1,457 | 3,459 | 5,409 |

## HUNTERDON COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Alexandria | 2 | 23 | 18 |
| Bethlehem | 17 | 44 | 33 |
| Clinton | 31 | 63 | 43 |
| Delaware | 26 | 59 | 43 |
| East Amwell | 17 | 35 | 14 |
| Franklin | 11 | 19 | 17 |
| Frenchtown | 8 | 13 | 11 |
| High Bridge | 10 | 25 | 29 |
| Holland | 15 | 29 | 19 |
| Kingwood | 3 | 21 | 20 |
| Lambertville | 45 | 101 | 67 |
| Lebanon | 26 | 43 | 44 |
| Raritan | 21 | 34 | 19 |
| Readington | 29 | 57 | 35 |
| Tewksbury | 13 | 36 | 35 |
| Union | 9 | 8 | 7 |
| West Amwell | 1 | 24 | 12 |
| | 284 | 634 | 466 |

## MERCER COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Chambersburg | 45 | 111 | 140 |
| East Windsor | 14 | 51 | 35 |
| Ewing | 2 | 6 | 81 |
| Hamilton | 14 | 36 | 37 |
| Hopewell | 31 | 65 | 54 |
| Lawrence | 5 | 15 | 25 |
| Millham | 3 | 52 | 29 |
| Princeton | 27 | 70 | 116 |
| Trenton | 380 | 489 | 601 |
| Washington | 1 | 25 | 26 |
| West Windsor | 6 | 26 | 19 |
| | 528 | 946 | 1,163 |



## MIDDLESEX COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Cranbury | 22 | 38 | 35 |
| East Brunswick | 24 | 60 | 52 |
| Madison | 3 | 11 | 13 |
| Monroe | 18 | 24 | 31 |
| New Brunswick | 149 | 430 | 336 |
| North Brunswick | 7 | 17 | 26 |
| Perth Amboy | 41 | 195 | 166 |
| Piscataway | 22 | 53 | 40 |
| Raritan | 20 | 55 | 47 |
| Sayreville | 14 | 21 | 20 |
| South Amboy | 17 | 102 | 69 |
| South Brunswick | 9 | 37 | 47 |
| Woodbridge | 11 | 87 | 64 |
| | 357 | 1,130 | 946 |

## MONMOUTH COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Atlantic | 7 | 22 | 24 |
| Eatontown | 35 | 31 | 39 |
| Freehold | 27 | 67 | 100 |
| Holmdel | 11 | 24 | 27 |
| Howell | 28 | 67 | 38 |
| Manalapan | 17 | 37 | 33 |
| Marlboro | 3 | 29 | 29 |
| Matawan | 18 | 47 | 47 |
| Middletown | 42 | 94 | 100 |
| Millstone | 11 | 22 | 22 |
| Neptune | 54 | 104 | 122 |
| Ocean | 67 | 242 | 126 |
| Raritan | 37 | 89 | 94 |
| Shrewsbury | 63 | 138 | 132 |
| Upper Freehold | 35 | 73 | 51 |
| Wall | 45 | 129 | 81 |
| | 500 | 1,215 | 1,065 |

## MORRIS COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Boonton | 15 | 63 | 53 |
| Chatham | 21 | 68 | 71 |
| Chester | 11 | 60 | 38 |
| Hanover | 20 | 55 | 110 |
| Jefferson | 2 | 26 | 21 |
| Mendham | 14 | 25 | 22 |
| Montville | 2 | 11 | 14 |
| Morristown | 59 | 145 | 128 |
| Mount Olive | 9 | 33 | 31 |
| Passaic | 11 | 19 | 20 |
| Pequannock | 10 | 67 | 45 |
| Randolph | 56 | 168 | 107 |
| Rockaway | 17 | 66 | 98 |
| Roxbury | 13 | 30 | 27 |
| Washington | 20 | 58 | 23 |
| | 280 | 894 | 808 |

## OCEAN COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Berkeley | 1 | 24 | 20 |
| Brick | 15 | 71 | 71 |
| Dover | 21 | 45 | 41 |
| Eagleswood | 7 | 10 | 17 |
| Jackson | 6 | 36 | 20 |
| Lacey | 7 | 12 | 19 |
| Manchester | 5 | 13 | 10 |
| Ocean | ..... | 5 | 8 |
| Plumstead | 17 | 45 | 31 |
| Stafford | 9 | 22 | 15 |
| Union | 5 | 27 | 16 |
| | 93 | 310 | 268 |

## PASSAIC COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Acquackanonk | 3 | 27 | 30 |
| Little Falls | 13 | 30 | 33 |
| Manchester | 1 | 11 | 22 |
| Passaic | 50 | 265 | 139 |
| Paterson | 562 | 1,605 | 1,284 |
| Pompton | 37 | 50 | 38 |
| Wayne | 3 | 14 | 14 |
| West Milford | 18 | 42 | 38 |
| | 687 | 2,044 | 1,598 |

## SALEM COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Alloway | 11 | 37 | 19 |
| Elsinboro | 1 | 2 | 4 |
| Lower Alloways Creek | 6 | 12 | 18 |
| Lower Penns Neck | 8 | 10 | 23 |
| Mannington | 2 | 32 | 38 |
| Oldmans | 13 | 28 | 18 |
| Pilesgrove | 19 | 67 | 54 |
| Pittsgrove | 16 | 73 | 19 |
| Quinton | 2 | 32 | 13 |
| Salem | 63 | 122 | 106 |
| Upper Penns Neck | 8 | 33 | 25 |
| Upper Pittsgrove | 5 | 14 | 12 |
| | 154 | 462 | 349 |



## SOMERSET COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Bedminster | 9 | 23 | 24 |
| Bernards | 22 | 37 | 36 |
| Branchburg | 2 | 20 | 19 |
| Bridgewater | 68 | 141 | 143 |
| Franklin | 18 | 53 | 50 |
| Hillsborough | 25 | 40 | 41 |
| Montgomery | 10 | 38 | 35 |
| North Plainfield | 24 | 72 | 52 |
| Warren | 7 | 18 | 18 |
| | 185 | 442 | 418 |

## SUSSEX COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Andover | 6 | 15 | 15 |
| Byram | 16 | 17 | 28 |
| Frankford | 15 | 14 | 24 |
| Green | 8 | 10 | 14 |
| Hampton | 3 | 10 | 8 |
| Hardyston | 22 | 6 | 31 |
| Lafayette | 5 | 7 | 11 |
| Montague | ..... | 8 | 7 |
| Newton | 17 | 22 | 46 |
| Sandyston | 6 | 11 | 15 |
| Sparta | 8 | 20 | 35 |
| Stillwater | 12 | 21 | 19 |
| Vernon | 11 | 18 | 23 |
| Walpack | 10 | 10 | 6 |
| Wantage | 20 | 38 | 42 |
| | 159 | 227 | 324 |

## UNION COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Clark | ..... | 3 | 3 |
| Cranford | 2 | 2 | 22 |
| Elizabeth | 259 | 913 | 697 |
| Fanwood | 6 | 23 | 19 |
| Linden | 4 | 32 | 28 |
| New Providence | 6 | 8 | 14 |
| Plainfield | 51 | 174 | 141 |
| Rahway | 46 | 74 | 107 |
| Springfield | 8 | 27 | 17 |
| Summit | 13 | 41 | 27 |
| Union | 3 | 40 | 55 |
| Westfield | 13 | 40 | 35 |
| | 411 | 1,377 | 1,165 |

## WARREN COUNTY.

| | M. | B. | D. |
|---|---|---|---|
| Allamuchy | ..... | 4 | 4 |
| Belvidere | 12 | 39 | 24 |
| Blairstown | 7 | 23 | 15 |
| Franklin | 9 | 24 | 21 |
| Frelinghuysen | 6 | 17 | 20 |
| Greenwich | 10 | 24 | 18 |
| Hackettstown | 31 | 48 | 40 |
| Hardwick | ..... | 6 | 5 |
| Harmony | 7 | 23 | 17 |
| Hope | 12 | 48 | 28 |
| Independence | 9 | 12 | 12 |
| Knowlton | 6 | 24 | 27 |
| Lopatcong | 6 | 46 | 21 |
| Mansfield | 14 | 10 | 22 |
| Oxford | 22 | 112 | 59 |
| Pahaquarry | 1 | 5 | 1 |
| Phillipsburg | 65 | 284 | 148 |
| Pohatcong | 3 | 28 | 16 |
| Washington | 38 | 68 | 42 |
| | 258 | 795 | 540 |

## TOTALS OF MARRIAGES, BIRTHS AND DEATHS FOR ALL THE COUNTIES.

| | M. | B. | D. |
|---|---|---|---|
| Atlantic | 203 | 515 | 435 |
| Bergen | 217 | 729 | 602 |
| Burlington | 358 | 1,023 | 912 |
| Camden | 634 | 1,362 | 1,370 |
| Cape May | 72 | 245 | 161 |
| Cumberland | 355 | 934 | 685 |
| Essex | 1,611 | 4,741 | 4,662 |
| Gloucester | 186 | 593 | 461 |
| Hudson | 1,457 | 3,459 | 5,409 |
| Hunterdon | 284 | 634 | 466 |
| Mercer | 528 | 946 | 1,163 |
| Middlesex | 357 | 1,130 | 946 |
| Monmouth | 500 | 1,215 | 1,065 |
| Morris | 280 | 891 | 808 |
| Ocean | 93 | 310 | 268 |
| Passaic | 687 | 2,044 | 1,598 |
| Salem | 154 | 462 | 349 |
| Somerset | 185 | 442 | 418 |
| Sussex | 159 | 227 | 324 |
| Union | 411 | 1,377 | 1,165 |
| Warren | 258 | 795 | 540 |
| | 8,989 | 24,077 | 23,807 |

# CONDENSED TABLES OF POPULATION

## ARRANGED FOR VITAL STATISTIC COMPARISONS.

### CENSUS OF 1885.

## *Abstract of Census Returns for the State of New Jersey—Semi-Decennial Census—1885.*

| Census by Counties. | Total population. | Dwelling houses. | Families. | Native born. White Males. | Native born. White Females. | Native born. Colored Males. | Native born. Colored Females. | Foreign born. Males, Irish. | Foreign born. Females, Irish. | Foreign born. Males, German. | Foreign born. Females, German. | Foreign born. Males, all other Nationalities. | Foreign born. Females, all other Nationalities. | Age of males by classes. Five years of age and under. | Age of males by classes. Five to twenty. | Age of males by classes. Twenty to sixty. | Age of males by classes. Over sixty. | Age of females by classes. Five years of age and under. | Age of females by classes. Five to twenty. | Age of females by classes. Twenty to sixty. | Age of females by classes. Over sixty. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic | 22356 | 4844 | 4887 | 9321 | 9131 | 698 | 627 | 117 | 199 | 732 | 651 | 520 | 360 | 1227 | 3388 | 5924 | 824 | 1160 | 3378 | 5678 | 777 |
| Bergen | 39880 | 7360 | 8285 | 14602 | 15273 | 909 | 984 | 915 | 1353 | 1895 | 1441 | 1376 | 1132 | 2224 | 5797 | 9333 | 2067 | 3134 | 6845 | 9027 | 1453 |
| Burlington | 57558 | 11579 | 12100 | 25162 | 26026 | 1287 | 1366 | 907 | 1126 | 609 | 440 | 386 | 249 | 3124 | 8708 | 14073 | 2446 | 3036 | 8837 | 14545 | 2789 |
| Camden | 76685 | 15114 | 15547 | 30500 | 31635 | 3583 | 3931 | 1275 | 1570 | 1288 | 1051 | 1071 | 828 | 4243 | 12016 | 19513 | 1842 | 4098 | 12507 | 20093 | 2373 |
| Cape May | 10744 | 2186 | 2348 | 4993 | 4863 | 285 | 306 | 56 | 71 | 39 | 20 | 74 | 37 | 576 | 1617 | 2722 | 508 | 580 | 1697 | 2564 | 480 |
| Cumberland | 41982 | 8816 | 9431 | 19005 | 18767 | 1050 | 1009 | 174 | 207 | 383 | 299 | 599 | 489 | 2501 | 6935 | 10132 | 1653 | 2410 | 6463 | 1·276 | 1612 |
| Essex | 213764 | 29271 | 46010 | 73188 | 78355 | 2220 | 2741 | 8075 | 1160 | 13874 | 12712 | 5832 | 5167 | 13148 | 32722 | 51998 | 5012 | 13182 | 33938 | 57699 | 6065 |
| Gloucester | 27603 | 5741 | 6013 | 12669 | 12140 | 609 | 561 | 259 | 292 | 494 | 285 | 192 | 102 | 1559 | 4604 | 6966 | 1075 | 1546 | 4189 | 6580 | 1084 |
| Hudson | 240342 | 25768 | 48135 | 79782 | 78079 | 910 | 1086 | 15773 | 16889 | 15971 | 15012 | 9263 | 7577 | 17443 | 39712 | 61241 | 4157 | 16339 | 40322 | 56343 | 4795 |
| Hunterdon | 37420 | 7959 | 8571 | 17239 | 18083 | 218 | 209 | 503 | 506 | 242 | 140 | 179 | 101 | 1963 | 5791 | 8725 | 1880 | 1996 | 6092 | 9072 | 1898 |
| Mercer | 66785 | 12656 | 13501 | 26082 | 27717 | 1627 | 1577 | 2060 | 2133 | 1828 | 1471 | 2464 | 1826 | 3777 | 10231 | 18020 | 1868 | 3635 | 9977 | 17104 | 2173 |
| Middlesex | 56180 | 9379 | 11412 | 21673 | 22084 | 822 | 807 | 2252 | 2329 | 2099 | 1362 | 1652 | 1100 | 3237 | 9071 | 14411 | 1776 | 3401 | 8609 | 13708 | 1967 |
| Monmouth | 62324 | 12521 | 13457 | 26656 | 27335 | 1852 | 1833 | 1232 | 1455 | 736 | 447 | 446 | 332 | 3633 | 9792 | 14977 | 2349 | 3654 | 10139 | 15285 | 2495 |
| Morris | 50675 | 8897 | 10122 | 20801 | 21371 | 386 | 440 | 1649 | 2169 | 629 | 449 | 1474 | 1307 | 3138 | 8027 | 11810 | 1975 | 3022 | 8130 | 12510 | 2053 |
| Ocean | 15586 | 3284 | 3405 | 7674 | 7307 | 75 | 48 | 78 | 103 | 69 | 51 | 104 | 77 | 897 | 2668 | 3789 | 631 | 842 | 2532 | 3632 | 595 |
| Passaic | 83374 | 11863 | 17013 | 26559 | 27844 | 515 | 527 | 3716 | 4711 | 2731 | 2413 | 7445 | 6913 | 5181 | 13709 | 20346 | 1720 | 4998 | 13814 | 21432 | 2174 |
| Salem | 25873 | 5323 | 5599 | 10745 | 10579 | 1499 | 1388 | 180 | 196 | 252 | 159 | 208 | 172 | 1392 | 4216 | 6225 | 1018 | 1469 | 3951 | 6013 | 1059 |
| Somerset | 27425 | 5250 | 5753 | 11032 | 11407 | 793 | 767 | 582 | 704 | 758 | 535 | 520 | 327 | 1373 | 4545 | 6526 | 1256 | 1294 | 4231 | 6915 | 1285 |
| Sussex | 22401 | 4291 | 4752 | 10796 | 10680 | 63 | 60 | 187 | 208 | 85 | 53 | 171 | 98 | 1243 | 3557 | 5403 | 1059 | 1163 | 3363 | 5547 | 1066 |
| Union | 61839 | 10316 | 12659 | 21981 | 23777 | 800 | 1006 | 2536 | 3655 | 2935 | 2390 | 1479 | 1280 | 3718 | 9207 | 15253 | 1543 | 3601 | 9730 | 16873 | 1914 |
| Warren | 37737 | 7896 | 8294 | 17431 | 17502 | 187 | 180 | 582 | 556 | 448 | 317 | 299 | 235 | 2232 | 6140 | 9145 | 1423 | 2331 | 5955 | 9125 | 1386 |
| Total in State | 1278033 | 210267 | 267294 | 487891 | 497955 | 20388 | 21453 | 43108 | 52032 | 48047 | 41698 | 35752 | 29709 | 77819 | 202486 | 316582 | 38082 | 76901 | 204699 | 320021 | 41493 |

Total increase of population in five years, 146,916. Total increase in cities of over 5,000 inhabitants, 113,027. Total foreign population, 250,346. Total increase thereof in five years, 28,646.



