

FOURTH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

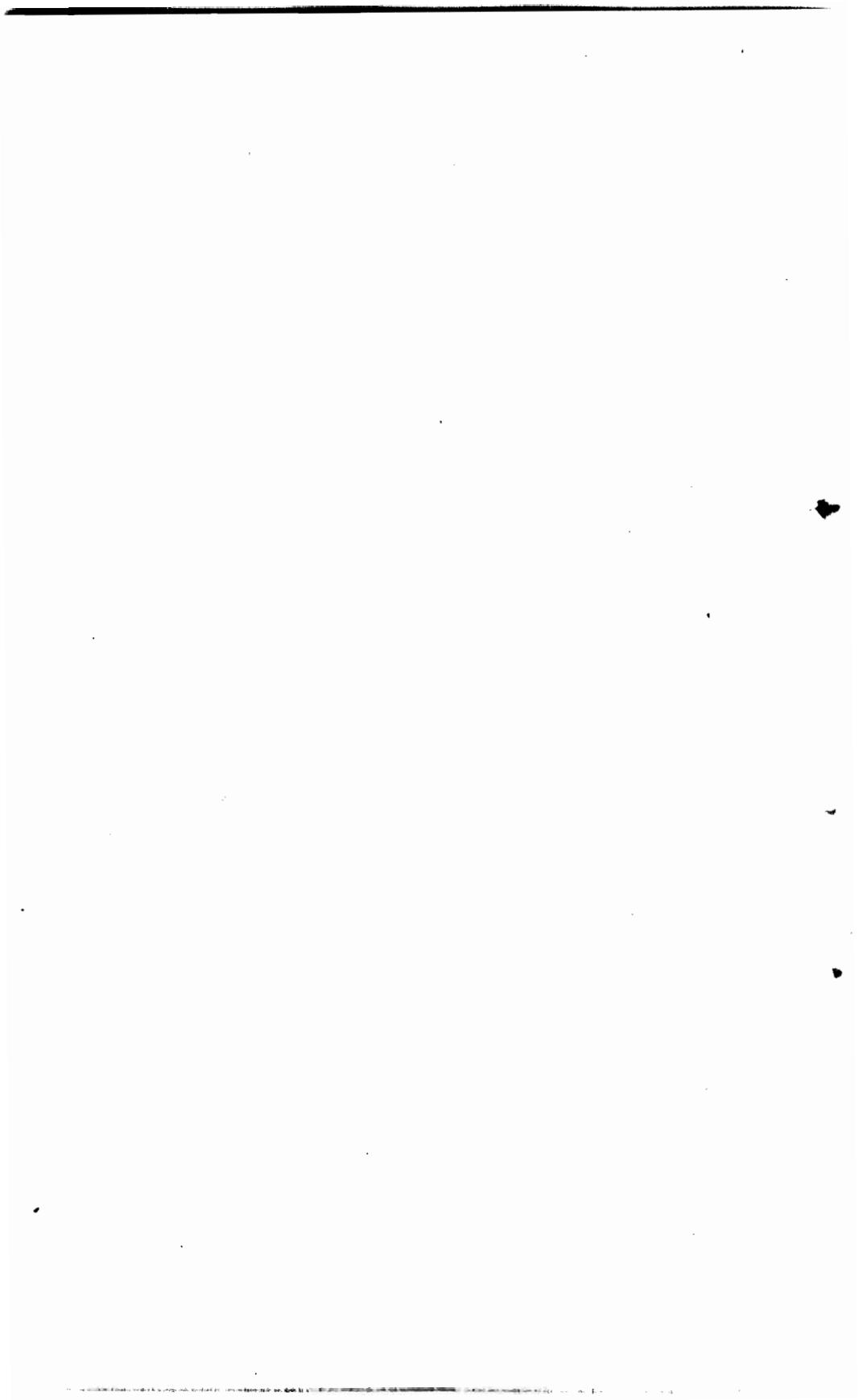
STATE OF NEW JERSEY,

1880.

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1881.



# STATE BOARD OF HEALTH.

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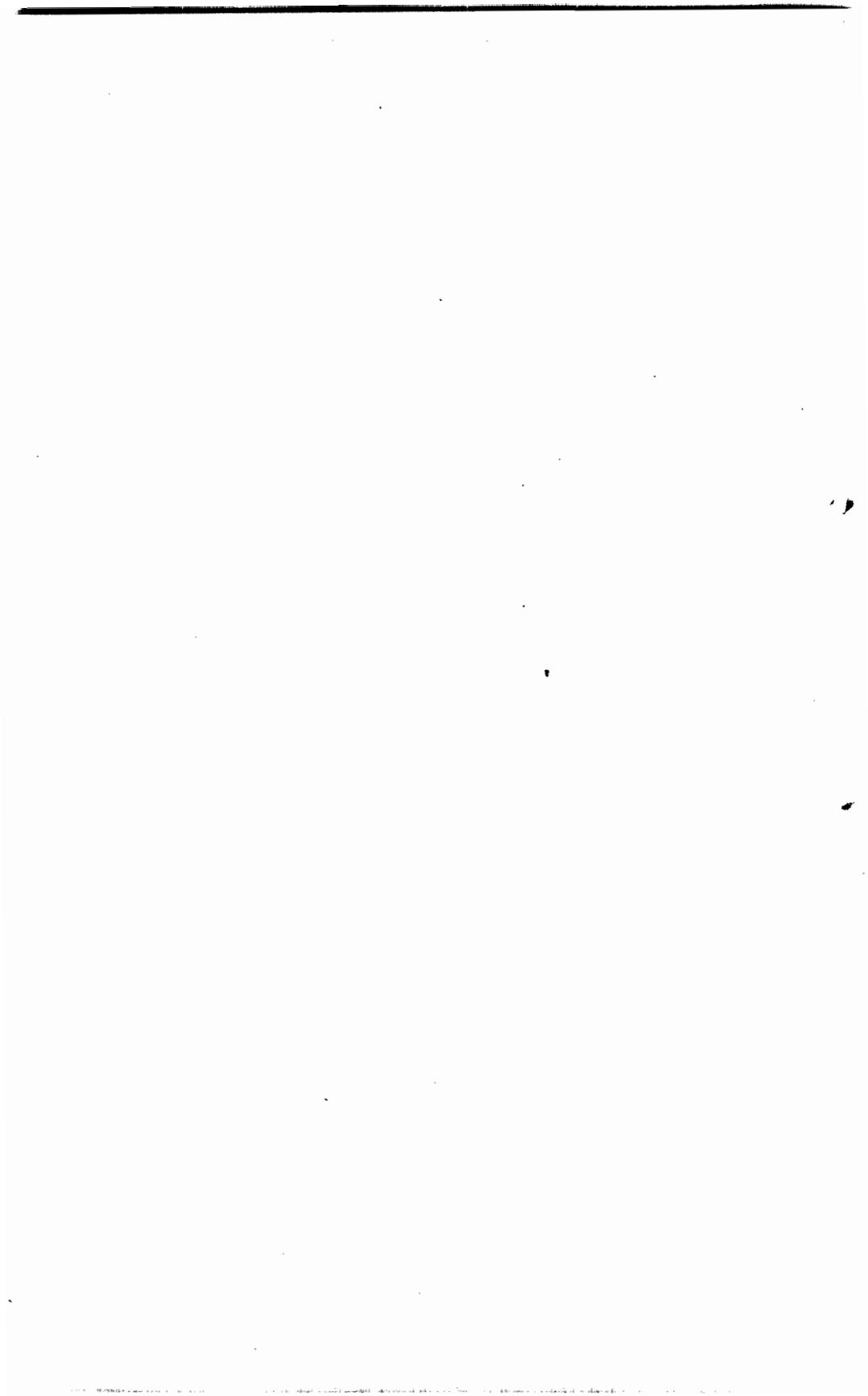
HON. HENRY C. KELSEY, Secretary of State, }  
HON. JOHN P. STOCKTON, Attorney General, } Members Ex-Officio.

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	P. O. Address.
CYRUS F. BRACKETT, Ph. D.....	Princeton.
FRANKLIN GAUNTT, M. D.....	Burlington.
THEODORE R. VARICK, M. D.....	Jersey City.
EZRA M. HUNT, M. D.....	Metuchen.
E. A. OSBORN, C. E.....	Middletown.
E. S. ATWATER, Att'y.....	Elizabeth.
LABAN DENNIS, M. D.....	Newark.

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President.....	C. F. BRACKETT, Ph. D.
Secretary.....	EZRA M. HUNT.
Recording Clerk.....	E. A. OSBORN.