## *Abstract of Census Returns for the Cities of New Jersey of Over 5,000 Population—1885.*

| Census of Cities. | Dwelling houses. | Families. | Native born. White Males. | Native born. White Females. | Native born. Colored Males. | Native born. Colored Females. | Foreign born. Males, Irish. | Foreign born. Females, Irish. | Foreign born. Males, German. | Foreign born. Females, German. | Foreign born. Males, all other Nationalities. | Foreign born. Females, all other Nationalities. | Age of males by classes. Five years of age and under. | Age of males by classes. Five to twenty. | Age of males by classes. Twenty to sixty. | Age of males by classes. Over sixty. | Age of females by classes. Five years of age and under. | Age of females by classes. Five to twenty. | Age of females by classes. Twenty to sixty. | Age of females by classes. Over sixty. | Total number of Inhabitants. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic City | 1725 | 1753 | 2949 | 3090 | 632 | 588 | 80 | 158 | 150 | 125 | 94 | 76 | 431 | 1011 | 2299 | 152 | 421 | 1085 | 2365 | 178 | 7942 |
| Bordentown | 1211 | 1212 | 2384 | 2701 | 127 | 139 | 185 | 228 | 48 | 36 | 8 | 1 | 276 | 917 | 1326 | 233 | 277 | 962 | 1534 | 332 | 5857 |
| Burlington | 1583 | 1613 | 3159 | 3393 | 295 | 325 | 141 | 204 | 38 | 15 | 73 | 47 | 408 | 1098 | 1925 | 276 | 382 | 1103 | 2092 | 406 | 7690 |
| Camden | 10524 | 10852 | 20895 | 22229 | 2326 | 2752 | 791 | 983 | 889 | 796 | 697 | 526 | 2799 | 8235 | 13480 | 1049 | 2666 | 8911 | 14202 | 1542 | 52884 |
| Gloucester City | 1137 | 1147 | 2461 | 2518 | ..... | 2 | 267 | 365 | 41 | 42 | 143 | 127 | 367 | 978 | 1462 | 98 | 366 | 950 | 1614 | 131 | 5966 |
| Bridgeton | 2093 | 2273 | 4456 | 4639 | 268 | 283 | 19 | 38 | 128 | 112 | 74 | 53 | 560 | 1550 | 2517 | 310 | 553 | 1517 | 2684 | 374 | 10065 |
| Millville | 1804 | 1866 | 4233 | 4001 | 64 | 69 | 63 | 72 | 103 | 71 | 86 | 62 | 572 | 1623 | 2141 | 214 | 568 | 1393 | 2094 | 219 | 8824 |
| Newark | 19467 | 34496 | 51056 | 54537 | 1474 | 1791 | 5538 | 7879 | 12096 | 11179 | 4267 | 3761 | 9828 | 23426 | 37557 | 3313 | 9782 | 24217 | 40672 | 4163 | 152988 |
| Orange | 2177 | 2904 | 5105 | 5558 | 259 | 303 | 1002 | 1337 | 521 | 422 | 404 | 325 | 947 | 2376 | 3710 | 255 | 939 | 2560 | 4119 | 3 5 | 15231 |
| Bayonne | 1779 | 2413 | 4953 | 4716 | 29 | 48 | 805 | 794 | 396 | 307 | 631 | 401 | 1151 | 1875 | 3667 | 161 | 1077 | 1912 | 3079 | 158 | 130·0 |
| Harrison | 1003 | 1335 | 2046 | 2204 | 5 | 6 | 536 | 657 | 244 | 249 | 450 | 409 | 523 | 1098 | 1508 | 94 | 549 | 1191 | 1741 | 102 | 6·06 |
| Hoboken | 2601 | 7928 | 11428 | 11825 | 55 | 52 | 1949 | 1959 | 3960 | 4351 | 1475 | 1167 | 2566 | 7226 | 9966 | 355 | 2388 | 6235 | 8437 | 518 | 37721 |
| Jersey City | 16114 | 30707 | 52543 | 51238 | 771 | 937 | 11209 | 12223 | 7960 | 7144 | 5160 | 4328 | 11198 | 24517 | 38567 | 2906 | 10374 | 26364 | 36269 | 3318 | 153513 |
| Town of Union | 1225 | 1683 | 2381 | 2416 | 9 | 9 | 196 | 161 | 1413 | 1317 | 268 | 225 | 687 | 1284 | 2096 | 157 | 594 | 1349 | 2029 | 202 | 8398 |
| Chambersburg | 1715 | 1775 | 3065 | 2995 | 20 | 27 | 177 | 200 | 442 | 431 | 666 | 519 | 608 | 1455 | 2158 | 126 | 583 | 1450 | 2010 | 152 | 8542 |
| Trenton | 6546 | 6893 | 13005 | 13236 | 761 | 696 | 1279 | 1291 | 1025 | 811 | 1318 | 964 | 1842 | 4794 | 9895 | 753 | 1835 | 5010 | 9315 | 942 | 34386 |
| New Brunswick | 2732 | 3682 | 7173 | 7735 | 326 | 427 | 598 | 891 | 440 | 379 | 157 | 132 | 1029 | 2793 | 4384 | 485 | 1101 | 2889 | 4911 | 666 | 18258 |
| Perth Amboy | 921 | 1326 | 2052 | 2116 | 25 | 23 | 307 | 293 | 167 | 129 | 652 | 547 | 439 | 895 | 1740 | 129 | 408 | 963 | 1574 | 163 | 6311 |
| Long Branch | 1015 | 1154 | 2050 | 2182 | 159 | 143 | 109 | 153 | 133 | 87 | 64 | 60 | 330 | 708 | 1330 | 146 | 316 | 790 | 1377 | 143 | 5140 |
| Morristown | 1308 | 1600 | 3146 | 3729 | 187 | 233 | 365 | 698 | 80 | 86 | 115 | 121 | 445 | 1104 | 2053 | 236 | 542 | 1382 | 2653 | 345 | 8760 |
| Passaic | 1087 | 1621 | 2607 | 2708 | 55 | 58 | 422 | 479 | 219 | 197 | 824 | 736 | 601 | 1298 | 2110 | 144 | 591 | 1338 | 2066 | 178 | 8376 |
| Paterson | 8686 | 13105 | 19087 | 20424 | 324 | 349 | 3098 | 4002 | 2172 | 1983 | 6071 | 5763 | 3810 | 10389 | 15393 | 1140 | 3629 | 10511 | 16781 | 1620 | 63273 |
| Salem | 1293 | 1291 | 2274 | 2501 | 209 | 243 | 58 | 81 | 60 | 43 | 23 | 14 | 317 | 792 | 1308 | 207 | 297 | 822 | 1475 | 298 | 5516 |
| Elizabeth | 4960 | 6404 | 10843 | 11578 | 280 | 325 | 1656 | 2154 | 2024 | 1679 | 857 | 723 | 2097 | 4990 | 7992 | 572 | 2014 | 5252 | 8444 | 758 | 32119 |
| Plainfield | 1474 | 1975 | 3361 | 3790 | 192 | 306 | 248 | 530 | 145 | 156 | 84 | 101 | 474 | 1227 | 2118 | 209 | 458 | 1287 | 2879 | 261 | 8913 |
| Rahway | 1345 | 1518 | 2632 | 2882 | 137 | 176 | 154 | 255 | 194 | 175 | 133 | 123 | 411 | 994 | 1620 | 224 | 388 | 1073 | 1835 | 316 | 6861 |
| Phillipsburg | 1690 | 1712 | 3524 | 3585 | 14 | 21 | 236 | 229 | 192 | 136 | 62 | 59 | 563 | 1382 | 1903 | 178 | 576 | 1371 | 1885 | 200 | 8058 |
| Total | 99215 | 146288 | 244868 | 254021 | 9003 | 10341 | 31488 | 37817 | 35206 | 32458 | 24856 | 21370 | 45279 | 110035 | 176225 | 14152 | 43674 | 113887 | 180136 | 18040 | 701428 |

*Abstract of Census Returns for the State of New Jersey, 1885, showing the Males and Females of the Native and the Foreign Population, and the respective totals by Counties; also the total Population at ages corresponding to those in the Tables of the Bureau of Vital Statistics.*

| By Counties. | Population. | Dwellings. | Families. | Native born. | | Foreign born. | | Total. | | Five years of age and under. | Five to twenty. | Twenty to sixty. | Over sixty. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Males. | Females. | Males. | Females. | Males. | Females. | | | | |
| Atlantic | 22856 | 4814 | 4887 | 10019 | 9758 | 1369 | 1210 | 11388 | 10968 | 2387 | 6766 | 11602 | 1601 |
| Bergen | 39880 | 7860 | 8285 | 15511 | 16257 | 4186 | 3926 | 19697 | 20183 | 5358 | 12612 | 18360 | 3520 |
| Burlington | 57558 | 11579 | 12100 | 26449 | 27392 | 1902 | 1815 | 28351 | 29207 | 6160 | 17545 | 28618 | 5235 |
| Camden | 76685 | 15114 | 15547 | 34083 | 35566 | 3587 | 3449 | 37670 | 39015 | 8341 | 24523 | 39606 | 4215 |
| Cape May | 10744 | 2186 | 2348 | 5278 | 5169 | 169 | 128 | 5447 | 5297 | 1156 | 3314 | 5286 | 988 |
| Cumberland | 41982 | 8816 | 9431 | 20055 | 19776 | 1156 | 995 | 21211 | 20771 | 4911 | 13398 | 20408 | 3265 |
| Essex | 213764 | 29221 | 46010 | 75108 | 81096 | 27781 | 19039 | 103189 | 100135 | 26330 | 66660 | 109697 | 11077 |
| Gloucester | 27603 | 5741 | 6013 | 13278 | 12701 | 945 | 679 | 14223 | 13380 | 3105 | 8793 | 13546 | 2159 |
| Hudson | 240342 | 25768 | 48135 | 80692 | 79165 | 41007 | 39478 | 121699 | 118643 | 33772 | 80384 | 117584 | 8952 |
| Hunterdon | 37420 | 7959 | 8571 | 17457 | 18292 | 924 | 747 | 18381 | 19039 | 3959 | 11886 | 17797 | 3778 |
| Mercer | 66785 | 12656 | 13501 | 27709 | 27294 | 6352 | 5430 | 34061 | 32724 | 7412 | 20208 | 35124 | 4041 |
| Middlesex | 56180 | 9379 | 11412 | 22495 | 22891 | 6003 | 4791 | 28198 | 27682 | 6638 | 17680 | 28119 | 3743 |
| Monmouth | 62824 | 12524 | 13457 | 28508 | 29168 | 2414 | 2284 | 30922 | 31402 | 7287 | 19931 | 30262 | 4844 |
| Morris | 50675 | 8897 | 10122 | 21187 | 21811 | 3752 | 3925 | 24939 | 25736 | 6170 | 16157 | 24320 | 4028 |
| Ocean | 15586 | 3284 | 3405 | 7749 | 7355 | 251 | 231 | 8000 | 7586 | 1739 | 5200 | 7421 | 1226 |
| Passaic | 83374 | 11863 | 17013 | 27074 | 28371 | 13892 | 14037 | 40966 | 42408 | 10179 | 27523 | 41778 | 3894 |
| Salem | 25373 | 5323 | 5599 | 12244 | 11967 | 635 | 527 | 12879 | 12494 | 2861 | 8197 | 12288 | 2077 |
| Somerset | 27425 | 5250 | 5753 | 11825 | 12174 | 1860 | 1566 | 13685 | 13740 | 2667 | 8776 | 13441 | 2541 |
| Sussex | 22401 | 4291 | 4752 | 10859 | 10740 | 443 | 359 | 11302 | 11099 | 2406 | 6920 | 10950 | 2125 |
| Union | 61839 | 10316 | 12659 | 22781 | 24783 | 6950 | 7325 | 29731 | 32108 | 7319 | 18937 | 32126 | 3457 |
| Warren | 37737 | 7896 | 8294 | 17618 | 17682 | 1329 | 1108 | 18947 | 18790 | 4563 | 12095 | 18270 | 2809 |
| Total | 1278033 | 210267 | 267294 | 508279 | 519408 | 126907 | 123439 | 635186 | 642847 | 154720 | 407185 | 636553 | 79575 |



*Abstract of Census Returns for the Cities of New Jersey, 1885, showing the Males and Females of the Native and the Foreign Population, and their respective totals in Cities of over 5,000 Inhabitants; also their total Population at ages corresponding to those in the Tables of the Bureau of Vital Statistics.*

| Census of Cities. | Population. | Dwelling houses. | Families. | Native born. | | Foreign born. | | Total. | | Five years of age and under. | Five to twenty. | Twenty to sixty. | Over sixty. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Males. | Females. | Males. | Females. | Males. | Females. | | | | |
| Atlantic City | 7942 | 1725 | 1753 | 3581 | 3678 | 324 | 359 | 3905 | 4037 | 852 | 2096 | 4664 | 330 |
| Bordentown | 5857 | 1211 | 1212 | 2511 | 2840 | 241 | 265 | 2752 | 3105 | 553 | 1879 | 2860 | 565 |
| Burlington | 7690 | 1583 | 1613 | 3454 | 3718 | 252 | 266 | 3706 | 3984 | 790 | 2201 | 4017 | 682 |
| Camden | 52884 | 10524 | 10852 | 23221 | 24981 | 2377 | 2305 | 25598 | 27286 | 5465 | 17146 | 27682 | 2591 |
| Gloucester City | 5966 | 1137 | 1147 | 2461 | 2520 | 451 | 534 | 2912 | 3054 | 733 | 1928 | 3076 | 229 |
| Bridgeton | 10065 | 2093 | 2273 | 4724 | 4922 | 216 | 203 | 4940 | 5125 | 1118 | 3067 | 5201 | 684 |
| Millville | 8824 | 1804 | 1866 | 4297 | 4070 | 252 | 205 | 4549 | 4275 | 1140 | 3016 | 4235 | 433 |
| Newark | 152988 | 19467 | 34496 | 52530 | 56328 | 21811 | 22319 | 74341 | 78647 | 19610 | 47643 | 78229 | 7506 |
| Orange | 15231 | 2177 | 2904 | 5364 | 5856 | 1927 | 2084 | 7291 | 7940 | 1886 | 4936 | 7829 | 580 |
| Bayonne | 13080 | 1779 | 2413 | 4982 | 4764 | 1832 | 1502 | 6814 | 6266 | 2228 | 3787 | 6746 | 319 |
| Harrison | 6806 | 1003 | 1335 | 2051 | 2210 | 1230 | 1315 | 3281 | 3525 | 1072 | 2289 | 3249 | 196 |
| Hoboken | 37721 | 2601 | 7928 | 11483 | 11377 | 7384 | 7477 | 18867 | 18854 | 4954 | 13461 | 18403 | 903 |
| Jersey City | 153513 | 16114 | 30707 | 53314 | 52175 | 24329 | 23695 | 77643 | 75870 | 21572 | 50881 | 74836 | 6224 |
| Town of Union | 8398 | 1225 | 1683 | 2390 | 2425 | 1877 | 1706 | 4267 | 4131 | 1281 | 2633 | 4125 | 359 |
| Chambersburg | 8542 | 1715 | 1775 | 3085 | 3022 | 1285 | 1150 | 4370 | 4172 | 1191 | 2905 | 4168 | 278 |
| Trenton | 34386 | 6546 | 6893 | 13766 | 13932 | 3622 | 3066 | 17388 | 16998 | 3677 | 9804 | 19210 | 1695 |
| New Brunswick | 18258 | 2732 | 3682 | 7499 | 8162 | 1195 | 1402 | 8694 | 9564 | 2130 | 5682 | 9295 | 1151 |
| Perth Amboy | 6311 | 921 | 1326 | 2077 | 2139 | 1126 | 969 | 3203 | 3108 | 847 | 1858 | 3314 | 292 |
| Long Branch | 5140 | 1015 | 1154 | 2209 | 2325 | 306 | 300 | 2515 | 2625 | 646 | 1498 | 2707 | 289 |
| Morristown | 8760 | 1808 | 1600 | 3333 | 3962 | 560 | 905 | 3893 | 4867 | 987 | 2486 | 4706 | 581 |
| Passaic | 8326 | 1087 | 1621 | 2662 | 2766 | 1486 | 1412 | 4148 | 4178 | 1192 | 2636 | 4176 | 322 |
| Paterson | 63273 | 8686 | 13105 | 19411 | 20773 | 11341 | 11748 | 30752 | 32521 | 7439 | 20900 | 32174 | 2760 |
| Salem | 5516 | 1293 | 1291 | 2483 | 2754 | 141 | 138 | 2624 | 2892 | 614 | 1614 | 2783 | 505 |
| Elizabeth | 32119 | 4960 | 6404 | 11123 | 11903 | 4537 | 4556 | 15660 | 16459 | 4111 | 10242 | 16436 | 1330 |
| Plainfield | 8913 | 1474 | 1975 | 3553 | 4096 | 477 | 787 | 4030 | 4883 | 932 | 2514 | 4997 | 470 |
| Rahway | 6861 | 1345 | 1518 | 2769 | 3058 | 481 | 553 | 3250 | 3611 | 799 | 2067 | 3455 | 540 |
| Phillipsburg | 8058 | 1690 | 1712 | 3538 | 3606 | 490 | 424 | 4028 | 4030 | 1139 | 2753 | 3788 | 378 |
| Total | 701428 | 99215 | 146238 | 253871 | 264362 | 91550 | 91645 | 345421 | 356007 | 88953 | 223922 | 356361 | 32192 |