## REPORT OF THE SECRETARY OF THE BOARD

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*To His Excellency, George B. McClellan,*

GOVERNOR:—On behalf of the State Board of Health of New Jersey, I have the honor to present to your Excellency a brief survey of the work of the Board for the past year, and such accompanying statements, papers and reports as bear upon the vital conditions of the people. The increase of duties assigned to us by the last Legislature, the formation of very many new local Boards of Health, the occurrence of several endemic diseases and the inquisitive spirit manifested as to various matters of health administration, have required, as never before, our active attention. The law which requires local Boards of Health to be formed, has resulted in a large increase of interest in local health administration. Subjects of the utmost importance to our citizens are thus locally discussed and public opinion is educated by the information which is sought and secured from various sources. One of the designs of this Board has for the first time been fully realized, the past year. Its advice has been sought in many measures of local interest, so that the service the State is thus doing has come to be appreciated, both in the interests of health, and the prosperity that so much depends thereupon. The local reports we are receiving, enable us to estimate the general condition of the population, while the vital statistics are giving us records of precision as to the courses and causes of disease. In nearly all the localities that most need it, there are now those who have an intelligent conviction of many things needing to be done, and who are seeking to make that public opinion, which must ever precede, or to a reasonable extent accompany, legal enactments. Foundations are being laid for a careful, systematic and faithful administration of those public affairs which have to do with the most vital concerns of our population.

While we have to regret the occurrence of some endemic diseases of a fatal character and a wide-spread extension of periodic fevers, yet the prevalence of serious or fatal disease was much less than for the period of our last report. The returns made up from July to July of each year show a less number of deaths by about twelve hundred than the previous year. While localities have suffered, there has been no wide-spread, fatal epidemic. The study of health questions is becoming organized into a system. From many of our cities and from some county and village localities, we have evidence of a comprehension of the necessities of a close watchfulness over the causes of disease, with a view to their prevention or abatement. It is no longer viewed as merely a professional matter, but as one which concerns the industrial welfare of the people. The advice of the Board is often asked in matters of local health administration, and we have thus been able to aid local authorities. We are now fairly in the position for a comprehensive oversight of the health interests of the State, and will be able to indicate how those evils are to be guarded against, which most imperil the life and health welfare of our citizens. Much information in this direction is diffused by the annual State report, as well as by personal correspondence and other agencies which we are able to promote. The library of the Board now presents a good outline of the various subjects of sanitary science and art, and we trust ere long to make it more extensively accessible to the people. Specimens of maps and other appliances also serve as models for the work necessary to be done by many of our cities and some of our closely settled rural districts. The wide duties imposed under the present law have brought us more in contact with localities and enabled us to indicate the most pressing wants. Requests are frequent for the presentation of these subjects to public attention, in connection with Teachers' Institutes and by Local Boards.

It has been our plan, in connection with the report of the secretary, to fully consider some one of the more prominent prevailing diseases of the State. Last year periodic or other malarial diseases were considered.

## DIPHThERIA

Has been, for several years past, so prominent and fatal a disease in this State, that it merits our most careful and inquisitive investigation. It has taken its place as fourth in the English list of zymotic diseases and is equally prominent in our own bills of mortality.

The order of diseases known as *zymotic* gets its name from the Greek word which means "causing to ferment," because such diseases were regarded as somehow allied to or as operating through such a process. While we cannot accept the term as defining the *modus operandi*, there is need that the various laws of fermentation be studied as in nature, as allied yet distinct and as related to animal or vegetable organism. Also that we study especially putrefactive ferments or putrefaction as distinct from usual fermentation, since it is toward the latter that many of the zymotic diseases seem to incline. "There are two species or groups of fungi, the yeast or ferment plants, and the putrefactive fungi which are developed during the process of putrefaction." Parkin, p. 29.

As these diseases are alike, in that they are believed to depend for their inception upon infective particles derived from without, such questions as these are opportune.

How can the production of the infective be prevented? If not prevented, how can exposure to it be avoided or lessened? If there must or may be exposure, how can the sedation or location of the particle in the human system be hindered or embarrassed? If likely to find some local lodgement, how can the part be put in such a condition as to fortify against it?

Or can there not be some substance introduced into the blood or secretions and for a time maintained there, that will render the system refractory to the process which the infective particle would otherwise set up, and which thus constitutes the disease?

If the gravity of the disease depends upon some chemical or decomposing changes which could be held in abeyance, or on the rapid multiplication of vegetable or animal organisms, which mechanically or otherwise cause a higher life to succumb to such prolific invasion, is it not possible to prevent the setting up of such processes by antizymotics or antiseptics.

The discussion of these points, however pertinent to any one of these diseases, can not now be entered upon at length, but they are to be thoughtfully borne in mind. If the ideas entertained by us as to these epidemic diseases, and their possibility of limitation and prevention by individual sanitation are correct, the future success offered to medicine is as much beyond the one limitation of small-pox as the application of a general life-preserving law is beyond the prevention of only one disease.

Diphtheria first found its record in the registry of the Registrar General of England, in 1855, as separate from scarlet fever, of which it before had been recognized as sometimes a complication. About the same time it began to attract attention in this country by an occasional outbreak. The first article as to it in the New York State Medical Transactions was in 1859.

In a full report of the diseases of Newark for the year 1858, in the New Jersey State Medical Transactions, it is not named.

In January, 1859, the reporter for Essex county says: A few sporadic cases of diphtheria have occurred, "some fatal, all very severe and demanding very careful treatment."

The State report made January, 1861, says: "The reports received by the committee notice, in every case, diphtheria as epidemic to a greater or less degree. It has been most prevalent in Essex, Hunterdon, Cumberland and Gloucester.

Ever since, in varying degrees of prevalence, it has found its place among the most serious yearly diseases with which we have to contend.

The number of deaths cannot be accurately stated, as returns from localities were often defective. Under the recent law, the more completed registry shows eleven hundred deaths from July 1st, 1878 to July 1st 1879, and the vital statistic report shows the deaths from July 1st, 1879 to July 1st, 1880. It far exceeds at present, in fatality, any of the communicable zymotic diseases. It is universally recognized as belonging to the class of ailments dependent to a large degree upon preventable causes.

Whether it is an old disease, recurring in its cycle, or recurring because, by other methods, we are imitating the filth of ancient civilization and over-crowding, it is not easy to determine. The general view is that it is the recurrence of a disease heretofore

described. In the identification, we find many descriptions of sore throat which are only analogous and strained into identity.

It is no more surprising a thing that a new disease should occur than that a new chemical compound should be discovered, or that life under new disturbing conditions should functuate varied phenomena. Although finding mention in the supplementary table of the causes of death in England in 1855, it does not receive extended notice from General Graham until 1858.

"Diphtheria," says he, "according to the popular theory, is bred in France—where the conditions are more favorable on the whole than they are in England—to the diffusion of putrid effluvia over the fauces.

Every Englishman admires the works of art, the picture galleries, the houses, the furniture, the cultivated personal tastes which surround him on every side in Paris, or on a small scale in Boulogne; he admires some of these objects every day, others every week; but has every day to give up his admiration at the door of that inscrutable *cabinet*, where the light of French refinement never comes; where his throat is assailed by the poisonous distillations that engender disease, and explode—if you count well the victims—with much more fatal consequences than gunpowder, or even than fulminating quicksilver. That men should lock up jewels in cabinets, keep their larders full of delicacies, or stock their cellars with wine, is natural; but it is a singular absurdity in civilized countries for men to attempt to hoard for years this volatile essence, which bursts its chains, and, like an unclean spirit, enters not only every apartment in the house, but every channel of access to the living chambers of the body, leaving at times such traces of its passage as diphtheria in the throat.

The disease once generated, wanders abroad and destroys life under circumstances quite different from those in which it was born; but impurity is always its natural ally.

The Scotch threw these matters into the streets, and justly incurred the censure of the fastidious.

In London, and even in the country mansions, retreats still exist which may rival the French magazines of impurity, but it has of recent years, been the practice to throw the guano compounds of London, with water, into the sewers; which, though not constructed for the reception of such matters, and consequently suffering

their volatile principles to escape into the streets, convey a portion of their elements to the Thames, and commit them to its flood of tidal waters.

Dr. Barker has recently performed an ingenious series of experiments on animals, to determine the effects of each of the noxious principles which arise from cesspools. He placed the animals in a close chamber by a cesspool, with which a tube opening into the chamber communicated; and a lamp was arranged so as to draw a current of cesspool air steadily over the creatures inside. With a pair of bellows, Dr. Barker could draw the air from the chamber.

A young dog in half an hour became very uneasy and restless; he vomited, and had a distinct rigor, and in the course of a day was exhausted.

When he was removed he soon recovered. "Another dog was subjected to the cesspool air during twelve days; in the first seven days he underwent a series of sufferings, not unlike the symptoms of the diseases of children in hot weather; on the ninth he was very ill and miserable." After he was liberated, on the twelfth day, he remained "very thin and weak for six weeks."

Dr. Barker then continued his experiments on the effects of definite doses of the gases in the sewers, and killed or poisoned several sparrows, linnets, jackdaws and dogs.

Thus, Dr. Barker has, for our instruction, imitated on a small scale, and on a few of the inferior animals, the vast experiment which is constantly going on, and destroys thousands of men, women, and children in all England.