# RETURNS OF DEATHS FROM ALL CAUSES.

## *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, 1885—By Counties.*

| COUNTIES. Statistical Divisions | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, Census of 1885. | Death-rate per 1,000. | Death-rate per 1,000 without cities of over 5,000. | Deaths under five in each 100, or comparison of these with total deaths. | Comp'r'tive number of deaths in each 100 from chief preventable diseases. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic | 108 | 62 | 27 | 128 | 109 | 435 | 22,356 | 19.46 | 17.21 | 39.08 | 26.44 | 1 | 18 | ... | 3 | 2 | 8 | 17 | ... | 66 | 28 | 34 | 31 | 30 | 33 | 30 | 35 | 22 | 9 | 1 | 4 | 7 |
| Bergen | 138 | 60 | 60 | 160 | 176 | 592 | 39,880 | 15.10 | 15.10 | 32.89 | 23.75 | 9 | 13 | ... | 13 | 4 | 3 | 21 | 1 | 79 | 39 | 32 | 80 | 35 | 57 | 30 | 56 | 28 | 8 | 4 | 8 | 23 |
| Burlington | 183 | 89 | 87 | 268 | 273 | 912 | 57,558 | 15.84 | 14.34 | 29.82 | 24.12 | 6 | 32 | ... | 21 | 1 | 5 | 48 | 5 | 102 | 54 | 72 | 99 | 56 | 57 | 37 | 97 | 53 | 22 | ... | 12 | 31 |
| Camden | 387 | 170 | 138 | 398 | 270 | 1,370 | 76,685 | 17.87 | 17.38 | 40.66 | 27 81 | 9 | 63 | ... | 29 | 2 | 11 | 70 | 1 | 196 | 87 | 121 | 127 | 104 | 90 | 38 | 106 | 49 | 20 | ... | 15 | 52 |
| Cape May | 44 | 13 | 9 | 37 | 57 | 161 | 10,744 | 14.99 | 14.99 | 35.40 | 23.60 | 1 | 8 | ... | 4 | 1 | 3 | 1 | ... | 20 | 9 | 8 | 16 | 7 | 9 | 2 | 30 | 10 | 6 | ... | 1 | 2 |
| Cumberland | 169 | 89 | 59 | 172 | 189 | 685 | 41,982 | 16.32 | 15.46 | 37.66 | 25.26 | 6 | 14 | ... | 21 | ..... | 7 | 27 | 5 | 93 | 46 | 67 | 55 | 56 | 49 | 26 | 52 | 30 | 12 | ... | 5 | 20 |
| Essex | 1086 | 779 | 497 | 1479 | 796 | 4,662 | 213,764 | 21.81 | 13.90 | 40.00 | 28.96 | 38 | 110 | .. | 78 | 17 | 24 | 529 | 14 | 540 | 378 | 313 | 519 | 364 | 293 | 178 | 317 | 189 | 111 | 5 | 52 | 142 |
| Gloucester | 93 | 65 | 45 | 102 | 151 | 461 | 27,603 | 16.70 | 16.70 | 34.27 | 25.62 | 5 | 11 | ... | 10 | ..... | 5 | 10 | ... | 77 | 32 | 40 | 38 | 33 | 25 | 17 | 42 | 28 | 7 | 3 | 3 | 19 |
| Hudson | 1431 | 982 | 529 | 1761 | 697 | 5,409 | 240,342 | 22.51 | 24.25 | 44.61 | 28.97 | 44 | 144 | 2 | 319 | 39 | 43 | 340 | 16 | 620 | 375 | 314 | 667 | 514 | 273 | 198 | 277 | 206 | 88 | 10 | 62 | 214 |
| Hunterdon | 64 | 47 | 29 | 139 | 190 | 466 | 37,420 | 12.45 | 12.45 | 23.83 | 15.88 | 3 | 13 | ... | 8 | ..... | ..... | 19 | 4 | 27 | 42 | 53 | 26 | 30 | 45 | 16 | 59 | 30 | 10 | ... | 4 | 17 |
| Mercer | 262 | 117 | 97 | 322 | 312 | 1,163 | 66,785 | 17.41 | 17.69 | 32.59 | 22.96 | 8 | 28 | ... | 17 | 1 | 15 | 59 | 3 | 136 | 97 | 65 | 90 | 64 | 80 | 45 | 151 | 80 | 27 | 1 | 8 | 54 |
| Middlesex | 236 | 131 | 84 | 261 | 225 | 946 | 56,180 | 16.84 | 16.09 | 38.79 | 27.80 | 7 | 23 | ... | 33 | 7 | 20 | 29 | 5 | 139 | 74 | 63 | 68 | 54 | 63 | 45 | 72 | 50 | 23 | 4 | 12 | 48 |
| Monmouth | 238 | 141 | 90 | 282 | 302 | 1,065 | 62,324 | 17.09 | 17.09 | 35.59 | 21.69 | 17 | 20 | ... | 7 | 22 | 4 | 39 | 3 | 119 | 60 | 72 | 136 | 72 | 70 | 50 | 93 | 75 | 17 | 3 | 7 | 40 |
| Morris | 144 | 70 | 67 | 266 | 258 | 808 | 50,675 | 15.94 | 16.22 | 26.49 | 18.94 | 6 | 17 | ... | 18 | ..... | 5 | 34 | 2 | 71 | 58 | 64 | 83 | 39 | 59 | 43 | 115 | 53 | 20 | 1 | 16 | 18 |
| Ocean | 44 | 37 | 14 | 78 | 90 | 268 | 15,586 | 17.19 | 17.19 | 30.22 | 21.27 | 2 | 9 | ..... | ..... | 9 | ..... | 8 | ... | 29 | 18 | 28 | 32 | 14 | 12 | 13 | 36 | 16 | 4 | ... | 3 | 7 |
| Passaic | 478 | 221 | 110 | 449 | 281 | 1,598* | 83,374 | 19.17 | 14.86 | 43.74 | 27.85 | 17 | 50 | ... | 17 | 17 | 7 | 86 | 7 | 244 | 103 | 107 | 181 | 129 | 89 | 60 | 101 | 76 | 42 | ... | 23 | 45 |
| Salem | 81 | 33 | 31 | 88 | 109 | 349 | 25,373 | 13.75 | 12.24 | 32.66 | 23.50 | 3 | 19 | ... | 4 | ..... | 1 | 14 | ... | 41 | 22 | 32 | 29 | 23 | 18 | 11 | 33 | 15 | 10 | 1 | 3 | 8 |
| Somerset | 81 | 35 | 46 | 123 | 133 | 418 | 27,425 | 15.24 | 15.24 | 27.75 | 22.25 | 6 | 6 | ... | 5 | ..... | 5 | 30 | 2 | 39 | 16 | 34 | 45 | 19 | 29 | 19 | 46 | 23 | 15 | ... | 3 | 25 |
| Sussex | 52 | 29 | 35 | 93 | 114 | 324 | 22,401 | 14.46 | 14.46 | 25.00 | 15.74 | 3 | 7 | ... | ..... | ..... | 2 | 16 | 1 | 22 | 27 | 25 | 45 | 22 | 32 | 10 | 30 | 18 | 9 | 1 | 6 | 11 |
| Union | 276 | 177 | 114 | 333 | 260 | 1,165 | 61,839 | 18.84 | 15.78 | 38.88 | 26 18 | 13 | 22 | ... | 27 | 13 | 11 | 85 | 1 | 133 | 87 | 68 | 127 | 93 | 79 | 40 | 101 | 47 | 24 | 2 | 11 | 35 |
| Warren | 116 | 62 | 42 | 167 | 150 | 540 | 37,737 | 14.31 | 13.21 | 32.96 | 19.44 | 5 | 15 | ... | 12 | ..... | 3 | 14 | 4 | 52 | 21 | 35 | 72 | 33 | 41 | 21 | 46 | 42 | 14 | ... | 10 | 19 |
| Total | *5711 | 3409 | 2210 | 7106 | 5142 | 23,807 | 1,278,033 | 18.63 | 15.63 | 38.31 | 26.17 | 209 | 642 | 2 | 646 | 135 | 181 | 1496 | 74 | 2845 | 1673 | 1647 | 2566 | 1791 | 1503 | 939 | 1895 | 1140 | 498 | 36 | 268 | 857 |

*Of those that died under one year, 1,606 died under one month, of which 1,057 died in the larger cities.

Total deaths from consumption for the State, as compared with total deaths, 13.94.

Rates for short periods, or which deal with small numbers, are only approximate, since temporary causes may have been in operation, and small numbers do not eliminate or balance errors which practically disappear in large aggregates. So, five or ten years' analyses are more important than any single year. The number of deaths before twenty, in proportion to the rest, are much more informatory as to local causes affecting health than the total deaths. So, also, the number dying from the zymotic diseases, and especially from fevers, croup, diphtheria, diarrheal diseases, consumption and brain and nervous diseases of children.



## *Return of Deaths from all Causes and Certain Specified Diseases, in the Cities of the State of New Jersey, of over 5,000 Population, for the Year ending June 30th, 1885.*

| CITIES HAVING OVER 5,000 POPULATION. Statistical Divisions. | DEATHS AT ALL AGES. Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total including undefined. | Population, census of 1885. | Death-rate per 1,000. | Deaths under five in each 100, or comparison of these with total deaths. | Comparative number of deaths in each 100 from chief preventable diseases. | PRINCIPAL CAUSES OF DEATH.* Remittent fever, &c. | Typhoid fever. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption, male. | Consumption, female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Atlantic City | 49 | 32 | 11 | 64 | 30 | 187 | 7,942 | 23.54 | 43.32 | 25.67 | ..... | 5 | 1 | ..... | 1 | 11 | ... | 30 | 12 | 10 | 12 | 19 | 21 | 13 | 11 | 11 | 4 | ..... | 3 | 4 |
| Burlington County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bordentown | 19 | 12 | 6 | 32 | 24 | 93 | 5,857 | 15.88 | 33.33 | 22.58 | ..... | 2 | 1 | ..... | ..... | 8 | ... | 10 | 7 | 6 | 10 | 4 | 7 | 3 | 6 | 11 | 2 | ..... | ..... | 4 |
| Burlington | 39 | 16 | 16 | 59 | 54 | 188 | 7,690 | 24.45 | 29.26 | 15.43 | 1 | 4 | 2 | ..... | 2 | 8 | 1 | 11 | 9 | 14 | 25 | 18 | 11 | 4 | 18 | 18 | 5 | ..... | 3 | 9 |
| Camden County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Camden | 283 | 121 | 111 | 287 | 162 | 968 | 52,884 | 18.30 | 41.74 | 28.41 | 8 | 43 | 27 | 2 | 6 | 53 | ... | 136 | 67 | 89 | 88 | 83 | 56 | 28 | 71 | 26 | 11 | ..... | 11 | 30 |
| Gloucester City | 23 | 12 | 8 | 32 | 17 | 92 | 5,966 | 15.42 | 38.04 | 19.57 | ..... | 1 | ..... | ..... | ..... | 7 | ... | 10 | 7 | 14 | 6 | 8 | 5 | 2 | 7 | 7 | 2 | ..... | ..... | 8 |
| Cumberland Co. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bridgeton | 46 | 27 | 13 | 47 | 42 | 179 | 10,065 | 17.78 | 40.78 | 19.55 | 1 | 3 | ..... | ..... | 2 | 2 | 1 | 26 | 15 | 12 | 21 | 19 | 10 | 8 | 11 | 14 | 1 | ..... | 1 | 7 |
| Millville | 43 | 21 | 12 | 39 | 34 | 149 | 8,824 | 16.89 | 42.95 | 30.87 | 2 | 4 | 1 | ..... | 3 | 3 | 2 | 31 | 13 | 17 | 15 | 8 | 12 | 5 | 6 | 5 | 3 | ..... | ..... | 5 |
| Essex County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Newark | 385 | 658 | 385 | 1210 | 572 | 3729 | 152 988 | 24.38 | 41.38 | 30.01 | 31 | 94 | 68 | 16 | 21 | 438 | 8 | 443 | 307 | 258 | 410 | 302 | 203 | 129 | 250 | 151 | 80 | 4 | 42 | 117 |
| Orange | 76 | 45 | 33 | 105 | 41 | 300 | 15,231 | 19.70 | 40.33 | 26.00 | ..... | 5 | 4 | ..... | ..... | 32 | 3 | 34 | 25 | 19 | 38 | 29 | 17 | 21 | 9 | 10 | 7 | ..... | 6 | 9 |
| Hudson County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bayonne | 78 | 42 | 12 | 76 | 34 | 243 | 13,080 | 18.58 | 49.38 | 25.10 | 3 | 8 | 4 | 1 | 2 | 15 | 1 | 27 | 13 | 12 | 29 | 32 | 14 | 5 | 14 | 7 | 3 | ..... | 4 | 19 |
| Harrison | 42 | 23 | 20 | 56 | 17 | 159 | 6,806 | 23.36 | 40.88 | 27.04 | 1 | 4 | ..... | ..... | ..... | 18 | ... | 20 | 15 | 12 | 20 | 20 | 5 | 4 | 12 | 4 | 2 | ..... | 2 | 7 |
| Hoboken | 237 | 127 | 60 | 310 | 109 | 843 | 37,721 | 22 35 | 43.18 | 26.33 | 3 | 21 | 10 | 5 | 7 | 47 | 4 | 125 | 62 | 58 | 85 | 84 | 53 | 39 | 53 | 32 | 19 | 4 | 9 | 38 |
| Jersey City | 869 | 673 | 373 | 1099 | 423 | 3442 | 153,513 | 22.42 | 44.80 | 30.10 | 24 | 100 | 294 | 28 | 32 | 173 | 10 | 375 | 216 | 200 | 459 | 313 | 170 | 123 | 153 | 136 | 52 | 5 | 37 | 122 |
| Town of Union | 68 | 46 | 28 | 52 | 23 | 217 | 8,398 | 25.84 | 52.53 | 39.17 | 4 | 5 | 4 | 5 | ..... | 47 | 1 | 19 | 16 | 9 | 23 | 20 | 11 | 2 | 8 | 8 | 7 | ..... | 5 | 2 |
| Mercer County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chambersburg | 41 | 13 | 11 | 52 | 22 | 140 | 8,542 | 16.39 | 38.57 | 25.71 | ..... | 3 | 6 | ..... | ..... | 6 | ... | 21 | 15 | 11 | 12 | 5 | 13 | 5 | 10 | 6 | 4 | ..... | 3 | 6 |
| Trenton | 160 | 65 | 50 | 174 | 133 | 601 | 34,386 | 17.48 | 37.44 | 22.80 | 2 | 11 | 9 | 1 | 4 | 22 | 1 | 87 | 57 | 31 | 42 | 47 | 40 | 25 | 54 | 41 | 15 | ..... | 5 | 32 |
| Middlesex County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| New Brunswick | 81 | 29 | 29 | 113 | 82 | 336 | 18,258 | 18.40 | 32.74 | 24.70 | 1 | 10 | 3 | ..... | 3 | 12 | 2 | 52 | 35 | 34 | 22 | 13 | 27 | 16 | 24 | 21 | 9 | 2 | 3 | 17 |
| Morris County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Morristown | 22 | 10 | 7 | 54 | 34 | 128 | 8,760 | 14.61 | 25.00 | 23.44 | 2 | 2 | 3 | ..... | 1 | 7 | 1 | 14 | 10 | 13 | 7 | 1 | 14 | 9 | 16 | 10 | 4 | ..... | 4 | ..... |
| Passaic County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Passaic City | 44 | 22 | 11 | 45 | 16 | 139 | 8,326 | 16.69 | 47.48 | 32.37 | 2 | 8 | ..... | 5 | 2 | 2 | 1 | 25 | 10 | 7 | 15 | 15 | 6 | 3 | 9 | 6 | 4 | ..... | 5 | 4 |
| Paterson | 384 | 184 | 86 | 393 | 229 | 1284 | 63,273 | 20.29 | 44.24 | 26.64 | 9 | 39 | 17 | 12 | 5 | 71 | 6 | 183 | 89 | 89 | 145 | 101 | 68 | 49 | 73 | 59 | 33 | ..... | 18 | 36 |
| Salem County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Salem City | 24 | 15 | 9 | 27 | 30 | 106 | 5,516 | 19.22 | 36.79 | 21.70 | 1 | 3 | ..... | ..... | ..... | 6 | ... | 13 | 7 | 9 | 10 | 10 | 5 | 2 | 12 | 4 | 5 | 1 | 1 | 3 |
| Union County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Elizabeth | 181 | 127 | 67 | 207 | 112 | 697 | 32,119 | 21.70 | 44.19 | 28.69 | 12 | 10 | 13 | 12 | 10 | 62 | 1 | 80 | 53 | 36 | 72 | 65 | 41 | 18 | 55 | 27 | 10 | 1 | 8 | 23 |
| Plainfield | 39 | 10 | 7 | 43 | 41 | 141 | 8,913 | 15.82 | 34.75 | 21.28 | 1 | 3 | 1 | ..... | ..... | 3 | ... | 22 | 13 | 7 | 19 | 8 | 10 | 10 | 15 | 4 | 3 | ..... | 1 | 4 |
| Rahway | 15 | 11 | 6 | 30 | 35 | 107 | 6,861 | 15.60 | 25.00 | 23.36 | ..... | 5 | 7 | ..... | ..... | 1 | ... | 12 | 14 | 11 | 11 | 5 | 8 | 3 | 12 | 1 | 1 | ..... | 2 | 2 |
| Warren County. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phillipsburg | 37 | 20 | 15 | 44 | 32 | 148 | 8,058 | 18.37 | 38.51 | 22.30 | 2 | 3 | 5 | ..... | 1 | 7 | 1 | 14 | 4 | 11 | 22 | 11 | 13 | 8 | 12 | 4 | 3 | ..... | 3 | 3 |
| Total | 3785 | 2361 | 1386 | 4650 | 2339 | 14,616 | 689,977 | 21.25 | 42.05 | 28.05 | 110 | 396 | 480 | 87 | 102 | 1061 | 44 | 1820 | 1091 | 989 | 1618 | 1240 | 840 | 534 | 921 | 623 | 289 | 17 | 176 | 511 |

*Small-pox column omitted; no deaths from this cause.