Instead of a few animals in a close chamber, more than two millions of people live in London over sewers and cesspools. The poison is generated in every house; it is distributed conveniently along all the lines of road, so as to throw up its vapors into the mouths, throats, and lungs of the people through innumerable gully-holes, which are either left untrapped or trapped imperfectly, in order that the poisonous gases might escape. A variation in the pressure of the atmosphere draws up the stinking air from the sewers, like Dr. Barker's bellows.

All the details of the experiment were as carefully contrived by the engineers of the old sewers' commissioners, as if they were constructing an apparatus for passing currents of poisonous

airs steadily over the people of London, with a view, like Dr. Barker, to ascertain their exact effects.

The engineers of the new Board of Works have endeavored to keep the apparatus in order. It is now time that this cruel experiment should cease. Last year, when no epidemic prevailed, not less than 14,795 unnatural deaths were registered in London. This was the aggregate effect of the impure airs, and of other sanitary defects."

The criticism is severe but in many regards sustained by continued experience, and still applicable in this country.

Since these utterances were penned very many attempts have been made to identify the "infective particle" of diphtheria, or to define the precise conditions under which its exciting cause is generated. It is not surprising that science and art should still fail to identify it, but this does not vacate the value of much knowledge we have acquired as to this disease. It is distinct from the usual eruptive diseases and has a marked septic character.

Each year has given increased conviction, that it does not, after having been started from a focus, acquire epidemic prevalence without the aid of foulness derived from household conditions. It is still a careful study with physicians whether it has chiefly to do with putrefaction and excretal charges—especially the excretion of human beings—whether it arises from sewers or from refuse from which all human excretion have been excluded, and how far dampness or excessive stagnant moisture may cause the special production which gives rise to this disease. Although more than most of the crowded-life diseases, it prevails in the country, yet when thus occurring it is frequently fostered by local conditions, or its introduction can be traced to a foul source.

Tyndall has shown that the countless myriads of motes that are seen dancing in every sunbeam are organic particles, and that among them are zymotic bodies which are germs of disease. These bodies are in concentrated force in the rooms occupied by persons suffering from such a disease as scarlet fever and we are always to seek dilution, ventilation and isolation.

We can therefore emphasize a sentence already quoted—"The disease once generated wanders abroad and destroys life under circumstances quite different from those in which

it was born; but impurity is always its natural ally." If the congener of its development is a sporule, or an animalcule, or only an undefined molecule, it may light upon any soil; but if surroundings are good and the person in good condition of life, the rule will be that it will seldom display vigor and virulence, and under such relations can never acquire epidemic momentum. Where there is large production of infective material from excessive and extended foulness "we may conceive the different kinds of zymotic matter distributed in clouds," and that like strata of air or emanations from factories these may have their floating direction governed by specific gravity by trees, by winds, by the humidity of the atmosphere, and thus different localities be differently exposed. But be assured where the local conditions or those of the individual are favorable—there the chief outbreaks will occur.

So far as diphtheria is concerned, the present showing and summing up of all evidence is that it takes its place among the diseases nurtured by filth incident to human habitations, upon moisture and heat co-operating therewith, and that the first principle of its limitation is to avoid these. While it is sometimes derived from persons, or conveyed by things, and thus communicable, the weight of opinion is that it at times springs up as a product amid unsanitary conditions, without a previous case or emanation therefrom.

Next, it may be said that it is not believed that diphtheria occurs frequently, if at all, from impure water, as do some of the zymotic diseases, or that it is especially conveyed by the discharges, as is believed as to cholera and typhoid fever. It is more essentially a foul air disease. It is also one of those foul air diseases which is believed especially to choose the fauces and surrounding membrane for its first display of unhealthy activity. "It thus infects the moist surfaces of the throat," and is conveyed into the lymphatics, and reaches the blood; many regard it as local, before it is constitutional in its action, and believe that protection is afforded by avoiding open inhalation through the mouth and by protecting the surface of the throat, from its sedation by astringent or antiseptic substances.

If, however, the blood is primarily or contemporaneously affected, prophylaxis now seeks to put it in a condition unfriendly to the setting up of the disease process. Barker speaks

of the anti-hyogenic effect of quinine. Laudor Brunton in his late work on "pharmacology and therapeutics" says "facts all seem to point to ferments or enzymes as the agents by which the tissues are built up or pulled down." \* \* The action of drugs upon these is becoming one of the most interesting questions in pharmacology."

It is claimed by many that "diphtherite" as a process is a factor in many diseases and that what we call "diphtheria" is only distinct in that it manifests itself so primarily as to give this specific name. Thus Martin, of Berlin, after defining the diphtheritic process as consisting of a "fungous formation the spores of which are seen under the microscope to penetrate not only into the tissues but within the blood vessels producing in the way a generalized disease," claims that even in puerperal fever this is the predominating element. Diphtheritic deposits have been long recognized as occurring in scarlet fever, measles, etc. It is not certain but that we are to study classes of disease and their allied traits much as the botanist does plants—which, although quite different, yet admit of association and of explanations even when great variations of type or hybridisms occur. Diphtheria as less often traceable to antecedent cases, as well defined in its prominent symptoms and as traceable in some of its blood and tissue changes, may well form the nucleus for close study into the etiology and prevention of zymotic diseases. Cleanliness, avoidance of all putrefactive decompositions, attention to the mould or fungoid producing moisture of foul air and foul water in buildings and preventive treatment of individuals are capable of greatly diminishing this insidious disease.

#### LOCAL EPIDEMICS, ETC.

In the enteric or typhoid fever at Princeton, the periodic and other malarial troubles of Bound Brook, and the small-pox of Camden, we have this year had three typical and impressive reminders of the evils that can result from avoidable diseases. ●

The mournfulness of death in educational institutions among those in the vigor and promise of early manhood; the depression of an entire population, and much suffering among the laboring classes, and the excitement of a loathsome contagion have each

in their way shown how melancholy and how pecuniarily unprofitable are the self-imposed burdens of avoidable sickness.

As the sickness at Princeton is made the subject of a separate paper we need not enlarge upon it here.

#### PERIODIC FEVERS OR "MALARIA."

In our last report, pages 18—25, under the division of Miasmatic Diseases, we gave special attention to that prevalent form of disease, whose periodicity is most distinctly declared in the form of "chills and fever."

It is unfortunate that the terms malaria and miasm, as frequently used, do not convey any distinct idea of the disease thus sought to be designated. In the nomenclature of the Royal College of Physicians, London, as reproduced in the United States Government publication, of the "Nomenclature of Diseases," which has been accepted thus far as the basis of our nosology, the term "Miasm" does not occur, and the term "Malarious," only as a definition of "Remittent Fever," a fever characterized by irregular repeated exacerbations, the remissions being less distinct in proportion to the intensity of the fever.

In the classification of the Registrar General of England, under the class of zymotic diseases miasmatic diseases are named as Order 1st. Under the order are associated nineteen diseases, the last being left indefinite under the title of "Other Zymotic Diseases." Ague and remittent fever appear as 16th and 17th in the list. In this classification miasmatic is used as the name of an order in its etymological and general sense, as meaning "a noxious particle or substance or exhalation floating in the air," which has become a cause of disease. Physicians when rightly using the term "malaria" do not use it in its derivative sense as a term for foul air in general, but as denoting "an exhalation from marshy districts producing fever or disease of an intermittent or remittent type." "It is believed to be the product of organic decomposition in soils," in which heat and moisture are important factors. From the fact that it seems to be generated in the greatest amount in marshes containing vegetable organic matter undergoing disturbed or uncompensated decomposition, it is often called marsh miasm.

While the term "miasmatic" may be employed to denote all

the forms of "foul air" or "infective particle" diseases, the term "malaria" should never be used in the lax sense it is by the laity and by too many physicians. If it is to mean anything distinctive and descriptive it must be confined to the class of diseases to which we have referred. There is increasing evidence that this malaria produces its own specific effects, and that to a great degree its production is due to causes which are within the range and the duty of human control.

Nature has its own processes of decay and its own compensations, so that the undisturbed great Dismal Swamp of Virginia, for instance, is not known as a cause of malaria. But when art substitutes something else for the exuberant vegetation of nature, or impedes natural water courses, or adds to the products of decay, or disarranges the relations of heat and moisture thereto or in any other way introduces its own methods, we must see to it that we provide for the changed conditions. It is now well understood how decomposition, the level of ground water and the heat of the ground, can be affected by artificial methods, how, where there cannot be immediate relief, we may prevent exposure and how we may fortify the system against attack.

It is fast coming to be understood by our leading students of social science, how neglect or remedy of evils that affect public health bear on the financial prosperity and general condition of the people. Much more is now known as needing to be done than is executed. The causes are abatable, although sometimes difficult of abatement. The time is not far distant when land and water rights and privileges will need to be guarded in the interests of public health, for the public good, just as property is taken for railroad and other improvements. While the strict forms of law and adherence to public rights must ever be recognized, regard for the general health must be held equal to that exercised for other material interests.