*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, 1885.*

| ATLANTIC COUNTY. Population, 22,356. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | | | Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
| Absecon | 1 | 3 | ..... | 5 | 3 | 12 | 567 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 5 | ..... | ..... | 1 | ..... | 1 | 1 | ..... | ..... | ..... | ..... |
| Atlantic City | 49 | 32 | 11 | 64 | 30 | 187 | 7,942 | 23.54 | ..... | 5 | ..... | 1 | ..... | 1 | 11 | ..... | 30 | 12 | 10 | 12 | 19 | 21 | 13 | 11 | 11 | 4 | ..... | 3 | 4 |
| Buena Vista | 6 | 1 | 2 | 3 | ..... | 12 | 1,016 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 2 | 1 | 1 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Egg Harbor City | 9 | 3 | ..... | 6 | 6 | 24 | 1,317 | ..... | ..... | 1 | ..... | ..... | ..... | 3 | ..... | ..... | 4 | 2 | 2 | ..... | 1 | 2 | 1 | 2 | 2 | ..... | ..... | ..... | ..... |
| Egg Harbor Township | 20 | 7 | 3 | 13 | 19 | 62 | 3,919 | ..... | 1 | 1 | ..... | 1 | ..... | ..... | ..... | ..... | 11 | 3 | 5 | 5 | 5 | 4 | 5 | 7 | 1 | 1 | ..... | ..... | 1 |
| Galloway | 3 | 4 | 3 | 16 | 17 | 43 | 2,153 | ..... | ..... | 4 | ..... | 1 | ..... | ..... | 1 | ..... | 3 | 4 | 4 | 5 | 2 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 1 |
| Hamilton | 10 | 5 | 6 | 8 | 6 | 35 | 1,484 | ..... | ..... | 5 | ..... | ..... | 2 | ..... | 3 | ..... | 7 | 1 | 3 | 3 | 2 | ..... | 2 | 3 | ..... | 1 | ..... | ..... | ..... |
| Hammonton | 9 | 6 | 1 | 8 | 21 | 45 | 2,525 | ..... | ..... | 1 | ..... | ..... | ..... | 3 | 1 | ..... | 7 | 3 | 3 | 4 | ..... | 2 | 7 | 1 | 5 | 1 | ..... | ..... | ..... |
| Mullica | 1 | 1 | 1 | 4 | 6 | 13 | 807 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | 1 | 1 | 2 | ..... | 1 | 1 | 2 | 1 | ..... | ..... | ..... | ..... |
| Weymouth | ..... | ..... | ..... | 1 | 1 | 2 | 626 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Totals | 108 | 62 | 27 | 128 | 109 | 435 | 22,356 | 19.46 | 1 | 18 | ..... | 3 | 2 | 8 | 17 | ..... | 66 | 28 | 34 | 31 | 30 | 33 | 30 | 35 | 22 | 9 | 1 | 4 | 7 |



*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, 1885.*

| BERGEN COUNTY. Population, 39,880. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | | | Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
| Englewood | 18 | 8 | 7 | 22 | 21 | 76 | 4,429 | ..... | ..... | ..... | ..... | 1 | 1 | ..... | ..... | ..... | 11 | 6 | 4 | 13 | 4 | 10 | 1 | 6 | 4 | ..... | 1 | 3 | 3 |
| Franklin | 6 | 2 | 1 | 8 | 8 | 25 | 2,194 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 1 | 3 | ..... | 3 | 5 | 1 | 2 | ..... | ..... | ..... | 2 | 1 |
| Harrington | 11 | 1 | 3 | 4 | 16 | 35 | 2,604 | ..... | ..... | 2 | ..... | ..... | ..... | 1 | 1 | ..... | 6 | ..... | ..... | 2 | 4 | 5 | 5 | 3 | ..... | 2 | ..... | ..... | 1 |
| Hohokus | 12 | 5 | 3 | 9 | 14 | 43 | 2,898 | ..... | 1 | ..... | ..... | ..... | ..... | 1 | 4 | ..... | 7 | 1 | 1 | 5 | 2 | 4 | 2 | 4 | 3 | 2 | ..... | ..... | 1 |
| Lodi | 20 | 9 | 10 | 21 | 12 | 72 | 4,347 | ..... | 1 | 2 | ..... | 5 | ..... | ..... | 1 | 1 | 7 | 7 | 2 | 9 | 8 | 4 | 2 | 3 | 3 | ..... | ..... | ..... | 3 |
| Midland | 8 | 1 | 1 | 3 | 10 | 23 | 1,617 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 3 | ..... | 1 | 3 | ..... | 3 | 2 | 2 | 2 | 2 | 1 | ..... | ..... | ..... | 1 |
| New Barbadoes | 16 | 10 | 5 | 25 | 29 | 87 | 4,983 | ..... | 2 | 1 | ..... | ..... | ..... | ..... | 2 | ..... | 15 | 7 | 5 | 20 | 6 | 6 | 5 | 10 | 1 | ..... | ..... | ..... | 4 |
| Palisade | 2 | 2 | 6 | 6 | 7 | 24 | 2,333 | ..... | ..... | 1 | ..... | ..... | 1 | 1 | 3 | ..... | 1 | ..... | 1 | 2 | ..... | 4 | 4 | 2 | 1 | ..... | ..... | ..... | ..... |
| Ridgefield | 12 | 5 | 5 | 11 | 11 | 45 | 4,487 | ..... | 1 | 2 | ..... | 1 | ..... | ..... | ..... | ..... | 8 | 2 | 3 | 11 | 3 | 2 | 2 | 6 | 1 | 1 | ..... | ..... | 2 |
| Ridgewood | 5 | 2 | 4 | 16 | 14 | 41 | 1,776 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 4 | 5 | 9 | 2 | ..... | 6 | 1 | 7 | 1 | 1 | ..... | ..... | ..... |
| Saddle River | 2 | 3 | ..... | 5 | 9 | 20 | 1,584 | ..... | 2 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 3 | ..... | 2 | 2 | ..... | 1 | 2 | 1 | ..... | 1 | ..... | ..... | 1 |
| Union | 20 | 8 | 14 | 16 | 7 | 65 | 3,914 | ..... | ..... | 2 | ..... | 6 | 2 | ..... | 4 | ..... | 11 | 4 | 1 | 7 | 2 | 1 | 1 | 3 | 4 | 1 | ..... | 3 | 2 |
| Washington | 6 | 4 | 1 | 14 | 18 | 46 | 2,714 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 3 | 3 | 1 | 4 | 1 | 7 | 2 | 6 | 3 | ..... | 3 | ..... | 4 |
| Totals | 138 | 60 | 60 | 160 | 176 | 602 | 39,880 | 15.10 | 9 | 13 | ..... | 13 | 4 | 3 | 21 | 1 | 79 | 39 | 32 | 80 | 35 | 57 | 30 | 56 | 28 | 8 | 4 | 8 | 23 |

*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, 1885.*

| BURLINGTON COUNTY. Population, 57,558. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bass River | 8 | 3 | .... | 4 | 5 | 20 | 905 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 3 | ..... | 1 | 2 | 2 | 1 | ..... | 4 | ..... | ..... | 1 | ..... |
| Beverly | 5 | 2 | 5 | 8 | 9 | 29 | 3,356 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 | 1 | 2 | 6 | 2 | 1 | 2 | 1 | 1 | ..... | ..... | 1 |
| Bordentown | 19 | 12 | 6 | 32 | 24 | 93 | 5,857 | 15.88 | ..... | 2 | ..... | 1 | ..... | ..... | 8 | ..... | 10 | 7 | 6 | 10 | 4 | 7 | 3 | 6 | 11 | 2 | ..... | 4 |
| Burlington | 39 | 16 | 16 | 59 | 54 | 188 | 7,690 | 24.45 | 1 | 4 | ..... | 2 | ..... | 2 | 8 | 1 | 11 | 9 | 14 | 25 | 18 | 11 | 4 | 18 | 18 | 5 | 3 | 9 |
| Chester | 7 | 7 | 7 | 11 | 17 | 51 | 3,071 | ..... | ..... | ..... | ..... | 2 | 1 | 1 | 5 | 1 | 7 | 2 | 4 | 2 | 2 | 5 | 4 | 2 | 4 | 2 | 1 | 1 |
| Chesterfield | 2 | ..... | 2 | 7 | 4 | 15 | 1,453 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 1 | 3 | 3 | ..... | 1 | ..... | 2 | ..... | ..... | ..... | ..... | 2 |
| Cinnaminson | 9 | 5 | 3 | 11 | 5 | 34 | 2,640 | ..... | 2 | 1 | ..... | .. | ..... | ..... | 3 | ..... | 6 | 2 | 3 | ..... | 3 | 1 | 1 | 4 | 3 | ..... | ..... | 2 | ..... |
| Delran | 11 | 10 | 1 | 8 | 9 | 39 | 1,932 | ..... | 1 | 1 | ..... | 5 | ..... | ..... | 3 | ..... | 7 | 2 | 1 | 3 | 3 | 2 | 2 | 6 | 1 | 1 | ..... | ..... | ..... |
| Eastampton | 1 | ..... | ..... | 3 | ..... | 4 | 655 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Evesham | 8 | 1 | 1 | 3 | 7 | 20 | 1,556 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 7 | ..... | 1 | 1 | 1 | ..... | ..... | 3 | 1 | ..... | ..... | ..... | ..... |
| Florence | 3 | 5 | 4 | 5 | 5 | 22 | 1,582 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 3 | 1 | 2 | 4 | 2 | 2 | ..... | 1 | ..... | 2 | ..... | ..... | 1 |
| Little Egg Harbor | 8 | 3 | 3 | 5 | 11 | 30 | 1,885 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 5 | ..... | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 4 | 1 | ..... | ..... | 1 | ..... |
| Lumberton | ..... | ..... | ..... | 2 | 4 | 6 | 1,735 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... | 1 | 1 | 1 | ..... | ..... | ..... | ..... | ..... |
| Mansfield | 4 | 1 | 5 | 6 | 14 | 30 | 1,715 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 4 | ..... | 1 | 3 | 2 | 7 | 1 | 1 | 1 | 5 | 1 | ..... | ..... | ..... | ..... |
| Medford | 8 | 5 | 3 | 8 | 13 | 39 | 2,064 | ..... | ..... | 3 | ..... | 1 | ..... | ..... | 3 | ..... | 9 | 2 | 4 | 4 | ..... | 1 | 3 | 5 | 1 | ..... | ..... | ..... | ..... |
| Mount Laurel | 2 | 3 | 3 | 3 | 4 | 15 | 1,781 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 2 | ..... | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | ..... | ..... | ..... | ..... | ..... |
| New Hanover | 2 | 1 | 4 | 9 | 5 | 22 | 2,235 | ..... | ..... | 3 | ..... | 1 | ..... | ..... | ..... | ..... | 3 | 1 | 4 | ..... | 1 | 3 | ..... | ..... | 2 | ..... | ..... | ..... | 2 |
| Northampton | 23 | 5 | 11 | 39 | 34 | 112 | 5,006 | ..... | ..... | 3 | ..... | ..... | ..... | 1 | 2 | 1 | 9 | 9 | 9 | 9 | 7 | 6 | 9 | 13 | 3 | 7 | ..... | 4 | 7 |
| Pemberton | 4 | 4 | 5 | 16 | 16 | 45 | 2,944 | ..... | ..... | 4 | ..... | 1 | ..... | ..... | ..... | ..... | 4 | 3 | 4 | 8 | ..... | 3 | 1 | 9 | 2 | ..... | ..... | ..... | 2 |
| Randolph | 3 | ..... | ..... | 1 | 2 | 6 | 365 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 1 | 1 | 1 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Shamong | 1 | 2 | 2 | 3 | 7 | 16 | 933 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 5 | ..... | 1 | 1 | 3 | 1 | ..... | ..... | ..... | 1 |
| Southampton | 7 | 2 | 3 | 6 | 10 | 29 | 2,263 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | ..... | ..... | 5 | 2 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | ..... | ..... | ..... | 1 |
| Springfield | 4 | 1 | 1 | 13 | 9 | 28 | 1,884 | ..... | ..... | 3 | ..... | ..... | ..... | ..... | ..... | 1 | 2 | 1 | 4 | 2 | 3 | 2 | ..... | 3 | 1 | 2 | ..... | ..... | ..... |
| Washington | 1 | ..... | 1 | ..... | 1 | 3 | 323 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Westampton | 1 | ..... | 1 | 4 | 2 | 8 | 688 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 | ..... | 2 | 1 | 1 | ..... | 1 | ..... | ..... | ..... | ..... |
| Willingboro | 1 | 1 | ..... | 1 | 2 | 5 | 725 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Woodland | 2 | ..... | ..... | 1 | ..... | 3 | 305 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Totals | 183 | 89 | 87 | 268 | 273 | 912 | 57,558 | 15.84 | 6 | 32 | ..... | 21 | 1 | 5 | 48 | 5 | 102 | 54 | 72 | 99 | 56 | 57 | 37 | 97 | 53 | 22 | ..... | 12 | 31 |



*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, 1885.*

| CAMDEN COUNTY. Population, 76,685. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Camden | 283 | 121 | 111 | 287 | 162 | 968 | 52,884 | 18.30 | 8 | 43 | ..... | 27 | 2 | 6 | 53 | ..... | 136 | 67 | 89 | 88 | 83 | 56 | 28 | 71 | 26 | 11 | ..... | 11 | 30 |
| Centre | 10 | 2 | 2 | 4 | 8 | 27 | 1,723 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 2 | ..... | 4 | 1 | 1 | 7 | 2 | 2 | ..... | ..... | 1 | ..... | ..... | ..... | 1 |
| Delaware | 7 | 1 | 1 | 6 | 3 | 18 | 1,572 | ..... | ..... | 1 | ..... | ..... | ..... | 1 | 1 | ..... | 4 | ..... | 1 | 4 | ..... | 1 | 1 | ..... | 1 | ..... | ..... | ..... | 1 |
| Gloucester City | 23 | 12 | 8 | 32 | 17 | 92 | 5,966 | 15.42 | ..... | 1 | ..... | ..... | ..... | ..... | 7 | ..... | 10 | 7 | 14 | 6 | 8 | 5 | 2 | 7 | 7 | 2 | ..... | ..... | 8 |
| Gloucester | 12 | 6 | 4 | 16 | 24 | 64 | 2,542 | ..... | 1 | 5 | ..... | ..... | ..... | ..... | ..... | ..... | 10 | 2 | 7 | 6 | 3 | 6 | 1 | 12 | 4 | 2 | ..... | ..... | 2 |
| Haddon | 6 | 9 | 3 | 17 | 18 | 53 | 3,270 | ..... | ..... | 4 | ..... | 1 | ..... | ..... | 3 | 1 | 4 | 2 | 2 | 4 | 1 | 7 | 1 | 8 | 1 | 2 | ..... | 2 | 2 |
| Stockton | 31 | 10 | 9 | 25 | 19 | 94 | 4,450 | ..... | ..... | 6 | ..... | ..... | ..... | 2 | 4 | ..... | 16 | 6 | 4 | 9 | 4 | 10 | 2 | 4 | 5 | 1 | ..... | 2 | 6 |
| Waterford | 7 | 6 | ..... | 4 | 12 | 29 | 2,098 | ..... | ..... | 1 | ..... | 1 | ..... | 2 | ..... | ..... | 4 | 1 | 1 | 3 | 1 | 2 | 2 | 1 | 2 | ..... | ..... | ..... | 2 |
| Winslow | 8 | 3 | ..... | 7 | 7 | 25 | 2,180 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 8 | 1 | 2 | ..... | 2 | 1 | 1 | 3 | 2 | 2 | ..... | ..... | ..... |
| Totals | 387 | 170 | 138 | 398 | 270 | 1,370 | 76,685 | 17.87 | 9 | 63 | ..... | 29 | 2 | 11 | 70 | 1 | 196 | 87 | 121 | 127 | 104 | 90 | 38 | 106 | 49 | 20 | ..... | 15 | 52 |

*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, 1885.*

| CAPE MAY COUNTY. Population, 10,744. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | | | Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
| Cape May City | 9 | 2 | ..... | 5 | 7 | 24 | 1,610 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 1 | 3 | 1 | 1 | ..... | 4 | 2 | 2 | ..... | ..... | 1 |
| Dennis | 9 | 4 | 2 | 10 | 11 | 36 | 2,328 | ..... | ..... | 1 | ..... | 3 | 1 | 1 | ..... | ..... | 5 | 2 | 2 | 2 | 2 | 2 | ..... | 2 | 1 | 2 | ..... | ..... | 1 |
| Lower | 10 | 2 | 5 | 9 | 9 | 35 | 2,026 | ..... | ..... | 6 | ..... | ..... | ..... | ..... | ..... | ..... | 9 | 2 | 1 | 1 | 1 | 3 | ..... | 6 | 1 | 1 | ..... | ..... | ..... |
| Middle | 7 | 4 | 1 | 6 | 17 | 35 | 2,605 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | ..... | 4 | 1 | 3 | 5 | 1 | 1 | 1 | 9 | 2 | 1 | ..... | 1 | ..... |
| Upper | 9 | 1 | 1 | 7 | 13 | 31 | 2,175 | ..... | 1 | 1 | ..... | 1 | ..... | 1 | ..... | ..... | ..... | 4 | 1 | 5 | 2 | 2 | 1 | 2 | 4 | ..... | ..... | ..... | ..... |
| Totals | 44 | 13 | 9 | 37 | 57 | 161 | 10,744 | 14.99 | 1 | 8 | ..... | 4 | 1 | 3 | 1 | ..... | 20 | 9 | 8 | 16 | 7 | 9 | 2 | 30 | 10 | 6 | ..... | 1 | 2 |



*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, 1885.*

| CUMBERLAND COUNTY. Population, 41,982. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | | | Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
| Bridgeton | 46 | 27 | 13 | 47 | 42 | 179 | 10,065 | 17.78 | 1 | 3 | ..... | ..... | ..... | 2 | 2 | 1 | 26 | 15 | 12 | 21 | 19 | 10 | 8 | 11 | 14 | 1 | ..... | 1 | 7 |
| Commercial | 11 | 6 | 1 | 6 | 7 | 31 | 2,544 | ..... | 1 | 2 | ..... | ..... | ..... | ..... | 1 | 2 | 1 | ..... | 4 | 1 | 5 | 2 | ..... | 1 | ..... | 1 | ..... | ..... | ..... |
| Deerfield | 6 | ..... | 1 | 3 | 6 | 16 | 1,632 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 4 | ..... | 1 | 1 | ..... | 2 | ..... | 3 | ..... | 1 | ..... | 1 | 2 |
| Downe | 5 | 1 | 1 | 7 | 5 | 19 | 1,860 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 2 | 3 | ..... | 1 | 2 | 1 | 2 | 1 | ..... | ..... | ..... | ..... |
| Fairfield | 8 | 3 | 8 | 6 | 11 | 41 | 1,612 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 14 | ..... | 4 | ..... | 4 | 2 | 2 | 1 | 1 | 2 | ..... | ..... | ..... | ..... | ..... |
| Greenwich | 8 | 3 | 3 | 2 | 12 | 28 | 1,267 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | ..... | 3 | ..... | 2 | 1 | 3 | 3 | ..... | 4 | 1 | ..... | 1 | ..... | 1 |
| Hopewell | 6 | 1 | 1 | 6 | 17 | 31 | 1,794 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 4 | 5 | 1 | 1 | 1 | ..... | 3 | 8 | ..... | 1 | ..... | 1 | ..... |
| Landis | 25 | 12 | 14 | 40 | 36 | 127 | 7,021 | ..... | 1 | 2 | ..... | 15 | ..... | 1 | 1 | ..... | 7 | 7 | 18 | 7 | 13 | 12 | 3 | 12 | 4 | 4 | ..... | 2 | 3 |
| Lawrence | 2 | 1 | 1 | 2 | 6 | 12 | 1,728 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 2 | ..... | ..... | 1 | 2 | ..... | ..... | 3 | ..... | ..... | ..... | ..... |
| Maurice River | 9 | 8 | 3 | 9 | 9 | 41 | 2,562 | ..... | ..... | ..... | ..... | 5 | ..... | ..... | 3 | ..... | 6 | 1 | 5 | 4 | 3 | 2 | 3 | 2 | 2 | ..... | ..... | ..... | 2 |
| Millville | 43 | 21 | 12 | 39 | 34 | 149 | 8,824 | 16.89 | 2 | 4 | ..... | 1 | ..... | 3 | 3 | 2 | 31 | 13 | 17 | 15 | 8 | 12 | 5 | 6 | 5 | 3 | ..... | ..... | 5 |
| Stoe Creek | ..... | 1 | 1 | 5 | 4 | 11 | 1,073 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 1 | ..... | 2 | ..... | 1 | 2 | 1 | ..... | 1 | ..... | ..... | ..... |
| Totals | 169 | 89 | 59 | 172 | 189 | 685 | 41,982 | 16.32 | 6 | 14 | ..... | 21 | ..... | 7 | 27 | 5 | 93 | 46 | 67 | 55 | 56 | 49 | 26 | 52 | 30 | 12 | ..... | 5 | 20 |

*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, 1885.*

| ESSEX COUNTY. Population, 213,764. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Belleville | 17 | 7 | 10 | 11 | 9 | 55 | 3,285 | ..... | .... | 1 | ..... | ..... | ..... | ..... | 4 | ..... | 7 | 2 | 6 | 6 | 8 | 3 | 2 | 7 | 2 | ..... | ..... | 2 |
| Bloomfield | 20 | 12 | 11 | 28 | 25 | 98 | 6,502 | ..... | .... | 3 | ..... | ..... | ..... | 1 | 10 | ..... | 13 | 6 | 4 | 13 | 3 | 8 | 3 | 11 | 4 | 2 | ..... | 3 |
| Caldwell | 4 | 7 | 8 | 12 | 18 | 50 | 3,336 | ..... | 4 | 1 | ..... | ..... | ..... | ..... | 5 | ..... | 4 | 1 | 3 | 4 | 3 | 8 | 1 | 8 | 3 | 2 | ..... | 2 |
| Clinton | 8 | 2 | 3 | 10 | 14 | 37 | 2,830 | ..... | .... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 2 | 5 | 2 | 2 | 3 | 5 | 1 | 5 | 2 | 1 | ..... | 1 |
| East Orange | 22 | 17 | 12 | 48 | 40 | 141 | 10,328 | ..... | 3 | 3 | ..... | ..... | 1 | 2 | 11 | ..... | 10 | 15 | 5 | 22 | 3 | 17 | 7 | 8 | 6 | 7 | 1 | 4 |
| Franklin | 4 | ..... | ..... | 2 | 5 | 11 | 1,602 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 2 | 1 | ..... | 2 | 2 | ..... | 1 | 1 | ..... | ..... | ..... |
| Livingston | 2 | ..... | 1 | 5 | 16 | 24 | 1,275 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 4 | ..... | 2 | 2 | 4 | 2 | 3 | ..... | ..... | 1 |
| Milburn | 10 | 8 | 6 | 8 | 15 | 47 | 2,023 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 11 | ..... | 6 | 3 | 3 | 2 | 1 | 6 | 3 | 5 | 3 | ..... | ..... | ..... | 1 |
| Montclair | 15 | 8 | 17 | 17 | 13 | 70 | 6,327 | ..... | ..... | 2 | ..... | 1 | ..... | ..... | 9 | 1 | 8 | 2 | 2 | 4 | 9 | 7 | 3 | 5 | 5 | 3 | ..... | ..... | ..... |
| Newark | 885 | 658 | 385 | 1210 | 572 | 3,729 | 152,988 | 24.38 | 31 | 94 | ..... | 68 | 16 | 21 | 438 | 8 | 443 | 207 | 258 | 410 | 302 | 203 | 129 | 250 | 151 | 80 | 4 | 42 | 117 |
| Orange | 76 | 45 | 33 | 105 | 41 | 300 | 15,231 | 19 70 | ..... | 5 | ..... | 4 | ..... | ..... | 32 | 3 | 34 | 25 | 19 | 38 | 29 | 17 | 21 | 9 | 10 | 7 | ..... | 6 | 9 |
| South Orange | 12 | 7 | 7 | 11 | 8 | 45 | 4,225 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | 5 | 1 | 6 | 3 | 5 | 4 | 2 | 3 | 3 | 3 | 1 | ..... | ..... | ..... | ..... |
| West Orange | 11 | 8 | 4 | 12 | 20 | 55 | 3,812 | ..... | ..... | ..... | ..... | 3 | ..... | ..... | 3 | 1 | 5 | 7 | 4 | 9 | 1 | 2 | 1 | 2 | 1 | 4 | ..... | 1 | 2 |
| Totals | 1086 | 779 | 497 | 1479 | 796 | 4,662 | 213,764 | 21.81 | 38 | 110 | ..... | 78 | 17 | 24 | 529 | 14 | 540 | 378 | 313 | 519 | 364 | 293 | 178 | 317 | 189 | 111 | 5 | 52 | 142 |



*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, 1885.*

| GLOUCESTER COUNTY. Population, 27,603. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clayton | 5 | 8 | 4 | 11 | 14 | 42 | 2,399 | ..... | 1 | 3 | ..... | 2 | ..... | 1 | 2 | ..... | 6 | 4 | 4 | 2 | 1 | 3 | ..... | 6 | 1 | 3 | ..... | ..... | ..... |
| Deptford | 2 | 6 | 3 | 3 | 12 | 26 | 1,744 | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 1 | ..... | ..... | 3 | 5 | 4 | 2 | 1 | ..... | ..... | ..... | ..... | 1 |
| East Greenwich | 4 | 3 | 3 | 3 | 11 | 24 | 1,233 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | ..... | ..... | 3 | ..... | ..... | 3 | 1 | 2 | 2 | 4 | 1 | ..... | ..... | ..... | 2 |
| Franklin | 13 | 13 | 4 | 8 | 16 | 54 | 2,362 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 17 | 3 | 6 | 7 | 4 | 3 | 2 | 2 | 4 | ..... | ..... | ..... | 3 |
| Glassboro | 11 | 4 | 5 | 11 | 7 | 39 | 2,377 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 2 | ..... | 8 | 4 | 2 | 5 | 2 | 1 | ..... | 3 | ..... | ..... | ..... | ..... | 2 |
| Greenwich | 12 | 2 | 3 | 13 | 12 | 43 | 1,729 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 7 | 2 | 4 | 2 | 2 | 1 | 3 | 8 | 3 | ..... | 1 | ..... | 3 |
| Harrison | 4 | 5 | 1 | 6 | 16 | 32 | 1,637 | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 1 | ..... | 2 | 4 | 3 | 3 | 3 | 1 | 2 | 1 | 5 | 1 | ..... | 1 | 3 |
| Logan | 6 | 1 | 1 | 7 | 9 | 24 | 1,653 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 4 | 1 | 3 | 1 | 1 | 1 | ..... | 4 | 5 | ..... | ..... | ..... | ..... |
| Mantua | 2 | 3 | ..... | 8 | 9 | 22 | 1,624 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... | 4 | 1 | 1 | 2 | ..... | 1 | ..... | 1 | ..... | ..... | 2 |
| Monroe | 5 | 7 | 6 | 7 | 10 | 37 | 1,950 | ..... | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... | 10 | 6 | 1 | 1 | 4 | 2 | 1 | 1 | 3 | ..... | ..... | 1 | 2 |
| South Harrison | ..... | 1 | ..... | 1 | 3 | 5 | 1,091 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... | ..... |
| Washington | 5 | 1 | 1 | 5 | 5 | 17 | 1,265 | ..... | ..... | 1 | ..... | 1 | ..... | 1 | ..... | ..... | 2 | 1 | 3 | 2 | ..... | 1 | 1 | 2 | 1 | ..... | ..... | ..... | ..... |
| West Deptford | 3 | 1 | 4 | 3 | 2 | 13 | 1,305 | ..... | 2 | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... | 2 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 |
| Woodbury | 17 | 7 | 4 | 8 | 15 | 51 | 3,278 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 2 | ..... | 11 | 3 | 6 | 2 | 6 | 1 | 3 | 6 | 2 | 1 | ..... | ..... | ..... |
| Woolwich | 4 | 3 | 6 | 8 | 10 | 32 | 2,046 | ..... | 1 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 4 | 4 | 1 | 3 | 3 | 3 | 1 | 3 | 2 | 1 | ..... | ..... | ..... |
| Totals | 93 | 65 | 45 | 102 | 151 | 461 | 27,603 | 16.70 | 5 | 11 | ..... | 10 | ..... | 5 | 10 | ..... | 77 | 32 | 40 | 38 | 33 | 25 | 17 | 42 | 28 | 7 | 3 | 3 | 19 |

*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, 1885.*

| HUDSON COUNTY. Population, 240,342. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | | | Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
| Bayonne | 78 | 42 | 12 | 76 | 34 | 243 | 13,080 | 18.58 | 3 | 8 | ..... | 4 | 1 | 2 | 15 | 1 | 27 | 13 | 12 | 29 | 32 | 14 | 5 | 14 | 7 | 3 | ..... | 4 | 19 |
| Guttenberg | 13 | 5 | 3 | 10 | 2 | 33 | 1,615 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | 1 | ..... | 7 | 1 | 2 | 4 | 4 | 1 | ..... | 1 | ..... | 1 | ..... | 2 | ..... |
| Harrison | 42 | 23 | 20 | 56 | 17 | 159 | 6,806 | 23.36 | 1 | 4 | ..... | ..... | ..... | ..... | 18 | ..... | 20 | 15 | 12 | 20 | 20 | 5 | 4 | 12 | 4 | 2 | ..... | 2 | 7 |
| Hoboken | 237 | 127 | 60 | 310 | 109 | 843 | 37,721 | 22.35 | 3 | 21 | ..... | 10 | 5 | 7 | 47 | 4 | 125 | 62 | 58 | 85 | 81 | 53 | 39 | 53 | 32 | 19 | 4 | 9 | 38 |
| Jersey City | 869 | 673 | 373 | 1099 | 423 | 3,442 | 153,513 | 22 42 | 24 | 100 | ..... | 294 | 28 | 32 | 173 | 10 | 375 | 216 | 200 | 459 | 313 | 170 | 123 | 153 | 136 | 52 | 5 | 37 | 122 |
| Kearny | 15 | 14 | 2 | 10 | 4 | 46 | 3,338 | ..... | 3 | 1 | ..... | ..... | ..... | ..... | 8 | ..... | 5 | 3 | 1 | 2 | 8 | ..... | ..... | 2 | 1 | ..... | ..... | 1 | 5 |
| North Bergen | 42 | 15 | 10 | 97 | 60 | 225 | 5,459 | ..... | 2 | 3 | 2 | 1 | ..... | 1 | 7 | ..... | 13 | 37 | 16 | 13 | 12 | 11 | 19 | 24 | 11 | 2 | ..... | 1 | 11 |
| Town of Union | 68 | 46 | 28 | 52 | 23 | 217 | 8,398 | 25.84 | 4 | 5 | ..... | 4 | 5 | ..... | 47 | 1 | 19 | 16 | 9 | 23 | 20 | 11 | 2 | 8 | 8 | 7 | ..... | 5 | 2 |
| Union | 14 | 9 | 5 | 6 | 3 | 37 | 1,781 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 8 | ..... | 4 | 1 | 2 | 4 | 5 | 1 | ..... | ..... | 2 | ..... | ..... | ..... | 1 |
| Weehawken | 6 | 5 | 5 | 14 | 6 | 36 | 1,469 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | 1 | ..... | 4 | 3 | 1 | 4 | 3 | 2 | 1 | 2 | 1 | ..... | 1 | ..... | 8 |
| West Hoboken | 47 | 23 | 11 | 34 | 16 | 128 | 7,162 | ..... | 4 | ..... | ..... | 1 | ..... | 1 | 15 | ..... | 21 | 8 | 1 | 24 | 13 | 5 | 5 | 8 | 4 | 2 | ..... | 1 | 1 |
| Totals | 1431 | 982 | 529 | 1761 | 697 | 5,409 | 240,342 | 22.51 | 44 | 144 | 2 | 319 | 39 | 43 | 340 | 16 | 620 | 375 | 314 | 667 | 514 | 273 | 198 | 277 | 206 | 88 | 10 | 62 | 214 |



*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, 1885.*

| HUNTERDON COUNTY. Population, 37,420. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | | | Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
| Alexandria | 4 | 1 | ..... | 5 | 8 | 18 | 1,235 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 1 | ..... | 1 | 1 | 3 | 1 | 4 | 1 | 1 | ..... | ..... | ..... |
| Bethlehem | 5 | 1 | 2 | 10 | 15 | 33 | 2,780 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 4 | 1 | 4 | 2 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Clinton | 8 | 9 | 1 | 12 | 13 | 43 | 2,900 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | 6 | ..... | 2 | 4 | 5 | 3 | 3 | ..... | 1 | 5 | 4 | ..... | ..... | 1 | 2 |
| Delaware | 6 | 8 | ..... | 17 | 18 | 43 | 3,092 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... | ..... | 1 | 7 | 5 | 1 | 1 | 2 | 1 | 8 | 2 | 2 | ..... | ..... | ..... |
| East Amwell | 2 | ..... | 2 | 3 | 7 | 14 | 1,549 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 2 | ..... | ..... | 2 | 2 | 1 | 2 | 1 | ..... | ..... | ..... | 2 |
| Franklin | 1 | 1 | 1 | 5 | 9 | 17 | 1,387 | ..... | ..... | 2 | ..... | 1 | ..... | ..... | ..... | 2 | 1 | 1 | 3 | 1 | ..... | 2 | ..... | 2 | 1 | 1 | ..... | ..... | ..... | ..... |
| Frenchtown | 2 | 1 | 1 | 2 | 5 | 11 | 1,066 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 | ..... | 1 | 1 | 1 | ..... | ..... | 1 | 1 | 3 | ..... | ..... | ..... | ..... |
| High Bridge | 3 | 4 | 5 | 11 | 6 | 29 | 2,024 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 3 | ..... | 1 | 5 | 4 | 4 | 3 | 1 | ..... | 2 | 2 | 1 | ..... | ..... | ..... | 1 |
| Holland | 2 | ..... | 1 | 5 | 11 | 19 | 1,867 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | ..... | 2 | 1 | 3 | 2 | 4 | 2 | ..... | ..... | ..... | ..... | 1 |
| Kingwood | ..... | 3 | 1 | 7 | 9 | 20 | 1,482 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 | 2 | 2 | 1 | 3 | 3 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | 2 |
| Lambertville | 9 | 8 | 5 | 18 | 27 | 67 | 4,067 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 4 | 9 | 9 | 5 | 3 | 4 | 2 | 11 | 3 | ..... | ..... | ..... | ..... | 3 |
| Lebanon | 3 | 4 | 3 | 14 | 20 | 44 | 2,816 | ..... | ..... | 3 | ..... | 1 | ..... | ..... | 3 | 1 | ..... | ..... | 6 | 1 | 4 | 7 | 2 | 7 | 2 | 2 | ..... | 2 | 1 | |
| Raritan | 3 | 1 | ..... | 6 | 8 | 19 | 3,978 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 3 | 1 | ..... | ..... | 5 | ..... | 2 | ..... | ..... | ..... | ..... | ..... | 2 |
| Readington | 6 | ..... | 3 | 11 | 13 | 35 | 2,940 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 4 | 6 | 1 | 4 | 6 | 1 | 4 | 1 | 1 | ..... | ..... | ..... | 2 |
| Tewksbury | 6 | 4 | 2 | 9 | 14 | 35 | 2,081 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | 3 | ..... | 3 | 2 | 3 | 2 | 2 | 4 | 1 | 3 | 3 | 2 | ..... | ..... | ..... | ..... |
| Union | 1 | 1 | 1 | ..... | 4 | 7 | 1,195 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| West Amwell | 3 | 1 | 1 | 4 | 3 | 12 | 960 | ..... | ..... | 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 2 | 1 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Totals | 64 | 47 | 29 | 139 | 190 | 466 | 37,420 | 12.45 | 3 | 13 | ..... | 8 | ..... | .... | 19 | 4 | 27 | 42 | 53 | 26 | 30 | 45 | 16 | 59 | 30 | 10 | ..... | 4 | 17 |

*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, 1885.*

| MERCER COUNTY. Population, 66,785. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases | Brain and nervous diseases of children | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chambersburg | 41 | 13 | 11 | 52 | 22 | 140 | 8,542 | 16.39 | ..... | 3 | ..... | 6 | ..... | ..... | 6 | ..... | 21 | 15 | 11 | 12 | 5 | 13 | 5 | 10 | 6 | 4 | ..... | 3 | 6 |
| East Windsor | 6 | 2 | 2 | 11 | 13 | 35 | 2,568 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 2 | 2 | ..... | 1 | 3 | 2 | 3 | 1 | 7 | 4 | 1 | ..... | ..... | 1 |
| Ewing | 3 | 1 | 2 | 41 | 39 | 81 | 2,489 | ..... | ..... | 4 | ..... | ..... | ..... | 1 | ..... | ..... | 2 | 2 | 8 | 2 | ..... | 4 | 1 | 40 | 6 | ..... | ..... | ..... | 4 |
| Hamilton | 6 | 2 | 3 | 11 | 15 | 37 | 3,420 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 1 | ..... | 4 | 3 | ..... | 3 | 1 | 4 | ..... | 5 | 6 | 1 | ..... | ..... | 3 |
| Hopewell | 6 | 2 | 4 | 11 | 26 | 54 | 4,367 | ..... | 1 | ..... | ..... | ..... | ..... | 3 | 1 | ..... | 1 | 4 | 5 | 7 | 2 | 1 | 1 | 13 | 6 | 1 | 1 | ..... | 1 |
| Lawrence | 5 | 2 | 4 | 7 | 7 | 25 | 1,589 | ..... | ..... | 2 | ..... | ..... | ..... | 1 | 1 | ..... | 3 | ..... | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 1 | ..... | ..... | 4 |
| Millham | 8 | 4 | 4 | 7 | 5 | 29 | 2,338 | ..... | 1 | 1 | ..... | ..... | ..... | 2 | ..... | ..... | 5 | 4 | 2 | 3 | 2 | ..... | 1 | 3 | ..... | ..... | ..... | ..... | ..... |
| Princeton | 24 | 24 | 13 | 24 | 31 | 116 | 4,577 | ..... | 3 | 2 | ..... | 1 | ..... | 4 | 27 | ..... | 9 | 9 | 1 | 13 | 2 | 7 | 6 | 9 | 5 | 4 | ..... | ..... | 2 |
| Trenton | 160 | 65 | 50 | 174 | 133 | 601 | 34,386 | 17.48 | 2 | 11 | ..... | 9 | 1 | 4 | 22 | 1 | 87 | 57 | 31 | 42 | 47 | 40 | 25 | 54 | 41 | 15 | ..... | 5 | 32 |
| Washington | 2 | 1 | 3 | 10 | 10 | 26 | 1,196 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 2 | 4 | 1 | 1 | 4 | 2 | 4 | 5 | ..... | ..... | ..... | ..... |
| West Windsor | 1 | 1 | 1 | 4 | 11 | 19 | 1,313 | ..... | 1 | 1 | ..... | 1 | ..... | ..... | 1 | ..... | ..... | 1 | ..... | 2 | ..... | 1 | 2 | 4 | ..... | ..... | ..... | ..... | 1 |
| Totals | 262 | 117 | 97 | 322 | 312 | 1,163 | 66,785 | 17.41 | 8 | 28 | ..... | 17 | 1 | 15 | 59 | 3 | 136 | 97 | 65 | 90 | 64 | 80 | 45 | 151 | 80 | 27 | 1 | 8 | 54 |