Never, more than in the last year, has evidence come to the Board, that malaria is dependent on local causes, which to a great degree admit of abatement. The mildness of the last winter, and the unusual heat and dryness of the spring months seem to have stirred into unusual activity the processes of vegetable decomposition, and so in many places to have added to the prevalent sickness.

Various localities in the State have given new evidence of a

continuation of unhealthy emanations long since realized. We have no experience not common to parts of other States except that our rapid growth, our centralization in towns and our many works of public improvement, cause more disturbance of natural conditions. Cities like Camden and Burlington have been greatly relieved as to malarial tendencies by improvements in drainage, while other cities have increased rather than diminished their impediments to a dry and cleanly soil.

Ewing township, in Union county, appealed to us in a case which seems plain. An unimportant saw mill site is the cause of the inundation of a considerable section in the township. On an appeal made to us by the Board of Health of that township we made careful examination of the district and also secured facts in detail as to the sickness and its localities. These were furnished with great precision and with corroborative evidence. At a meeting of the Township Board, held in Trenton, full conference was held with the Secretary as to the means to be used for relief. It is recognized that some defects exist in our laws as to the securing of drainage for health, and is believed that where clear evidence is afforded of prevalent damage in this respect the law should provide means of relief.

The following is part of a letter received about the same time from the Cashier of the Bank of New York, resident at Belleville:

NEW YORK, July 23, 1880.

A. W. ROGERS, M. D.,

*President of the State Medical Society.*

*Dear Sir:*—Having lived for several years at Belleville, and suffered from malaria in my own family, I have been led to observe the influences which produce or aid in the dissemination of malaria, and I have observed that the prevalence of diseases of that nature, (to a large extent), depends on the condition of the water in the various mill or factory ponds. And I have observed that the drawing down or emptying of the ponds for repairs to dam or other purpose, during the summer time, has been followed by a wave of chills and fever or typhoid. Last season the old Birds' mill pond, (you may know it), was drained during the hot weather, that the Newark Aqueduct Board might lay their pipes across. Immediately after, the lower Hendricks pond was partly emptied to repair the Montclair Railway bridge; the effect was evident in increase and spread of malarial

disorders. Two years before, the upper Hendricks pond was emptied and the locality of Montgomery was a prey to malaria. There is no doubt in my mind that the improper use of the water-courses and ponds is largely the cause of the reputation of New Jersey for malaria &c., and it does seem to me that it is a proper subject for legislation.

## BOUND BROOK.

The condition of the beautiful village of Bound Brook has become so well known, that we are in no danger of injuring its best interests, by speaking plainly of its deplorable experience. About July 27th, we received the following note from one of its physicians:

EZRA M. HUNT, M. D., METUCHEN, N. J.

*My Dear Doctor*:—Bound Brook is certainly in a very unhealthy condition. On Main street there is but *one house* which escapes from malaria in some form—and this is simply a fair sample of the whole town. Chills are frequent—fearful neuralgia more so—but the fever predominates. The street on which I reside, the best drained and located on a small hill, I do not believe one man, woman or child escapes, except by leaving town. When I say I believe, I mean I have been unable to find a single exception to the statement. Now my object is to see if I cannot persuade you to visit this place, show you its plague spots and see what can be done for it.

Respectfully yours, &c.,

C. M. FIELD, M. D.

BOUND BROOK, N. J.

A visit the subsequent day and a careful examination, not only of the one chief marsh, but of all surroundings convinced us that there were local causes of disease of the most serious character. Changes caused by the alterations of roads, building of railroads, gradual obstruction of water-courses and the accumulation of decayed and decaying vegetation had attracted attention before. The previous summer, the increase of intermittents and remittents had been so great that complaint had been made before the grand jury, and before the sickness of this summer, an indictment of the chief marsh as a nuisance, had been made.

Not long after our first visit, the State Board of Health was asked to be informally present at a meeting of the Township

Board of Health and of the citizens, held for the purpose of producing evidence that might satisfy the Township Board that this marsh needed to be reported by them as a nuisance. Although it was not necessary that our Board should formally meet, and as at this stage of proceedings it had only an advisory and individual relation, three or four members of the Board were present.

The proceedings were conducted in a deliberative way and full opportunity afforded to get at the facts as to the prevailing sickness and as to its causes.

Every physician of the town testified to the due extent of the evil and agreed as to its causes. The most prominent citizens declared that unless there was an abatement of the evil, property interests could not induce them to remain as residents.

Whole families of laboring men prostrated, business paralyzed, all that could get away seeking relief by flight, and a kind of testimony irresistible, both as to the facts in evidence and the character of those offering it, made out a case of malarial poisoning so oppressive and universal, as to furnish such a typical example of concentrated malarial poison and of its saturating effects as deserves to form a whole chapter in the future history of periodic fevers, due to localized and artificial causes. Gen. Viele, after a careful inspection of the whole precinct, declared it to be the worst exhibit of a malarial manufactory that he had ever witnessed, and worse than anything known this side of Africa. Assertions that had seemed to us extravagant were fully verified by what we saw and heard, so that I believe every member of the Board felt fully convinced of the severity of the visitation and the reality of its alleged exciting causes. Even in July, all through the pond, there were patches of dead vegetation, not even the water lily being able to withstand the alternations. The mild winter, the heat of early spring, the alternation of water and of exposure of the bottom of the marsh, with its decaying mass, to the action of hot suns, made an effluvium so sensible at nights, and often in days of humid atmosphere, as to be fully certified by the community at large. It was a "macerating reservoir of vegetable substances, causing those pestiferous exhalations to which intermittents in all their grades and varieties have been obviously traceable." While no doubt other evils exist, this marsh and its tributaries

were the chief cause. While this does not inculpate the present owners, since they do not seem intentionally to have created the evil, yet it did show that the equity of law should somehow reach the evil before another summer comes.

The local Board of Health, under the act of March 12th, 1880, declared the mill-dam a nuisance, and ordered its removal in November. In the meantime, a second complaint was made before the grand jury of Somerset county, and a true bill found. The case came up for trial at the fall term and occupied the court at Somerville for ten days. It will ever be a notable trial in the history of New Jersey sanitary legislation. The owners of the land made a most vigorous defence, with the aid of some of the ablest counsel of the State. The Prosecutors showed a universality of sickness such as we believe has never been exhibited in any such trial. No person of the vicinity could be found to testify exemption. On the former trial it was shown that one man had not been sick, and that an old man and his wife, who usually retired soon after sunset, had escaped. On the second trial it appeared that these three had since all been down with remittent or intermittent fever. Attempt was made to show that the malaria at Bound Brook was a part of the general prevalence of this malady; that there were other operative causes; that the water of the pond was not harmful, but that the wells might be. The verdict of the jury sustained the indictment of the grand jury. The case fully shows that law must in such flagrant cases protect the health of the citizen, and that even ownership in real estate is not so precious as the lives of the people. As it is desirable that no private property should be confiscated without award, and also that it should not become a public nuisance, we submit, that drainage for health should be recognized in the State of New Jersey. The law does not hesitate to provide for drainage of land for benefits to agriculture, or to condemn one's private property when it is wanted to build a railroad, or to widen its tracks. This is right. But it is also right that under the same restrictions, or the same provisions for equitable appraisement, mill-dams or marsh lands, which are notably unhealthy, should admit of similar condemnation, under provisions fair alike to owners and to the general public. Surely the public interest requires that whole communities should not be prostrated as a result of such

artificial marshes as that which fully suspended the prosperity of this growing town.

The defendant was directed to abate not only the mill-dam, but to remove all the obstruction that had caused the nuisance. And it is being promptly abated. The details of the trial, the evidence, the pleadings, and the charge of the Judge, are worthy of permanent record.

There is very great need, in many localities in this State, of drainage for health, and there is need of such legislation as, while it guards personal rights, should make it as possible in behalf of the public health for the Supreme Court to condemn land for this, as it is for other public interests.

Extracts from the reports of local Boards of Health will indicate various localities where "malarial" diseases have occurred. While climatic conditions have favored so wide-spread a prevalence, it will be found that many localities have been exempt, and that those regions have suffered most which have long been recognized as in the vicinity of unhealthy swamps or low grounds, filled with vegetable refuse.

We also call attention to one of the reports from a local Board, of a peculiar endemic fever which occurred near Blackwoodtown, and is believed to have been caused by putrefactive composts, brought there for fertilizing purposes.

See reports of local Boards.

#### THE ELIZABETH NUISANCE.

Early in the year our attention was directed to a nuisance that existed between Elizabeth and Elizabethport, in the case of an establishment for the recovery of sulphuric acid from the refuse liquors left in the refining of kerosene oil.