*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, 1885.*

| MIDDLESEX COUNTY. Population, 56,180. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cranbury | 7 | 3 | 5 | 8 | 11 | 35 | 1,569 | ..... | ..... | ..... | ..... | 3 | 3 | .... | 2 | ..... | 5 | 2 | 2 | 4 | 1 | 1 | 2 | 3 | 3 | ..... | ..... | ..... | 2 |
| East Brunswick | 12 | 9 | 8 | 9 | 14 | 52 | 3,697 | ..... | 1 | 2 | ..... | 2 | 1 | 3 | 1 | ..... | 13 | 2 | 1 | 1 | ..... | 4 | 3 | 3 | 1 | 2 | ..... | 2 | 1 |
| Madison | 1 | 4 | ..... | 1 | 7 | 13 | 1,519 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 3 | ..... | ..... | 2 | 1 | 3 | 1 | ..... | 1 | ..... | 1 | ..... | ..... |
| Monroe | 6 | 1 | 2 | 7 | 14 | 31 | 3,199 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 2 | 2 | 4 | 2 | 5 | ..... | 2 | 2 | 4 | ..... | 1 | ..... | ..... | 2 |
| New Brunswick | 81 | 29 | 29 | 113 | 82 | 336 | 18,258 | 18 40 | 1 | 10 | ..... | 3 | ..... | 3 | 12 | 2 | 52 | 35 | 34 | 22 | 13 | 27 | 16 | 24 | 21 | 9 | 2 | 3 | 17 |
| North Brunswick | 3 | 3 | 4 | 9 | 6 | 26 | 1,272 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 1 | ..... | 3 | 3 | 1 | 3 | 2 | 2 | ..... | 4 | ..... | 2 | ..... | 1 | 1 |
| Perth Amboy | 57 | 44 | 12 | 41 | 20 | 165 | 6,311 | ..... | 2 | 3 | ..... | 20 | 1 | 7 | 3 | ..... | 19 | 9 | 10 | 6 | 22 | 7 | 7 | 8 | 3 | ..... | 1 | 3 | 10 |
| Piscataway | 6 | 1 | 3 | 13 | 15 | 40 | 3,155 | ..... | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... | 5 | 2 | 1 | 4 | 1 | 4 | 6 | 5 | 2 | ..... | ..... | 1 | 1 |
| Raritan | 11 | 3 | 1 | 11 | 16 | 47 | 3,656 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8 | 1 | 3 | 1 | 1 | 3 | 2 | 7 | 4 | 2 | ..... | ..... | 4 |
| Sayreville | 5 | 6 | 3 | 3 | 3 | 20 | 2,549 | ..... | ..... | 1 | ..... | ..... | 1 | 1 | 1 | ..... | 5 | 3 | ..... | 1 | 1 | ..... | ..... | ..... | 3 | ..... | ..... | ..... | 1 |
| South Amboy | 19 | 17 | 4 | 21 | 8 | 69 | 4,054 | ..... | 1 | 1 | ..... | 3 | ..... | 4 | 4 | 1 | 6 | 3 | 3 | 10 | 6 | 1 | ..... | 6 | 6 | 1 | ..... | 1 | 4 |
| South Brunswick | 9 | 5 | 7 | 12 | 10 | 47 | 2,714 | ..... | 1 | 1 | ..... | ..... | 1 | ..... | 5 | ..... | 7 | 3 | 3 | 2 | ..... | 4 | 2 | 2 | 1 | 5 | ..... | 1 | 3 |
| Woodbridge | 19 | 6 | 6 | 13 | 19 | 64 | 4,227 | ..... | 1 | 2 | ..... | 1 | ..... | ..... | ..... | ..... | 11 | 7 | 3 | 7 | 6 | 5 | 4 | 6 | ..... | 1 | ..... | ..... | 2 |
| Totals | 236 | 131 | 84 | 261 | 225 | 946 | 56,180 | 16.84 | 7 | 23 | ..... | 33 | 7 | 20 | 29 | 5 | 139 | 74 | 63 | 68 | 54 | 63 | 45 | 72 | 50 | 23 | 4 | 12 | 48 |

*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, 1885.*

| MONMOUTH COUNTY. Population, 62,324. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic | 3 | 1 | 2 | 12 | 6 | 24 | 1,656 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 2 | 2 | 3 | 2 | ..... | 3 | 2 | 2 | 2 | ..... | ..... |
| Eatontown | 5 | 3 | 4 | 11 | 16 | 39 | 2,812 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 7 | 2 | 4 | 3 | ..... | 3 | 4 | 4 | 2 | 1 | 2 | 1 |
| Freehold | 15 | 23 | 9 | 27 | 25 | 100 | 4,494 | ..... | 1 | ..... | ..... | ..... | 7 | ..... | 9 | ..... | 14 | 6 | 7 | 9 | 8 | 12 | 1 | 11 | 6 | 1 | ..... | ..... | 1 |
| Holmdel | 4 | 7 | 1 | 4 | 11 | 27 | 1,649 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 10 | 1 | 4 | 2 | 1 | ..... | 1 | 2 | 2 | 1 | ..... | ..... | ..... |
| Howell | 7 | 6 | 2 | 11 | 12 | 38 | 3,308 | ..... | 1 | ..... | ..... | ..... | 2 | ..... | ..... | ..... | 3 | 2 | 2 | 7 | 1 | 3 | 2 | 2 | 6 | ..... | ..... | ..... | 2 |
| Manalapan | 5 | 8 | 2 | 8 | 10 | 33 | 2,143 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 3 | ..... | 1 | 1 | 4 | 5 | 4 | 3 | 1 | 3 | 3 | ..... | ..... | ..... | 2 |
| Marlboro | 5 | 3 | 2 | 8 | 11 | 29 | 2,089 | ..... | ..... | ..... | ..... | 2 | 1 | ..... | 1 | ..... | ..... | 1 | ..... | 2 | 5 | 2 | 1 | 2 | 6 | 2 | ..... | ..... | ..... |
| Matawan | 14 | 3 | 5 | 12 | 13 | 47 | 2,756 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 2 | 6 | 4 | 11 | 7 | 5 | 5 | ..... | 2 | ..... | ..... | ..... | ..... |
| Middletown | 24 | 15 | 9 | 26 | 25 | 100 | 5,802 | ..... | 5 | 3 | ..... | ..... | 3 | 2 | 3 | 1 | 8 | 7 | 4 | 13 | 10 | 5 | 3 | 7 | 7 | 2 | ..... | ..... | 2 |
| Millstone | 4 | ..... | 2 | 6 | 10 | 22 | 1,917 | ..... | ..... | 2 | ..... | ..... | 1 | ..... | 1 | ..... | 1 | 1 | 1 | 2 | ..... | 2 | 1 | 1 | 2 | ..... | ..... | 1 | 1 |
| Neptune | 39 | 9 | 13 | 29 | 31 | 122 | 6,421 | ..... | 5 | 3 | ..... | 1 | ..... | 2 | 2 | ..... | 22 | 4 | 9 | 14 | 7 | 12 | 2 | 6 | 10 | 1 | 1 | ..... | 1 |
| Ocean | 30 | 20 | 10 | 37 | 23 | 126 | 7,540 | ..... | 2 | ..... | ..... | ..... | 1 | ..... | 9 | ..... | 14 | 5 | 5 | 12 | 8 | 7 | 11 | 9 | 10 | 3 | 1 | 1 | 12 |
| Raritan | 23 | 7 | 7 | 26 | 31 | 94 | 4,238 | ..... | 2 | 4 | ..... | 2 | 1 | ..... | 5 | 1 | 10 | 4 | 8 | 10 | 1 | 5 | 6 | 11 | 5 | 1 | ..... | 1 | 3 |
| Shrewsbury | 30 | 15 | 10 | 38 | 37 | 132 | 7,558 | ..... | ..... | 5 | ..... | 2 | 1 | ..... | 3 | ..... | 21 | 9 | 9 | 22 | 5 | 9 | 7 | 18 | 4 | 1 | ..... | 1 | 6 |
| Upper Freehold | 9 | 5 | 4 | 9 | 23 | 51 | 3,130 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 | 2 | 4 | 9 | 5 | 1 | 1 | 9 | 2 | ..... | ..... | ..... | 2 |
| Wall | 21 | 16 | 8 | 18 | 18 | 81 | 4,820 | ..... | 1 | 2 | ..... | ..... | 4 | ..... | ..... | ..... | 9 | 2 | 7 | 11 | 5 | 4 | 2 | 6 | 4 | 1 | ..... | 1 | 7 |
| Totals | 238 | 141 | 90 | 282 | 302 | 1,065 | 62,324 | 17 09 | 17 | 20 | ..... | 7 | 22 | 4 | 39 | 3 | 119 | 60 | 72 | 136 | 72 | 70 | 50 | 93 | 75 | 17 | 3 | 7 | 40 |



*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, 1885.*

| MORRIS COUNTY. Population, 50,675. Statistical Divisions | DEATHS AT ALL AGES. Under one year | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boonton | 9 | 4 | 3 | 21 | 16 | 53 | 2,732 | ..... | ..... | 1 | ..... | ..... | ..... | 1 | 3 | ..... | 5 | 6 | 4 | 5 | ..... | 1 | 4 | 6 | 3 | 4 | ..... | 1 | 5 |
| Chatham | 13 | 6 | 8 | 23 | 20 | 71 | 4,291 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 6 | ..... | 4 | 8 | 7 | 13 | 4 | 4 | 5 | 5 | 4 | 2 | ..... | ..... | ..... |
| Chester | 5 | 3 | 2 | 17 | 10 | 36 | 2,510 | ..... | 1 | 2 | ..... | ..... | 2 | ..... | ..... | ..... | 6 | 2 | 4 | 4 | 2 | ..... | 2 | 3 | 3 | 3 | ..... | ..... | 1 |
| Hanover | 10 | 4 | 6 | 48 | 44 | 110 | 4,459 | ..... | 2 | ..... | ..... | 2 | ..... | ..... | 1 | ..... | 3 | 5 | 5 | 10 | 3 | 8 | 3 | 49 | 6 | ..... | ..... | 1 | ..... |
| Jefferson | 5 | 3 | 2 | 4 | 7 | 21 | 1,559 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 2 | 3 | 2 | 2 | ..... | 2 | ..... | ..... | ..... | ..... | 2 |
| Mendham | 2 | ..... | 1 | 4 | 15 | 22 | 1,431 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5 | 3 | 3 | 4 | ..... | 1 | 5 | ..... | ..... | ..... | 1 |
| Montville | 1 | 1 | 2 | 3 | 7 | 14 | 1,225 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... | 1 | 1 | 2 | ..... | 3 | 3 | 1 | ..... | 1 | ..... | ..... | ..... |
| Morristown | 22 | 10 | 7 | 54 | 34 | 128 | 8,760 | 14.61 | 2 | 2 | ..... | ..... | 3 | ..... | 1 | 7 | 1 | 14 | 10 | 13 | 7 | 1 | 14 | 9 | 16 | 10 | 4 | ..... | 4 |
| Mt. Olive | 2 | 4 | 4 | 10 | 11 | 31 | 2,005 | ..... | ..... | 3 | ..... | ..... | ..... | 1 | ..... | ..... | 3 | 4 | 1 | 3 | 3 | 4 | 2 | 2 | 1 | 1 | ..... | 1 | ..... |
| Passaic | 5 | ..... | ..... | 4 | 11 | 20 | 1,716 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 4 | 2 | 4 | ..... | ..... | 3 | ..... | 3 | ..... | ..... | ..... | ..... |
| Pequannock | 11 | 2 | 6 | 13 | 13 | 45 | 2,625 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | 1 | ..... | 3 | 5 | 1 | 3 | 1 | 5 | 3 | 5 | 3 | 1 | ..... | 2 | ..... |
| Randolph | 28 | 8 | 12 | 31 | 27 | 107 | 7,045 | ..... | ..... | 3 | ..... | 1 | ..... | ..... | 2 | ..... | 12 | 6 | 7 | 8 | 11 | 7 | 5 | 12 | 7 | 2 | 1 | 4 | 4 |
| Rockaway | 16 | 15 | 11 | 30 | 26 | 98 | 5,573 | ..... | ..... | 3 | ..... | 7 | ..... | ..... | 9 | ..... | 7 | 7 | 10 | 15 | 6 | 3 | 3 | 6 | 6 | 2 | ..... | 3 | 2 |
| Roxbury | 11 | 7 | 1 | 2 | 5 | 27 | 2,184 | ..... | 1 | ..... | ..... | ..... | ..... | 2 | ..... | 1 | 9 | ..... | ..... | ..... | 3 | 2 | ..... | 1 | 1 | ..... | ..... | 2 | 3 |
| Washington | 4 | 3 | 2 | 2 | 12 | 23 | 2,560 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 3 | ..... | 2 | ..... | 2 | 3 | ..... | 2 | 1 | 6 | 1 | ..... | ..... | ..... | ..... |
| Totals | 144 | 70 | 67 | 266 | 258 | 808 | 50,675 | 15.94 | 6 | 17 | ..... | 18 | ..... | 5 | 34 | 2 | 71 | 58 | 64 | 83 | 39 | 59 | 43 | 115 | 53 | 20 | 1 | 16 | 18 |

*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, 1885.*

| OCEAN COUNTY. Population, 15,586. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Berkeley | 6 | 3 | ..... | 7 | 4 | 20 | 714 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 5 | ..... | 1 | 2 | 2 | 2 | ..... | 3 | 1 | 1 | ..... | ..... | ..... |
| Brick | 17 | 12 | 2 | 22 | 17 | 71 | 3,794 | ..... | 2 | ..... | 2 | ..... | ..... | 1 | ..... | ..... | 7 | 3 | 5 | 15 | 3 | 2 | 6 | 8 | 2 | ..... | 1 | 3 |
| Dover | 5 | 5 | 4 | 14 | 13 | 41 | 2,591 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 5 | ..... | 3 | 4 | 6 | 5 | 4 | 1 | 2 | 6 | 4 | 1 | ..... | ..... | 2 |
| Eagleswood | 4 | 2 | ..... | 4 | 7 | 17 | 681 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 3 | ..... | 3 | 2 | 1 | ..... | 1 | 3 | ..... | ..... | ..... | ..... | ..... |
| Jackson | ..... | 1 | 5 | 3 | 10 | 20 | 1,763 | ..... | ..... | 1 | ..... | ..... | 4 | ..... | 1 | ..... | ..... | 2 | ..... | 3 | ..... | ..... | ..... | 4 | 2 | 1 | ..... | ..... | ..... |
| Lacey | 2 | 3 | ..... | 4 | 10 | 19 | 746 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 1 | 2 | 4 | 2 | 1 | 2 | 2 | ..... | 1 | ..... | ..... | 1 |
| Manchester | 1 | 4 | ..... | 3 | 2 | 10 | 1,098 | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... | 2 | 1 | 1 | 1 | ..... | 1 | ..... | 1 | ..... | ..... | ..... | ..... | 1 |
| Ocean | ..... | ..... | ..... | 4 | 3 | 8 | 541 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 1 | 4 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Plumstead | 5 | 2 | 2 | 7 | 15 | 31 | 1,546 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 1 | 4 | ..... | 1 | 2 | 1 | 4 | 6 | ..... | ..... | 1 | ..... |
| Stafford | 2 | 1 | ..... | 6 | 6 | 15 | 1,026 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 3 | ..... | ..... | ..... | 2 | 1 | 2 | 1 | ..... | ..... | ..... | ..... |
| Union | 2 | 4 | 1 | 4 | 3 | 16 | 1,083 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | 3 | 2 | 2 | ..... | 1 | 1 | ..... | 2 | ..... | ..... | ..... | 1 | ..... |
| Totals | 44 | 37 | 14 | 78 | 90 | 268 | 15,586 | 17.19 | 2 | 9 | ..... | ..... | 9 | ..... | 8 | ..... | 29 | 18 | 28 | 32 | 14 | 12 | 13 | 36 | 16 | 4 | ..... | 3 | 7 |