In the separation of the kerosene much sulphuric acid is used. The thick liquid left consists of various nauseous hydrocarbons or complex oils, in connection with the sulphuric acid. The whole is known as "sludge." This was brought to a dock and transferred to vats and retorts, and by a crude process and by imperfectly conducted works the acid was separated. The result was that the fumes of sulphuric acid and a floating vapor, composed of various of these petroleum compounds, was diffused a great distance. In certain states of the atmosphere it

did not seem to mingle with the air, but to be carried along through it as if a distinct and unmingling substance. Recently an author has attempted to show that the reason of the heavy fogs of London is partly to be found in the fact that the similar atoms given off from various factories become coated with an oily pellicle and so are prevented from oxidation and from ready mingling with the atmosphere. Whatever may be the reason it is certain that some vapors do not readily submit to atmospheric dilution and are to be studied as to their resisting constituency.

At least it was certain as to this vapor that it was a great annoyance to the whole district in which the distillery works had been started. In very many, beside discomfort, it produced a sensation of oppressive breathing and nausea, and it was claimed that in others it caused headache, diarrhœa and other serious sickness. There was the usual difference of view as to whether it was absolutely harmful, and at one time it seemed as if a long litigation would ensue on the point whether it was a nuisance injurious to public health.

Although the present English law, in its definition of a nuisance injurious to health, includes such permanent odors as unpleasantly affect large masses of people, and are found to nauseate or distress large numbers of persons, yet our own courts have heretofore been exact in their requirements as to proofs of actual evil effects to the human system.

But the case in hand illustrates the present tendency to pay due regard to the public health, to consider all alleged interferences therewith. Public opinion was earnest and outspoken in condemnation of the evil. The physicians of the district very unanimously expressed their opinion that the vapor was unfavorable to health. The Secretary of the State Board of Health was requested to make a full examination of the works and an inquiry into the effects, and of the vapor.

At the same time an indictment was sought from the grand jury, and an injunction from the higher court. The case was fully presented and finally an indictment secured.

The Chancellor also appointed an expert commission for the purpose of examining into the alleged nuisance, its effects on public health, and whether it could be remedied so as to permit the continuation of the works. The result of the examination

was such as to satisfy them of the imperfection of method and the evils arising therefrom.

The owners are experimenting on methods, in order to satisfy the committee of experts. The nuisance will be abated. The case seemed to illustrate three or four important points:

I. The power of intelligent public opinion, when it is freely expressed, is persistent and adapts right methods for the accomplishment of its object. Much failure in removing nuisances that is attributed to the imperfection of law, is due to a defective public opinion, a feeble or defective expression of it or a resort to methods which are unwise and indefensible.

II. The tendency of law to conserve the interests of public health. The case was acknowledged to be one difficult of proof by the closest tests of chemical analysis, or by testimony as to the effects of such vapors in dilution. But the exact testimony of personal experience was found to be definite enough to overcome all this. Although some of the decisions of courts, several years since, seemed discouraging as to the definition and abatement of nuisances, it is evident that now both public opinion and law incline to regard the protection of the public health as a frequent and definite duty of the State. The Attorney General in his opinion on a law passed by the last Legislature and referred to him for direction as to one of its clauses, after giving a construction thereto, governed by the intent rather than the technical wording, says: "If the law was not a sanitary measure, it might be questionable whether it would bear such a construction." The same spirit is manifested in both State decisions and municipal ordinances. Law is both being made and executed which, while regarding private rights, recognizes the fact that the health of the people is a supreme law.

III. It showed how crude and imperfect are many of the processes now carried on to the discomfort of the public.

The so-called factory was little more than a series of vats and retorts placed out of doors, with only a shed over them, in which not the least attempt was made to absorb or burn nauseous emanations, or to conduct a chemical process with some regard to public comfort. This was not because the evil did not permit of remedy, or, at least, of abatement, to a large degree, but because the parties did not know of the best methods, or did not care to incur the additional expense. The Local

Government Board of England has recently, through Dr. Ballard, made a most able and elaborate report as to the best method of conducting those manufacturing or chemical processes, which are apt to cause nuisance. It has been shown that these trade-occupations now admit of clear and safe conduct, and that evils arise chiefly from defects of apparatus or supervision. Already our chief routes to New York City are tainted with questionable smells, and the refuse factories which are driven from the cities of other States, find refuge within our limits. We must insist upon it, either that such establishments are not placed in our midst, or that they be conducted according to the methods consistent with our proper comfort and health.

IV. The vapor and odors from this factory illustrate how, notwithstanding the true doctrine of the diffusion of gases and the power of the air as an oxidizer or deodorant, there yet may be circumstances in which mists, vapors or organic particles may be carried unchanged for long distances and be capable of exercising their own peculiar influences. It is known that the odorous particles from this factory were at times recognizable several miles distant. After having heard statements as to its recognition at Cranford and at the docks at Perth Amboy, we had a still more convincing experience. Three weeks after my own visit to the works, on a day when the wind was east, with the damp, sleety atmosphere of an approaching snow-storm, I perceived the odor distinctly on an inland road between two woods, a distance of twelve miles from the spot. On this occasion and at two subsequent times, in similar condition of wind and moisture, it was distinctly perceived by several at a distance of eleven miles, and the odors described by those who did not know from whence it came. There is accumulating evidence that in certain conditions of atmosphere waves of vapor may move in invisible strata for distances much greater than once conceived. It is not improbable that when a contagion has become greatly multiplied in one spot, it may thus be raised and float away from its own district, and carry its infective particles long distances and affect only those that come within its zone.

## SMALL-POX IN CAMDEN.

About the middle of July information reached us through private sources that there were some cases of small-pox in Camden. An official inquiry, addressed to us by the National Board of Health, with information received by them, led me, on July 28th, to address to the Sanitary Committee of that city, a letter as to facts known to the Board, as to the need of more active measures in reference to this disease, and of more active exercise of sanitary police in general. The letter was kindly received by the Common Council, and referred to its Sanitary Committee. Other communications from private citizens, induced me soon after, to visit in person the City Clerk, of Camden, as the city official with whom the Board has official relations. We obtained from him such facts as made us urge upon him at once to communicate with the sanitary authorities, some of whom were absent from the city. August 16th, I received a communication from James H. Wroth, City Physician, asking me, on behalf of the State Board of Health, to meet the Sanitary Committee at my earliest convenience. I telegraphed for a meeting the next day.

It proved to be a conference with the Sanitary Committee of the Council, and with several of the leading physicians and citizens. We spent the afternoon in a thorough inquiry into the facts as to the spread of the disease, and its localities. It was admitted to be on the increase each day, and also that adequate means had not been devised for its check. Without undue criticism of the fact, it was the accepted view that all should, with rapid promptness, co-operate in the adoption of those means which were advised. August 22d, our Board received the gratifying evidence that very active measures had been already taken, that new supplies of vaccine virus had been secured, that a system of isolation and vaccination was being followed with satisfactory results. Reports to the Board showed thirty-eight cases in the hospital, sixty cases in the city, and many persons exposed. The conference was otherwise valuable as directing attention to various other defects in sanitary administration, and in securing the initiation by the sanitary committee and others of a plan for more effective sanitary care.

Small-pox is so far a preventable disease that we need not

here report the thousand statements and arguments already in print as to the means of isolation of every occurrent case, and of such vaccination as will deprive the disease of material for attack. Clearing up the rear yard and using disinfectents is very good as a general cleanliness and is primary in case of some epidemics, but isolate and vaccinate are the primary things to do in impending small-pox. By our present methods about every seven years we raise a population so unprotected through neglect of vaccination as to give sure and hardy soil for fertilizing and propagating this disease. So long as we pursue this plan, we shall continue to have, every ten years, pecuniary losses (not to speak of lives) from small-pox, more than equivalent to what it would cost to vaccinate gratis the entire growing population.

Now that bovine virus is so easily procured and those who fear contamination from other people's children may be vaccinated from safe sources, there can be no possible excuse for an epidemic of small-pox. It is a reproach to our civilization, an evidence of a corrupted taste for eruptions and disfigurements, an ensign of carelessness, or a proof of original sin too actual for argument.

While other methods than those of compulsory vaccination may be expedient, yet our laws should go far enough to restrain those who by their neglect endanger society, from attendance on public schools, from leaving houses that are infected, or from exposures of the life and health of others until such time as vaccination has been performed or the danger has ceased.

## KEROSENE EXPLOSIVES.

In the second report of this Board, pages 16-22, attention was drawn to the dangers to life resulting from illuminating oils. In view of the facts in evidence, it was claimed that some legislation is needed on the subject.

Last winter a bill was presented, which, while it sought to secure regulation, was not, in all its parts, such as the Board could have approved. The need of exact legal enactment as to the subject, is being made more and more apparent by the frequency of accidents. These oils are more largely used each year, as we find by the statements of dealers in cities where gas

can be had. Their use necessarily falls under the charge of those who are not always intelligent or careful. Some of the accidents occur in the designed use of the oils. Others result from attempts to fill burning lamps or to light fires. While this use is to be censured, yet many of the accidents that occur in such cases would not take place were the oil of standard purity. During the last year we have heard of an unusual number of these accidents, and have reason to believe that the sale of low grade oils is increasing. It is to be remembered that such oils, especially in summer, give off gases which mixed with common air are highly inflammable. Many a half full can or lamp or a partly filled barrel has this volatile and inflammable gaseous mixture floating above the surface. It is not merely formed by the light approaching, but is there ready to explode if the light or fire happens to be brought in contact.

The following case which has come under our examination this year, will illustrate:

A girl of twelve years, living in the township of Raritan, toward Perth Amboy, was left with a sick friend alone in the house, on a very warm May day. The fire was probably supposed to be out, but a few embers must have been beneath the wood she attempted to light. The can exploded and set her clothing on fire. The top was on, showing that she had only attempted to pour from the very small spout. She ran out of doors in a strong wind, and in five minutes fell on the grass, and was dead before the farmer in the field could reach her.

On visiting the house, we found that the top of the can had been so violently separated as to leave the full mark of its rim on the ceiling, and so as to cut through deep into the brown plaster. Many spots of oil had been thrown here and there over the entire kitchen. A small amount of gunpowder could not have shown greater explosive power. On inquiry we found that the quart can had in it scarcely enough oil to fill a lamp—was in a warm closet, about fifteen feet from the stove. It was evident that the can always contained the explosive gases ready to set on fire the oil or anything that came within reach. Tracing the oil to the vendor we found it had been bought and sold by him as one hundred and twelve degrees test oil and was very largely in the market in most of the towns. It was tested May 17th by Prof. A. B. Cornwall, of Princeton, and he wrote as follows:

"The sample of kerosene you left me I have tested to-day. It flashes at eighty-eight degrees Fahrenheit, and burns (fire test) at one hundred and seven degrees Fahrenheit. The tests were made in a Tagliabue's open tester, with a thermometer by Tagliabue, specially made for such tests, and showing single degrees. A preliminary test was first made and the oil was again tested, raising the temperature uniformly from seventy-three degrees to eighty-eight degrees in twenty-four minutes, and from eighty-eight degrees to one hundred and seven degrees in eighteen minutes more. The oil is unsafe."

On writing to the wholesale dealer in Newark, we received the following:

NEWARK, N. J., May 19th, 1880.

*Mr. E. M. Hunt, Metuchen:*

DEAR SIR:—Yours of the 18th received. We were not aware that we were putting out oil at less test than branded. The oil is shipped for us from Philadelphia, and guaranteed to us to stand a test of one hundred and twelve degrees, and we guarantee to our customers this test. You will find on one of the heads of the barrel the State of Pennsylvania Inspector's brand, as viz:

Inspected by Charles F. Miller. Guaranteed fire-test one hundred and twelve degrees, Philadelphia; and we supposed that the State Inspector's brand was a sufficient guarantee that the oil would stand test as branded. In regard to the accident you speak of, if one hundred and fifty degrees test-oil was poured into a *burning fire*, it would ignite and explode just the same as the one hundred and twelve degrees, and all the accidents, or ninety-nine per cent. of them, happen from the careless use of kerosene in just this manner, by pouring on the oil *after* the fire has been started; but we will give this our immediate attention and thoroughly investigate it, and call upon you at your office in a few days. Until then, we remain

Yours, &c.

On receipt of this, we again communicated with Prof. Cornwall, who not only re-affirmed his former examination, but claimed that 150° test oil poured on a fire, would not give such results as we had found in the case. Further correspondence led not only to a visit from this firm, but from the firm in Philadelphia, which had sold the article. None of these gentlemen were personally intending to sell below the standard. The one from Philadelphia frankly told me that such oil should never be put on the market, especially in summer. He even cautioned

the storekeeper against allowing it to be in the barrel on his front platform in the sun. He said that the article was largely sold at wholesale at about seven and a half cents per gallon, and that it was so nearly a bye-product, that it would not pay to adulterate it with naphtha. In half full barrels, or cans, or lamps in hot days, an inflammable vapor could generally be found floating on the surface. One of the firm selling it here, after hearing what was said, filled his can with a different article. Both of these large dealers said that the better class of wholesale dealers would support a proper law, although aware that there was concerted action against legislation on the part of some prominent firms.

Our experience in this case, the information given, and other inquiries, have made us feel that it is well nigh inexcusable for our State longer to delay such restrictive and regulative legislation, as the exigences of the public safety demand. Local Health Boards in various localities are inquisitive as to their powers in reference to it. The Secretary of the Board of Health, of Washington, Warren county, instituted careful tests of the oils for sale in that town. The fifteen oils examined were none of them found even up to the "fire test," at which they were bought and sold; some of them being more dangerous than others. One of the worst was one sold as 150° fire test. The examinations made by Dr. Baird, and the conservative efforts made at correction, as detailed in the *Washington Review*, of July 2d, 1880, are well worthy of general attention. We only ask that the repeated admonitions given by accidents, which endanger and destroy life, and by the united testimony of chemists and other experts, be no longer allowed to pass unheeded.

#### LOCAL BOARDS OF HEALTH.

The most important sanitary progress of the past year in this State, has been the formation of about two hundred township or city Boards of Health. In many of our townships are villages like Somerville, Bound Brook, etc., which stood in great need of Health Boards. Indeed, to make the Health Boards of larger cities effective, there must also be some power of health administered in the adjacent townships. Many of our cities were found to have only sanitary committees and no adequate pro-

vision for the mode of organizing Health Boards prescribed in their charters. Many of these, like Camden and New Brunswick, have availed themselves of the new law to organize more effective boards. The Boards organized through the State have shown four types, decided by the intelligence or executive capacity of those who constituted them, or by the conceptions of influential men as to what needed really to be done.

One and the smaller class has organized merely because the law requires it, and assumes that their township is perfectly healthy, and really needs no Board.

A second class, while not knowing of any evils, recognized that it is quite possible that such may exist, and so begins in a proper way to inquire into and study the needs of the district, or holds itself in readiness to consider questions or complaints which may arise.

A third class, knowing something of the real needs, have, in a business, systematic way, proceeded with judicious regard to public rights, which circumstances justify. It is surprising how much some such have accomplished without recourse to severe measures, and how much the public sentiment has been educated.

A fourth class would attack every public and private measure with a zeal neither according to knowledge or according to the law, and are distressed that the law does not give arbitrary power.

It was to be expected that in the start of such Boards there would be incomplete knowledge as to needs, and crude views as to methods; but a review of the whole evidence will show that as a whole these local authorities are doing, or preparing to do, effective work.

A township which at the first wrote that they needed not to organize, was among the very first to find itself invaded by a nuisance from an adjacent city so pronounced as to call for activity.

We have numerous correspondence which shows how the interest of the people has been aroused, how evils are being examined, and how much room there is to believe that the law will be salutary, as much by the information it will spread and by the evils it will prevent, as by its exercise in those cases where positive orders or legal action are required.

In many districts the first step is to secure a thorough acquaintance with the character of soil and underlying structures, with water courses natural and artificial, with obstructions to natural change or artificial aid—with the contour or topography of the district as secured by sanitary map—with well and water supply—with cellars, house drains, cesspools privy vaults, both as to their kind and proximity, and with prevailing sickness and its localities.

A brief paper in this report by the President of one of these Boards will present some outline of the feasible work to be done by such Boards. Abstracts from some of the reports received and references to their organization will give a good idea of the local interest which is being manifested. We have abundant evidence from various portions of the State, of important preparatory work in the interest of public health.

This Board has been more frequently consulted the last year than in all previous years of its existence. While only seeking to be advisory, it has a sphere of usefulness constantly enlarging, and by counsel and advice has been able to give direction to important sanitary movements.

#### THE NEW JERSEY SANITARY ASSOCIATION AND LOCAL ASSOCIATIONS.

The New Jersey Sanitary Association has proved itself a valuable auxiliary to the work of this Board, and aided in awakening public attention to sanitary matters. Its recent meeting, held in the city of Elizabeth, excited much attention and the papers read were of great importance. The press throughout the State has largely disseminated the information furnished.

The West Ewing Local Association is formed on the Newport plan and conducts sanitary inspections of the entire township. It has recently published a volume of its proceedings, and may well be consulted as a model of what a rural community may do in appreciation both of public health and local thrift.

The Sanitary Association of Elizabeth has been active and useful, and succeeded in awakening local attention to health matters. In several other localities we have been made aware of local voluntary organizations which are aiding in giving shape to health administration.

## SANITARY MAPS AND THE HUDSON COUNTY SURVEY.

In our last report we noted the fact that arrangements had been made for a sanitary survey of those parts of Hudson county which bore relation to New York bay and harbor. This included the cities of Bayonne, Jersey City and Hoboken, and the thickly settled portions of the county adjacent. The survey was undertaken with the aid and direction of the National Board of Health. We were able to command the services of excellent engineers, and the assistance of others who had to do especially with sanitary inspection and vital statistics. The sanitary map of Speilmann & Brush, of Hoboken and Jersey City, and that of Messrs. Eddy & Carrigan, of Bayonne, are specimens of correctness and execution to which we would invite the attention of all cities. Since then, under the auspices of our Board and of the Elizabeth Sanitary Association, Ernest L. Myer, of Elizabeth, has executed a similar map with full details. We can point with pride to these three maps, as furnishing a model for the whole State, and as showing what is needed to be done in every incorporated city, town or borough. By such maps all levels can be known, all underground constructions be recorded and such details, represented in a condensed or graphic way, as are essential to all future planning. For the want of just such records and outlines we have seen a local institution waste no small amount of money, and can point to cities constantly making blunders because of the absence of the necessary facts as to former work done, as to soil, gradients, etc.