*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, 1885.*

| PASSAIC COUNTY. Population, 83,374. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acquackanonk | 10 | 2 | 2 | 10 | 6 | 30 | 2,038 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | 2 | ..... | 5 | ..... | 4 | 5 | 2 | ..... | 1 | 2 | ..... | 2 | ..... | ..... | 1 |
| Little Falls | 8 | 3 | 3 | 11 | 8 | 33 | 1,701 | ..... | 3 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 2 | 1 | 2 | 3 | 3 | 2 | 3 | 1 | 4 | ..... | ..... | ..... | 3 |
| Manchester | 7 | 1 | ..... | 8 | 6 | 22 | 1,639 | ..... | 1 | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 4 | 1 | 1 | 2 | 2 | ..... | 1 | 2 | 3 | 1 | ..... | ..... | ..... |
| Passaic | 44 | 22 | 11 | 45 | 16 | 139 | 8,326 | 16.69 | 2 | 8 | ..... | ..... | 5 | 2 | 2 | 1 | 25 | 10 | 7 | 15 | 15 | 6 | 3 | 9 | 6 | 4 | ..... | 5 | 4 |
| Paterson | 384 | 184 | 86 | 393 | 220 | 1,284 | 63,273 | 20.29 | 9 | 39 | ..... | 17 | 12 | 5 | 71 | 6 | 183 | 89 | 89 | 145 | 101 | 68 | 49 | 73 | 59 | 33 | ..... | 18 | 36 |
| Pompton | 13 | 2 | 4 | 9 | 9 | 38 | 2,109 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 3 | 1 | ..... | 6 | 3 | 6 | 2 | 3 | 3 | 1 | ..... | ..... | ..... |
| Wayne | 2 | 3 | 1 | 3 | 5 | 14 | 1,866 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 3 | ..... | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | ..... | ..... | ..... | ..... | 1 |
| West Milford | 10 | 4 | 3 | 10 | 11 | 38 | 2,422 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 4 | ..... | 1 | ..... | 3 | 4 | 2 | 6 | ..... | 9 | 1 | 1 | ..... | ..... | ..... |
| Totals | 478 | 221 | 110 | 449 | 281 | 1,593 | 83,374 | 19.17 | 17 | 50 | ..... | 17 | 17 | 7 | 86 | 7 | 244 | 103 | 107 | 181 | 129 | 89 | 60 | 101 | 76 | 42 | ..... | 23 | 45 |

*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, 1885.*

| SALEM COUNTY. Population, 25,373. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alloways | 2 | 3 | 2 | 4 | 6 | 19 | 1,749 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 2 | ..... | 3 | 3 | ..... | ..... | 2 | 2 | ..... | 1 | ..... | ..... | 1 |
| Elsinboro | 1 | ..... | ..... | 2 | 1 | 4 | 571 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Lower Alloways Creek | 3 | 1 | 3 | 2 | 8 | 18 | 1,365 | ..... | 1 | 1 | ..... | 1 | ..... | ..... | 1 | ..... | 1 | ..... | 1 | 1 | 1 | 1 | 2 | 1 | 2 | ..... | ..... | ..... | 1 |
| Lower Penns Neck | 4 | 1 | 4 | 8 | 5 | 23 | 1,408 | ..... | ..... | 4 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 3 | 5 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Mannington | 9 | 4 | 4 | 8 | 12 | 38 | 2,161 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... | ..... | 3 | 3 | 4 | 4 | 3 | 1 | 2 | 1 | 1 | ..... | ..... | 1 | ..... |
| Oldmans | 3 | 2 | ..... | 4 | 8 | 18 | 1,463 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 2 | ..... | 2 | 2 | ..... | 2 | 1 | ..... | ..... | ..... | ..... |
| Pilesgrove | 13 | 3 | 4 | 19 | 15 | 54 | 3,397 | ..... | ..... | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Pittsgrove | 6 | 1 | 1 | 5 | 6 | 19 | 2,135 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 3 | ..... | 8 | 3 | 5 | 5 | 3 | 2 | ..... | 6 | 4 | 2 | ..... | 1 | 1 |
| Quinton | 5 | ..... | 2 | 1 | 5 | 13 | 1,460 | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... | ..... | 4 | ..... | ..... | 1 | ..... | 2 | 1 | ..... | ..... | 1 | ..... | ..... | 2 |
| Salem | 24 | 15 | 9 | 27 | 30 | 106 | 5,516 | 19.22 | 1 | 3 | ..... | ..... | ..... | ..... | 6 | ..... | 13 | 7 | 9 | 10 | 10 | 5 | 2 | 12 | 4 | 5 | 1 | 1 | 3 |
| Upper Penns Neck | 8 | 2 | 1 | 7 | 7 | 25 | 2,216 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 6 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | ..... | ..... | ..... |
| Upper Pittsgrove | 3 | 1 | 1 | 1 | 6 | 12 | 1,932 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 1 | ..... | 2 | 2 | 1 | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Totals | 81 | 33 | 31 | 88 | 109 | 349 | 25,373 | 13 75 | 3 | 19 | ..... | 4 | ..... | 1 | 12 | ..... | 41 | 22 | 32 | 29 | 23 | 18 | 11 | 33 | 15 | 10 | 1 | 3 | 8 |



*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, 1885.*

| SOMERSET COUNTY. Population, 27,425. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bedminster | 2 | 2 | 4 | 5 | 11 | 24 | 1,769 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5 | ..... | ..... | 2 | 1 | 3 | ..... | 2 | 1 | 5 | 1 | ..... | ..... | ..... | 2 |
| Bernards | 3 | 2 | 6 | 6 | 19 | 36 | 2,504 | ..... | 1 | 1 | ..... | 1 | ..... | ..... | 1 | 2 | 4 | 2 | 1 | 2 | 3 | 2 | ..... | 6 | 4 | ..... | ..... | 1 | 1 |
| Branchburg | ..... | 1 | 2 | 8 | 8 | 19 | 1,177 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 6 | 1 | 1 | 4 | 2 | 2 | 1 | ..... | ..... | ..... | 2 |
| Bridgewater | 29 | 16 | 17 | 48 | 33 | 143 | 8,454 | ..... | 2 | 3 | ..... | 2 | ..... | 2 | 15 | ..... | 12 | 6 | 14 | 14 | 7 | 6 | 6 | 17 | 5 | 5 | ..... | 2 | 9 |
| Franklin | 13 | 6 | 4 | 11 | 16 | 50 | 3,720 | ..... | 2 | ..... | ..... | ..... | ..... | 1 | 6 | ..... | 8 | ..... | 3 | 4 | 1 | 4 | 3 | 5 | 3 | 2 | ..... | ..... | 2 |
| Hillsborough | 8 | 4 | 3 | 9 | 17 | 41 | 3,151 | ..... | 1 | 1 | ..... | ..... | ..... | 1 | 1 | ..... | 6 | 2 | 2 | 4 | 4 | 4 | 1 | 4 | 2 | 1 | ..... | ..... | 1 |
| Montgomery | 7 | 1 | 4 | 10 | 13 | 35 | 1,800 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | 1 | 2 | 8 | 1 | 3 | 3 | 5 | 2 | 1 | ..... | ..... | 1 |
| North Plainfield | 12 | 3 | 5 | 22 | 10 | 52 | 3,728 | ..... | ..... | 1 | ..... | 2 | ..... | ..... | ..... | ..... | 7 | 3 | 4 | 8 | 2 | 4 | 3 | 1 | 3 | 2 | ..... | ..... | 5 |
| Warren | 7 | ..... | 1 | 4 | 6 | 18 | 1,122 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 2 | ..... | 1 | 1 | ..... | ..... | ..... | 1 | 2 | 4 | ..... | ..... | 2 |
| Totals | 81 | 35 | 46 | 123 | 133 | 418 | 27,425 | 15 24 | 6 | 6 | ..... | 5 | ..... | 5 | 30 | 2 | 39 | 16 | 31 | 45 | 19 | 29 | 19 | 46 | 23 | 15 | ..... | 3 | 25 |

*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, 1885.*

| SUSSEX COUNTY. Population, 22,401. Statistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Andover | 4 | 1 | 1 | 4 | 5 | 15 | 1,014 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 | ..... | 1 | 1 | ..... | 2 | ..... | 3 | 1 | 1 | ..... | 1 | 1 |
| Byram | 6 | 4 | ..... | 9 | 9 | 28 | 1,242 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 1 | 1 | 1 | 4 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | ..... | 1 | ..... |
| Frankford | 6 | 1 | 1 | 3 | 13 | 24 | 1,495 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 4 | 5 | 1 | 2 | ..... | 4 | ..... | 1 | ..... | ..... | ..... |
| Greene | 1 | ..... | 2 | 6 | 5 | 14 | 704 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 3 | 2 | ..... | ..... | 3 | ..... | ..... | 1 | ..... | ..... | 2 | 1 |
| Hardyston | 6 | 3 | 6 | 11 | 5 | 31 | 2,500 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 3 | ..... | 2 | 3 | 2 | 8 | 5 | 1 | ..... | 12 | 2 | ..... | ..... | ..... | 1 |
| Hampton | ..... | ..... | 1 | 4 | 3 | 8 | 938 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 3 | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Lafayette | ..... | 1 | ..... | 6 | 3 | 11 | 816 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 | 1 | 3 | ..... | 1 | 1 | 3 | ..... | ..... | ..... |
| Montague | 1 | 1 | 2 | 2 | 1 | 7 | 900 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 1 | 1 | ..... | ..... | 1 | 1 | ..... | ..... | ..... |
| Newton | 3 | 4 | 10 | 15 | 13 | 46 | 2,648 | ..... | ..... | 3 | ..... | ..... | ..... | ..... | 8 | ..... | ..... | 3 | 5 | 6 | 2 | 2 | 4 | ..... | 6 | 4 | 1 | 1 | ..... | 1 |
| Sandyston | 2 | 1 | 1 | 3 | 7 | 15 | 1,092 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | ..... | ..... | ..... | ..... |
| Sparta | 9 | 5 | 6 | 9 | 10 | 35 | 1,901 | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | 6 | 2 | 2 | 7 | 3 | 1 | 2 | 3 | 2 | ..... | ..... | ..... | 1 |
| Stillwater | 3 | 2 | ..... | 6 | 8 | 19 | 1,366 | ..... | 1 | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 3 | ..... | 4 | ..... | 2 | 1 | 2 | ..... | ..... | ..... | ..... | 1 |
| Vernon | 6 | 3 | 2 | 3 | 9 | 23 | 1,855 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... | 1 | ..... | 3 | 3 | 4 | ..... | ..... | ..... | ..... | ..... | ..... | 1 |
| Walpack | 2 | ..... | 1 | 2 | 1 | 6 | 553 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 1 | ..... | 1 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wantage | 3 | 3 | 2 | 10 | 22 | 42 | 3,377 | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 3 | 2 | 5 | ..... | 2 | 3 | 6 | 3 | 1 | ..... | 2 | 4 |
| Totals | 52 | 29 | 35 | 93 | 114 | 324 | 22,401 | 14.46 | 3 | 7 | ..... | ..... | ..... | 2 | 16 | 1 | 22 | 27 | 25 | 45 | 22 | 32 | 10 | 30 | 18 | 9 | 1 | 6 | 11 |



*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, 1885.*

| UNION COUNTY. Population, 61,839. Satistical Divisions. | DEATHS AT ALL AGES. Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including undefined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH. Remittent fever, etc. | Typhoid fever | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous diseases of children | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal diseases | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clark | ..... | ..... | ..... | 1 | 2 | 3 | 363 | ..... | ..... | ..... | ..... | 1 | 1 | ..... | 3 | ..... | ..... | ..... | ..... | ..... | 3 | 1 | 3 | 1 | 2 | 2 | ..... | ..... | ..... |
| Cranford | 3 | 3 | 4 | 9 | 3 | 22 | 1,251 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... | ..... | ..... |
| Elizabeth | 181 | 127 | 67 | 207 | 112 | 697 | 32,119 | 21.70 | 12 | 10 | ..... | 13 | 12 | 10 | 62 | 1 | 80 | 53 | 36 | 72 | 65 | 41 | 18 | 55 | 27 | 10 | 1 | 8 | 23 |
| Fanwood | 1 | 5 | 3 | 4 | 6 | 19 | 1,210 | ..... | ..... | ..... | ..... | 2 | ..... | ..... | 3 | ..... | 1 | ..... | 2 | ..... | 1 | 3 | 1 | ..... | 1 | ..... | ..... | ..... | 1 |
| Linden | 7 | 5 | 3 | 8 | 5 | 28 | 1,971 | ..... | ..... | ..... | ..... | 2 | ..... | ..... | 1 | ..... | 6 | ..... | 3 | 5 | 1 | 1 | 2 | ..... | 1 | ..... | ..... | ..... | 4 |
| New Providence | ..... | ..... | ..... | 6 | 8 | 14 | 824 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | 1 | ..... | 2 | ..... | 4 | 2 | 1 | ..... | ..... | ..... |
| Plainfield | 39 | 10 | 7 | 43 | 41 | 141 | 8,913 | 15.82 | 1 | 3 | ..... | 1 | ..... | ..... | 3 | ..... | 22 | 13 | 7 | 19 | 8 | 10 | 10 | 15 | 4 | 3 | ..... | 1 | 4 |
| Rahway | 15 | 11 | 16 | 30 | 35 | 107 | 6,831 | 15.60 | ..... | 5 | ..... | 7 | ..... | ..... | 1 | ..... | 12 | 14 | 11 | 11 | 5 | 8 | 3 | 12 | 1 | 1 | ..... | 2 | 2 |
| Springfield | 6 | 3 | 1 | 3 | 4 | 17 | 847 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | 1 | 2 | 1 | 1 | 4 | 2 | 1 | 1 | ..... | ..... | ..... | ..... | 1 |
| Summit | 7 | 4 | 1 | 10 | 5 | 27 | 2,539 | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 5 | 4 | 1 | 3 | 1 | 1 | 1 | 1 | 3 | ..... | ..... | ..... | ..... |
| Union | 12 | 8 | 7 | 6 | 22 | 55 | 2,589 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 9 | ..... | 3 | ..... | 2 | 5 | 6 | 5 | 3 | 5 | 5 | 2 | 1 | ..... | ..... |
| Westfield | 5 | 1 | 5 | 6 | 17 | 35 | 2,352 | ..... | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... | 3 | 1 | 3 | 7 | 1 | 3 | ..... | 3 | 2 | 5 | ..... | ..... | ..... |
| Totals | 276 | 177 | 114 | 333 | 260 | 1,165 | 61,839 | 18.84 | 13 | 22 | ..... | 27 | 13 | 11 | 85 | 1 | 133 | 87 | 68 | 127 | 93 | 79 | 40 | 101 | 47 | 24 | 2 | 11 | 35 |

*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, 1885.*

| WARREN COUNTY. Population, 37,737. Statistical Divisions. | DEATHS AT ALL AGES: Under one year. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Total, including unde-fined. | Population, census of 1885. | Death-rate per 1,000. | PRINCIPAL CAUSES OF DEATH: Remittent fever, etc. | Typhoid fever. | Small-pox. | Scarlet fever. | Measles. | Whooping-cough. | Croup and diphtheria. | Erysipelas. | Diarrheal diseases. | Consumption—male. | Consumption—female. | Acute lung diseases. | Brain and nervous dis-eases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Digestive and intestinal disease. | Cancer. | Acute rheumatism. | Puerperal. | Accident. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Allamuchy | .... | .... | 1 | 3 | .... | 4 | 787 | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | 3 | .... | .... | 2 | 1 | 1 | .... | .... | .... | 1 |
| Belvidere | 3 | 1 | 1 | 9 | 10 | 24 | 1,814 | .... | 1 | 1 | .... | .... | .... | .... | .... | .... | 3 | 1 | 3 | 1 | 5 | .... | 1 | 4 | 4 | 1 | .... | .... | .... |
| Blairstown | 5 | 1 | 2 | 2 | 5 | 15 | 1,590 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | .... | .... | .... | .... |
| Franklin | 3 | .... | 1 | 8 | 9 | 21 | 1,382 | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | 1 | 2 | 1 | 3 | 2 | 1 | 2 | 1 | 4 | .... | 1 | 2 |
| Frelinghuysen | 1 | 1 | .... | 8 | 10 | 20 | 964 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | 2 | 2 | 4 | 1 | .... | 1 | 1 | .... | 2 | .... |
| Greenwich | 7 | 3 | .... | 1 | 7 | 18 | 920 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | .... | .... | .... |
| Hackettstown | 11 | 2 | 3 | 16 | 7 | 40 | 2,645 | .... | .... | 2 | .... | .... | .... | .... | .... | 2 | .... | 2 | 1 | 1 | 7 | 1 | 1 | 1 | 4 | 1 | 1 | 2 | 2 | .... |
| Hardwick | 1 | 1 | 2 | 1 | 1 | 5 | 520 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 2 | .... | .... | .... | .... | .... | .... | .... | .... |
| Harmony | 4 | 4 | 2 | 2 | 5 | 17 | 1,256 | .... | 1 | 1 | .... | 3 | .... | .... | .... | .... | .... | 1 | 1 | 2 | 1 | 2 | .... | 1 | 2 | 5 | 1 | .... | 1 | .... |
| Hope | 2 | 6 | 2 | 9 | 9 | 28 | 1,548 | .... | 1 | .... | .... | .... | .... | .... | 1 | .... | .... | 3 | 1 | 2 | 2 | 2 | 3 | 2 | 4 | 5 | 2 | .... | 3 | .... |
| Independence | 2 | 5 | .... | 5 | 5 | 12 | 1,134 | .... | .... | 2 | .... | 1 | .... | .... | .... | .... | .... | .... | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 1 | .... | .... | .... |
| Knowlton | 5 | 3 | 2 | 9 | 8 | 27 | 1,456 | .... | .... | 3 | .... | .... | .... | .... | 2 | .... | .... | 2 | 2 | 1 | 5 | 1 | 2 | 1 | 3 | 6 | 1 | .... | .... | .... |
| Lopatcong | 5 | 7 | 3 | 4 | 2 | 21 | 1,725 | .... | .... | 1 | .... | 1 | .... | .... | 1 | .... | .... | 7 | 1 | 3 | 1 | 2 | 2 | 1 | 4 | 4 | 1 | .... | 3 | .... |
| Mansfield | 1 | 1 | 2 | 11 | 8 | 22 | 1,600 | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | 1 | 2 | 2 | 4 | 1 | 1 | .... | 5 | 3 | .... | .... | .... | .... |
| Oxford | 15 | 5 | 4 | 15 | 18 | 59 | 4,382 | .... | 1 | 2 | .... | .... | .... | .... | 1 | .... | .... | 6 | 2 | 4 | 4 | 4 | 1 | 1 | 3 | 6 | 1 | .... | .... | .... |
| Pahaquarry | .... | .... | .... | .... | 1 | 1 | 351 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Phillipsburg | 37 | 20 | 15 | 44 | 32 | 148 | 8,058 | 18.37 | 2 | 3 | .... | .... | 5 | .... | 1 | 1 | 14 | 7 | 2 | 6 | 14 | 11 | 13 | 8 | 12 | 4 | 3 | .... | 3 | 3 |
| Pohatcong | 3 | 3 | .... | 5 | 5 | 16 | 1,567 | .... | .... | .... | .... | .... | .... | 2 | .... | .... | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 4 | 1 | 1 | .... | 2 | 2 |
| Washington | 11 | 5 | 3 | 12 | 9 | 42 | 4,038 | .... | 1 | 1 | .... | .... | .... | .... | 1 | .... | 1 | 1 | 3 | 4 | 8 | 5 | 4 | 1 | 8 | 1 | 1 | .... | .... | 2 |
| Totals | 116 | 62 | 42 | 167 | 150 | 540 | 37,737 | 14.31 | 5 | 15 | .... | 12 | .... | 3 | 14 | 4 | 52 | 21 | 35 | 72 | 33 | 41 | 21 | 46 | 42 | 14 | .... | 10 | 19 |

# COMMENTS ON THE VITAL TABLES AND ON SPECIAL DISEASES.

The record for the statistical year ending June 30th, 1885, as shown by the tables of this report, gives an aggregrate of 8,989 marriages, 24,077 births and 23,807 deaths.