In addition to the mapping, inquiries were made as to all points relating to sanitary management and specimen sanitary inspections made. It had been expected that by this time the National Board would have been able to publish the map and details, from which we could procure lithographs. It is still believed that work of such importance to the Nation, as well as to the State, will be provided for, so that the general government will place within our reach the full results. Our Board has therefore postponed the printing of the maps for this year, although they will be accessible to any cities wishing to study the plans. We publish, however, some of the details of inspection in this report, such as will give some idea of the work done and of its importance as a model.

We are also able to present in connection herewith a brief and able report on the Question of Quarantine and exterior Sanitary Defences of the New Jersey front of the Harbor of New York, kindly prepared by Dr. Elisha Harris, Secretary of the New York State Board of Health.

It is plain that there are some interests along our State front, opposite to New York City, which local care is not able to reach, and that the State in defense of its public health needs somehow to secure, better sanitary arrangements than at present exist. The crippled state of local resources delays action which ought to be taken for the protection of the people from some most flagrant and apparent sources of disease.

#### CONDITION OF ALMS-HOUSES—JAILS.

The State Sanitary Commission of 1866, as appointed by the law of the previous Legislature, reported as to the condition of the county and township alms-houses of the State. Some facts were then elicited which showed that their sanitary condition was too often overlooked. Some statements made as to the condition of county jails seemed to the Board to make it important to associate these in an inquiry. The Board was not able to undertake an investigation throughout the State, but thought it best to single out four or five counties as a fair indication of what might be needed in others. This work has been carefully and accurately performed and the results will appear in the paper on the subject which is a part of the report. No one can examine into the general facts as to the neglects which are apt to occur in all public institutions, where the dependent or the criminal classes are kept, without seeing that each State or each county has some provisions by which such places shall be subject to a careful examination as to their sanitary condition and the means of promoting the best interests of society, as related to the inmates. In many States this is regarded as so important as to be committed to a Board of Charities. Our inquiry has only related to those matters which bear more directly on health conditions. It is evident that in this respect there is need of more careful circumspection. Either the State Board or Local Boards of Health should so acquaint themselves with the sanitary condition of these institutions as to secure them from being sources of evil either to the surrounding or to the inmates. Just

as the report is being printed, we have had occasion to make a sanitary investigation of the Camden County Alms-house, on account of a malignant form of fever prevailing there. The details will appear in the next report; but the number of inmates and the idleness and overcrowding that occurs in the winter months, is even to the casual observer, evidence that a stricter care of all our county and township alms-houses is needed. The present deplorable condition of that institution, is only what must occur whenever the spark alights to set ablaze the extra-hazardous material which has been collected.

## DRAINAGE.

In dealing with great sanitary questions we are constantly feeling how essential are proper ground conditions to the maintenance of health.

Natural water-courses are impeded and no provision made for that additional drainage which varied construction and alteration demand. This is especially true in respect to cities. Among the valuable papers of this report will be found one which presents this subject with fullness of detail, and with direct evidence as to its bearings upon the life and health of our population. We call special attention to the careful use made of some of the English tables, and to the practical methods advised for executing such sanitary work.

## WATER SUPPLY.

The oft-recurring and vital question of water supply is occupying the attention of many portions of our State. Several of our larger cities have no adequate water supply. Others, while having sufficient quantity, have reasons for great misgiving as to quality. While in good seasons and for the present there may be escape from very pronounced evils, a great risk is being run. There are reductions of vital force and bowel disturbances from impure water, which shorten and destroy as many lives as does an occasional epidemic. Most of our larger cities are on tide water, and so, near the emptying places of rivers. It matters much whether a water-course is intercepted and in part appropriated as a water supply away up near its

sources, or whether it is taken as near its exit, as Newark or Jersey City. In many of our towns reliance is still placed upon well water. This answers, in the smaller villages, before any one street becomes compact; but where houses crowd each other, and the various out-door and in-door contrivances and cesspools of cities are introduced, there is no defense for the well. Its good previous reputation cannot save it when it gets into such vile company. It was for a time thought that driven wells, or wells called artesian, which go down beyond the reach of soil contamination, would be our safety. But joints or fissures in much of the underlying rock may contaminate these. Worse than all, by reason of hardness or other saline constituents, the water is seldom fit for use. The many trials about Newark and Bellville and Orange have, for the most part, proved unsatisfactory, except as furnishing a supply for machinery use. Rain water, properly stored in cisterns, often answers well, and is not liable to some of the objections urged against the rain water of the British Isles. Dr. Fox, an able medical officer of health, in his work on the "Sanitary Examinations of Water, Air and Food," places last the "waters of streams and rivulets, the majority of which contain more or less filth, and in times of heavy rains, soil and mineral debris of every description." All these water questions are worthy of the closest expert study before expensive methods of supply are adopted; but they should not be left undecided so long as to peril the growth of our cities and the health of the inhabitants. We hope ere long more fully to draw attention to the water-sheds of our State, and to the indications for supply which relate to special localities.

#### OUR SEASIDE RESORTS.

These need our careful attention because of their rapid growth; because so many of our citizens spend a portion of their time as residents there, and because so many take it for granted that a sandy soil will purify all that enters it and the great sea quickly carry away all that flows into its waters.

It is, however, constantly to be borne in mind that pure sand is not a good filter. We know of a case in which, on our shore, a part of a barrel of brine was emptied more than fifty feet distant from a deep tube or driven well. About three weeks

afterwards the water of the well was found to be salt, and so continued for several days. The circumstance was recalled, and there was good reason to believe that the salt had thus found its way into the deep water supply.

It is known that at many places cesspools are relied upon and found convenient because they so seldom fill. Their contents pass rapidly into the soil and may easily pollute it or render it unfit for a water supply. In these rapidly growing towns and villages it should be an axiom that cesspools, if used at all, should be made so tight that their contents will not leak into the ground, and should be emptied on a system. Since the introduction of iron piers, it may be quite feasible to have sewage boats so built that they shall receive this sewage by means of pipes and as often as necessary, carry it out from shore, beyond the possibility of deposit on the shore sand. To illustrate the crudeness of present methods of sea-side disposal, and the necessity of a more defensible system, we need only quote from the recent work of Robinson, an English Authority on Sewage Disposal:

“To avoid a nuisance the sewage must be discharged into the sea at a point, not only below low water, but where there is a well ascertained current which would carry it permanently seaward.

A point of discharge complying with these conditions cannot always be found to exist close to the town, or requires to be ascertained by careful tidal and other observations. At the outfall there should be a continuous movement seaward during the twenty-four hours, instead of an oscillating action to and fro, resulting in a return of the sewage and its disposition along the shore, not only at the outfall and in its immediate neighborhood, but also at distant places to which the tide carries. The foreshore of many watering places is being polluted in this way, and in time it will prejudicially affect them, as the knowledge that the foreshore is polluted becomes generally known.

The expenditure necessary to ensure an efficient system of sewage disposal, although it may appear heavy at first, is in the end, the truest economy.

The difficulties attending the discharge of sewage into the sea would be diminished were it not that it has a higher tempera-

ture, and a lower specific gravity than sea or river water, which causes it to rise to the surface. If it is not carried seaward quickly, part of the suspended solid impurities are deposited on the coast wherever there is still water and no tidal current, whilst the rest of the suspended, together with the dissolved impurities float on the surface, and are carried backwards and forwards by every tide, decomposing and liberating offensive gases."

This action was pointed out by Professor Stanley Jevons, in a letter to the *Times*, of December 2d, 1878, with reference to the formation of sewage mud banks in the Thames, by the discharge of sewage at the outfalls at Crossness and Barking.

He pointed out that matters which would remain suspended for many days in fresh water, would be readily precipitated in a few hours when the water is saline, and states that much of the sewage matter indeed, would, if left to itself, float in water; but in the presence of saline matter, which kills the pedetic or oscillating motion of suspended particles, cohesive attraction comes into play. The minute particles of suspended clay will then adhere to the organic sewage particles, and carry them to the bottom of the river, where they will form foul pestiferous banks of ooze.

In the same way we may explain the peculiarly unhealthy effect produced at seaside watering places, where the sewage is poured down the beach, into the sea, in front of the town, if any such there still be. Unless there be strong tidal currents the foul particles are not carried away, but are precipitated and mingled with the sand and mud of the beach.

If the salt water enters the sewers the deposit will occur therein, and we may infer that flushing the sewers with sea water, will probably do a good deal more harm than good.