The comparative record for four years past may be thus tabulated:

| | M. | B. | D. |
|---|---|---|---|
| 1884–5 | 8,989 | 24,077 | 23,807 |
| 1883–4 | 8,968 | 25,263 | 21,716 |
| 1882–3 | 9,166 | 24,430 | 23,310 |
| 1881–2 | 8,337 | 23,108 | 25,959 |

Slight variations occur from the supplemental returns, but not so as to materially affect the comparative statement. It is believed that the marriage and death-rates are quite correct, but that there is not as full a registry of birth returns as there should be. This failure occurs chiefly in the cities, some of which are now taking measures more fully to enforce the law. Legal decisions have so often recognized the right of the State to secure this information, and physicians, as a rule, have so far recognized it, that any lack of complete return is to be attributed to carelessness. The books now furnished for the convenience of practitioners are found very serviceable and cause them to be less apt to forget the filling out of a blank on the second or third visit. As the cases are now so frequent in which there is need to get a statement of time of birth, both in law and for statistical purposes, it is important that those concerned be able thus to verify age and other circumstances.

The record as to marriages is more and more complete. Clergymen of all denominations have come to recognize the importance of this record. The form of statement given on the back of the marriage blank enables them to have the signatures of the parties in those cases where the persons are unknown or the age needs to be certified.

The examination of our records and of the divorce records shows that we have little need of a law as stringent as that which has been passed in Pennsylvania. If that law continues in force many from that State will hereafter need to seek in New Jersey the proof of their marriage contract.

The records of death for this year show an increase over the last year, 1883–4, of 2,649. It was a year of exceptional health—so that the present year has only been the average of the last four years. As we come to study the various tables of localities several causes are apparent. There was, for the State at large, a decrease in remittent fever of twenty-one deaths, a diminution of five deaths from small-pox, and an increase of two deaths from typhoid fever. Scarlet fever had an increase of ninety-nine deaths, measles a decrease of fifty-four deaths, whooping-cough an increase of sixty-five and diphtheria the sad increase of 469. Erysipelas was six less than the former year. Diarrheal diseases, as found before the age of twenty, destroyed 383 lives more than in the former year. Consumption destroyed 116 more males and eleven less females. Acute lung diseases caused a death increase of 392; brain and nervous diseases of children, 193; diseases of heart and circulation, 179; urinary and kidney diseases, forty-seven, and digestive and adult brain and spinal diseases an increase of 231; intestinal diseases of adults, sixty-five; cancer, fourteen; puerperal diseases, forty-seven. The most marked increase to be found is in diphtheria and diarrheal diseases. When the specially low death-rate of the former year is taken into consideration, as well as the increase of the population, the increase will be found to fall almost entirely with diphtheria, acute lung and diarrheal diseases. In any climatological comparisons, whooping-cough needs to be added to acute lung diseases, since an increase in number of deaths therefrom is generally owing to pulmonary complications. As we compare further between cities over 5,000 and the county, we find a diminution of typhoid fever and scarlet fever and measles and whooping-cough. But the city increase of diphtheria was 336 out of the total increase of 469. (The population of these cities is 689,977 out of the total State population of 1,278,033.)

Diarrheal diseases had an increase of 108 in cities, or scarcely their natural proportion. Puerperal diseases had an increase of forty-five in cities out of the entire increase of forty-seven. Acute lung diseases had an increase in cities of 202. Of the brain and nervous diseases the city increase was 130. The city increase in diseases of heart and



circulation was ninety-four. There were twenty-four less deaths in cities from urinary and kidney diseases, notwithstanding a slight general increase. Brain and nervous diseases increased in cities 115 out of a total increase of 130.

A still further analysis of individual cities will show other significant facts, especially when compared with changes being made.

The relations between cleanliness, good water and good drainage and good sanitary administration and the diminution or control of various diseases is indisputable. While exceptional cases occur in which we are not able to trace the connection, and while a disease bred or made malignant by filth may acquire such specificity and such virulence as to invade healthy homes, just as the fires which originate in combustibles now and then destroy a "fire-proof" building, these exceptions do not invalidate the abundant evidence of the relations between filth and disease or disprove the fact that a great majority of diseases are practically preventable or reducible to a meagre minimum.

### REMITTENT FEVER.

The encouraging diminution in remittent fever from the average of the past six years, we believe comes in some small degree from a greater appreciation of the need of drainage and from the avoidance of exposure to malarial influences where they exist. Where thorough drainage is instituted, one of the first records of its effect is the diminution of periodic fevers, except where the large amount of drier ground filled with decaying vegetable debris is not utilized for growing crops. Our drainage laws are now quite available, and in parts of the State much attention is given to the subject. Two hundred and nine deaths from remittent fever means a considerable amount of chills and fever and other malarial disorders which are not fatal but suspend labor and cause great injury to health. It is to be remembered that all these and all that die therefrom have inbreathed an air different from that which is needed for respiration, and had they lived in places where drainage is perfect and where natural processes of vegetable decay and the proper appropriation of the results by growing vegetation are carried on uninterruptedly, neither the sickness nor the deaths from this cause would have resulted. It is worthy of note that over one-half of the cases occurred in cities of over 5,000 inhabitants. Imperfect drainage of the soil of our cities is one of the chief evils to health.

### TYPHOID FEVER.

The average of deaths in New Jersey for the six years previous to this, from typhoid fever, was 576. An increase to 646, although in part accounted for by increase of population, is not a very satisfactory record; 396 of the cases in cities is beyond the average of 332 for the last six years. This is the more significant, because all careful physicians now more thoughtfully guard the discharges, and since the disease does not now so often destroy several members of a family. Health officers are more vigilant in watching over localities where it exists, and institute such measures of disinfection and cleanliness as tend to prevent its spread. There is still much to be done in all these directions. In the meantime, the medical profession needs to be diligent in settling the question whether typhoid fever occurs from a combination of evils and under special circumstances without any antecedent case, also to determine whether there are mongrel or cesspool fevers of a low type which destroy life, which are not remittent fevers and yet have not the characteristic lesions of typhoid. It would be a great gain to medical knowledge, as well as to the public health, if every skilled and experienced practitioner would place on record his opinion on this subject, together with the accurate statement of the cases and of the facts by which he had arrived at his conclusions.

### SMALL-POX.

Our exemption from small-pox has been almost complete this year, two deaths only having occurred. If the chief incentive to vaccination, as some aver, is an epidemic of small-pox in some part of the State, then this is a perilous fact. But it is believed there is a growing habit of securing vaccination for children, and that careless and culpable neglect is not so common as formerly. Both the law and the influence of physicians, school boards and Boards of Health has made itself felt. The choice now given between arm-to-arm and bovine vaccination satisfies the anxieties of the few who formerly objected.

From the City Board of Health, 301 Mott street, New York; H. A. Martin & Son, Roxbury Station, Boston, Mass.; Dr. E. L. Giffith, State street, Chicago, and the firm of W. Wyeth & Sons, Philadelphia, can now be had lymph, such as is fully indorsed by



competent examiners. It can almost be said that there is no good and sufficient reason why a case of small-pox should ever occur again in the State of New Jersey. While most genuine and thorough vaccinations last a lifetime, it is a wise precaution to repeat vaccination between fifteen and twenty years of age, or to resort to it again if small-pox is prevalent in the vicinity.

### SCARLET FEVER,

With its 646 fatal cases, testifies to the need of thorough isolation, disinfection and of very early attendance on the first symptoms of the disease. Seven hundred and thirty-four was the average of cases for the last six years previous. If there is proper watchfulness and early attention, it is far more manageable than formerly and ought not to be allowed to become epidemic. Out of the 646 deaths this year, 480 were in cities of over 5,000 inhabitants. Out of the 4,404 deaths of the previous six years, 3,007 were in cities, showing how much more prevalent or fatal a disease it is in the cities than in the country.

### MEASLES

Is fortunately a disease that does not cause so large a death-rate in proportion to the number of cases. Indeed, from what we know of the disease and of its severity as modified by exposure to cold, by climate, etc., it is very certain that thorough care ought to make it nearly always a very mild disease. The deaths therefrom this year were 135. The average for the six years previous was 127, but this average was much raised by the former year, in which the deaths were 189. The disease has been very prevalent in the State for the two years ending with last July. Of the deaths this year, 87 occurred in the cities. In the former six years, out of 762 deaths, 566 occurred in the cities, this larger proportion being chiefly owing to 189 deaths in Jersey City and 149 in Newark. For the five former years, out of 573 deaths therefrom, 414 occurred in cities. Here, again, we see how cities excel in epidemics.

### WHOOPING-COUGH.

Out of the 181 deaths from this cause the last year, 102 occurred in cities. Out of the 116 deaths of the previous year, 72 occurred in

cities. For the six previous years, the average of deaths from this cause was 179. The average in cities was 111. It is not always recognized that whooping-cough is a more fatal disease than measles. Nor is it often enough remembered that in whooping-cough the discharges from the throat and the nostrils should be received in disinfectants, and not be allowed to dry so as to mingle with the atmosphere of rooms.

### CROUP AND DIPHTHERIA.

The sad record of membranous croup and diphtheria, which have now come to be regarded as so closely allied in their pathological and clinical characteristics, ought certainly to attract the most earnest attention of all who look upon the death of children as a loss to families and to the State. It is the more serious because, unlike most of the communicable diseases, it is apt to recur, and because of the insidious character of the contagion. Of the 1,496 deaths this year, 1,061 were in cities. The average of deaths therefrom for the six previous years, was 1,124, of which an average of 762 were in cities. While this shows the disease not to be equally prevalent in the country, the proportion of cases in country districts and small villages and towns is greater than in the case of the other communicable diseases. Its record in the last seven years, of 8,242 deaths, as against 5,050 deaths from scarlet fever, serves to show how much more formidable it has become than the former great enemy of child life. The Board hopes, during the present year, to set on foot measures for a closer local study of this disease and for more earnest efforts on the part of physicians and local Boards.

### DIARRHEAL DISEASES.

Two thousand eight hundred and forty-five deaths from diarrheal diseases of persons under twenty years of age, against an average for the last six previous years of 2,371, and an increase of about 400 over the previous year, is one of those indications of increased diarrheal tendency which too often has proved the precursor to some epidemic affecting especially the intestinal tract. Our office tables and our reports show that dysentery was a little more prevalent than usual, but nowhere reaching an epidemic, except in a section of Middlesex county. The subject of infant feeding has received much attention recently, and it is believed that there is much greater need



of accurate attention thereto. The various artificial foods differ much, some of them being very good but more of them intolerably bad.

Impure water makes a large record in diarrheal disease. So does the use of imperfect foods, such as stale vegetables and diseased meat. Note the fact that out of an average of 2,371 deaths from this cause of persons under twenty, 1,548 occurred in cities. With the fact that so many leave the cities for the summer months, and that no children are included under one month, this is a large relative mortality. Attention is directed to what is said elsewhere in this report on infant mortality and artificial foods.

### CONSUMPTION.

The 3,320 deaths this year from consumption is a little above the average of 3,050 for the last six years previous.

Two thousand and eighty of these occurred in cities, the average of cities for the six years previous being 1,844. This means that 13.94 per cent. of all deaths are caused by this disease.

The causes of consumption are rapidly increasing in cities by reason of close dwellings, close factories, close school-houses, the dust of trades and occupations, and various influences which depress life. More than any other disease among those over eighteen years of age, it is the record of unfavorable conditions for health and life.

The analysis of cases and the consideration of consumption as a preventable disease were fully presented in the fifth report, 1881. There is a great need that the attention of all sanitarians be fully directed to this disease, which destroys far more than the wandering epidemics, and which is even more preventable than the most of them.

Tuberculosis, as found in animals, is now often discussed in its relation to human tuberculosis. In all the English markets and dairies both the meat and milk of such animals are condemned as food. Many claim that the disease is communicable. It can also be said that pleuro-pneumonia and other diseases of animals are well worthy of comparative study by physicians. As by law the report of the Board of Health on animal disease is made to the Board of Agriculture, its reports may be consulted for further information.

### ACUTE LUNG DISEASES.

The record of 2,566 deaths from these is an increase of 392 over the previous year. The average for the six years previous was 2,339, which, allowing for the increase of population, is nearly the present average. Of the 2,566 deaths this year, 1,618 occurred in the cities. For the previous six years the city average was 1,424. As with consumption, the great increase of acute lung affections is in the cities. This again points to the need of purity of air, and of great attention to all conditions of crowded living. Pneumonia has so much increased in frequency and severity as sometimes to seem to prevail as does an epidemic. It is not so much due to our changeable climate as to close dwellings, improper modes of heating and various exposures, such as those who know how to care for their health, know how to avoid.

### BRAIN AND NERVOUS DISEASES OF CHILDREN.

One thousand seven hundred and ninety-one deaths from these is an increase over the 1,598 of the former year. The average for the previous six years was 1,701. No class of diseases points more accurately to the loss of hereditary vigor. The death of many such a child is the record of over-work, over-anxiety, or some other form of undue pressure on the part of the parents. Of the 1,791 deaths, 1,240 occurred in cities. The average in cities for the previous six years was 1,169. A sustained average of over two-thirds in cities tells something of the pressure of city life, as, also, of the undue nervous susceptibility of those that survive.

### DISEASES OF THE HEART AND OF THE CIRCULATION.

These numbered 1,503, of which 840 were in cities. The number for the previous year was 1,324, and the average for the six years previous, 1,150. The average for cities during the six previous years was 609. This is a lower average than is generally supposed. Two facts may partly account for it. Acute rheumatism is a common disease of the country and among those exposed to farm labor, and often is the foundation of heart disease. It is also true that, after middle life, many who find some form of heart impairment move out of cities into the country, and so become enrolled as belonging to country localities.



### URINARY DISEASES.

These numbered 939 deaths, of which 534 were in cities. The average for six years previous was 682, of which an average of 396 was in cities. Most of these are some form of kidney affection, especially those forms known as Bright's disease. Each year shows a steady increase.

### ADULT BRAIN AND SPINAL DISEASES.

One thousand eight hundred and ninety-five deaths from adult brain and spinal diseases, as added to the deaths of brain and nervous diseases among children, show how large a prrt of the population die from these causes. Of these 921 were in cities. The average number for the six previous years was 1,485, that of cities being 709.

### DIGESTIVE AND INTESTINAL DISEASES.

Adult deaths from these numbered 1,140, of which 623 were in cities. The average for the six previous years was 977; the average for cities being 511.

### CANCER.

Of the 498 deaths from this cause, 289 were in cities. The average for the six years previous was 433, with an average of 236 in cities.

### ACUTE RHEUMATISM.

Acute rheumatism shows a record of thirty-six deaths for the year, of which seventeen were in cities. The average for the last six years is sixty-three, the average for cities being thirty. It is claimed by many physicians that since the introduction of the treatment by salycylic acid, or of this in conjunction with alkalies, the death-rate has decreased, and that resultant heart trouble is less frequent.

### PUERPERAL DISEASES.

These show an increase over the previous year. The relations of erysipelas thereto, as well as the influence of scarlet fever contagion and of any septic conditions, are to be borne in mind.

The deaths this year were 268, of which 176 were in cities. The deaths of the previous year were 221, of which 131 were in cities. The increase in cities this year was chiefly in Jersey City and Newark. The average for the six previous years was 234, of which an average of 134 occurred in cities.

### ACCIDENTS.

Eight hundred and fifty-seven deaths by accident, of which 511 were in cities, shows a gradual increase from the various casualties of railroads, machinery, bathing, etc. There is much need of greater care as to all machinery. No losses seem more avoidable than most of those which occur by what we call accident. All machinery should be properly protected by methods now well understood.

The time has come when these records can be studied with great advantage by all physicians and all who are interested in the public health. We now have for seven years the facts in evidence as to the actual ravages of disease, and are able to associate their prevalence with localities or with causes within the range and duty of human control. Life is not only precious to the individual citizen, to the family, but to the State. Society has no greater waste and no greater burden than untimely death and unnecessary sickness. The laws of health are as definite and as ascertainable as most other laws. They have their basis in the natural arrangement of things, in definable infringements upon laws or a want of adjustment to changed circumstances. The causes of disease are no more recondite than those which obtain as to other physical laws. The rewards of discovery in this science are soon manifest in an art which means the prolongation of life and the happiness of increased healthfulness. There is enough already known to stir into energy those who are accurate in the application of results. There is enough unknown to inspire those who love to investigate in lines full of promise. We therefore urge upon physicians and Health Boards the most earnest attention to all the details of sanitary care and a fuller study of the conditions necessary to health. As the friends of the State, we cannot do so much in any other direction for the preservation of its vigorous progress; as lovers of our race we can in no other way better show our interest in the welfare of mankind, and as physicians and sanitarians we can thus certify our zeal in advancing the occupation to which we are devoting our energies.

# TABLE OF CONTENTS.

NINTH REPORT OF THE BOARD OF HEALTH.

# TABLE OF CONTENTS.

REPORT OF THE BUREAU OF VITAL STATISTICS.





# INDEX.