In the proceedings of the Boston Society of Natural History, for February, 1874, Dr. Hunt, states: I have called attention to the fact that the clay resulting from the decay of rock remains for many days suspended in pure water, though not in waters even slightly saline, and is therefore readily precipitated in a few hours, when the turbid fresh waters mingle with those of the sea, thus forming fine argillaceous sediments.

The geological significance of this fact was, it is believed, first

pointed out in 1861, by Mr. Lidell, in Humphrey's and Abbot's "Report on the Physics and Hydraulics of the Mississippi River," (appendix A, p. xi,) where he applied it to explain the accumulations of mud at this river's mouth.

Sea water delays the oxidation of organic matters, so that the foul constituents of sewage, which in river water would be liberated and got rid of in a short time, are preserved in sea water, which causes them to accumulate and form dangerous deposits ready for the quickening action of the summer sun, when gases, injurious to health, are evolved. It is claimed, too, that brackish water, or foul material slightly saltish, attacks the refuse matters, and liberates foul-smelling gases.

The objectionable nature of deposits from sewage is evidenced by the observations made by the late Dr. Letheby, on the mud banks that are forming in the river Thames. He describes them as being composed of black and fetid mud, in a state of active putrefactive decomposition, and when examined under the microscope, they were found to consist of broken-up sewage matter, the remains of animalcules, the disintegrated tissues of vegetables, and swarms of diatomaceous remains; and he stated that the mud and suspended matters of the river contained from 6.3 to 18.9 per cent. of the solid constituents of sewage.

To prevent the possibility of doubt the connection between the deposits in the river, and the sewage discharge from the outfalls, has been clearly traced by analyses, and the chemical correspondence between the two unmistakably established.

The same opinion is held by Dr. Frankland and Dr. Tidy as to the similarity in chemical composition between the mud banks in the Thames and the sewage of the outfalls. In some cases, by means of long outfall sewers, the sewage is carried away from the place producing it to the sea, but they are frequently simply transferring the refuse to others, a set of the tide carrying it so as to cause mischief and nuisance elsewhere.

These outfall sewers require careful ventilation as the sewer gases are otherwise liable to be forced back into the town drains at high tide, or after storms, and thus into the houses, even if the house drains are trapped from the main sewers.

A catchment pit should be placed at the outfall, and the solids deposited therein removed systematically. Even then the addi-

tion of a disinfectant and deodorant is sometimes desirable, or it may be found feasible in connection with our iron piers to have a sewage boat so constructed as daily to receive the sewage and convey it three or four miles out to sea.

It will be pleasant when our own seaside resorts attain the precision in health management now secured by most of the English watering places. It is now considered indispensable that these should be able to certify themselves to the public, as to their water supply and methods of sewage disposal, and as to the actual records of health, both of residents and non-residents for series of years. Douglas Galton, in his anniversary address before the Sanitary Institute of Great Britain, says: "A comparison of the local acts obtained by different towns, shows the progress which is continually taking place in the sanitary intelligence of the community. This is illustrated by taking only one point, viz: the registrars of disease in several towns, notably, watering places or health resorts in which self-interest is largely concerned, have obtained power in special acts of Parliament to require the compulsory registration of infectious diseases. These towns, instead of concealing real nuisances or causes of disease, found that it is better, by publicity, to subject themselves to the highest tests of salubrity, and at the same time avail themselves of the highest motives for sanitary completeness.

#### RESCUE OF THE DROWNING.

The fact that our vital statistics of the last year showed the loss of one hundred and ninety-three persons by drowning, and that we have so long an extent of sea-coast, led us to print in the report of last year an article on drowning. Afterward the whole subject of the rescue from asphyxia was re-studied, and a full examination made of all the plans adopted for the resuscitation of the drowned. The result was the circular issued by this Board and largely distributed throughout the State. A captain in the life-saving service on our coast made himself conversant with it, and soon had an opportunity to apply it, as thus stated: "In a case of drowning at Monmouth Beach, not long since, after various efforts had been used to resuscitate the body by those present, Captain C. H. Valentine, Superintendent of

Life Saving Station No. 4, was sent for, and restored the man by following the rules for resuscitating the drowned, as laid down by the State Board of Health, and known as the New Jersey Method. These regulations have been adopted throughout the State, and are the most serviceable of any of the methods for resuscitating the drowned." It contains two or three directions not to be found in any other plan, and insists upon the value of the electric battery and the hypodermic syringe for administering brandy and digitalis. We commend it to the careful study of all who may be called on to treat such cases. We believe all life stations and all prominent hotels should have ready at hand the pocket battery and the hypodermic syringe. The whole cost is not over ten dollars, and, in some cases, these are indispensable. No one could read the facts as to the recent loss of General Torbet without feeling that any such resuscitation at hand would have saved his life. We commend this whole subject to the attention of our citizens, not only because of the number of accidents the last summer, but because, with our rivers and lakes and great seaside resorts, there is likely to be frequent need of this kind of service. Medical aid is in vain in such cases unless there is a full knowledge of the best methods of manipulation, and a ready resort to these collateral aids when required. We believe that this circular should be in each hotel on our coast, and that local health boards should extend a knowledge of it.

## REGULATION OF MEDICAL PRACTICE.

In the early history of our country, and especially in our own State, important safeguards existed in order to assure the people that those who attempted the practice either of medicine, surgery or midwifery, had received such special preparation for their work, as to assure the people that the interests of human life would be promoted by their art.

By degrees, legislative restrictions gave way to an almost unprotected laxity. Illinois was the first State to move in the direction of restoring restrictive legislation. This did not seek to discriminate in favor of any one school or sect, but only required that all who professed to exercise the healing art should be able to give such evidence of previous preparation for their

duties, as might not unduly risk the health and the life of the citizen. The law went into effect July, 1877. It was found that out of the 7,600 physicians in the State, only 3,600 were legalized practitioners. In 1880 the number of authorized practitioners had increased to 4,825, and the number of unqualified practitioners had greatly decreased. Last year an additional evil was discovered, in the sale of diplomas, and became so flagrant as to attract the attention of our National Government. Subsequent revelations leave no doubt that in addition to the multitudes of unqualified practitioners who could show no license, several thousands more have operated under bogus diplomas and still further jeopardized human life. The disposition to limitation and restriction in our State, was manifest among the people and in some of our intelligent legislators before it was among authorized medical practitioners. The latter had become so used to this kind of laxity and so displeased with successive acts of legislation which had practically deprived them of any control of the matter, that they apparently viewed it with little concern. But it became so evident that the public health was suffering from this promiscuous practice, that the last Legislature enacted a mild form of restricting law. It only seeks to assure that each person claiming to be a doctor of medicine, should have received a license from some duly authorized Medical College. The State having done this much to protect the public health, and having shown this appreciation of the relation of proper medical education to the welfare of the citizen, it behooves all regularly educated practitioners to do their part in aiding to secure the fulfillment of the law. We think that the responsibility of a carrying out and enforcement of the law, commends itself to all local medical societies of all sects. No man whose diploma will not bear scrutiny need now be allowed to practice upon the credulity of the citizens. By a record of places of graduation, the people are better able to discriminate between those colleges of any sect which are best and those which have too low a grade of requirement. This Board has felt called upon to recognize this as one of the points in which the public has been guarded against what had become a prevailing nuisance. We append to this report a copy of the circular issued in reference to it and

inclusive of the law. We counsel both the people and all local medical societies to see to it that its requirements are complied with. We hope to have ere long a completed list of all those whose names are recorded as practitioners, as we have now of all those who claim to be practitioners, in each locality and so shall be able to compare the two. The duties of this Board are now so numerous that we can scarcely do more than register the names. It must be left mostly to the people of each vicinity and to authorized medical practitioners to see that purchased diplomas and empirics are abated. The law much needs a clause by which the genuineness of copies of diplomas offered for record can be known.

#### THE SANITARY EXHIBIT.

The value of an exhibition of sanitary appliances, as a means of acquainting the people with the principles of their application, and with various improvements conservative of the public health has long been recognized in Great Britain. Under the auspices of the New Jersey State Fair, and with the aid of this Board, the first American exhibit was held last year at Waverly. This year the Agricultural Society erected a special building for the sanitary department. Although the display was not extensive, we think no one examined it without feeling fully repaid, and without realizing its importance. Systems of heating and ventilation, the disposal of sewage, the various forms of household contrivances and other sanitary subjects were illustrated. We invite to it the attention of all citizens, and hope as a Board to join with others in promoting so great an interest. It will be our plan to have on hand for exhibit some of the latest improvements from the sanitary museum we are seeking to establish at Trenton, and also each year to secure from dealers and inventors their most approved appliances.

#### METEOROLOGY AND CLIMATOLOGY.

“Meteorology properly embraces the study of atmospheric phenomena resulting in connection with the physical properties and conformation of the earth, in what we call climate and weather.” We, therefore, in its bearing on public health, study

meteorology only in its bearing in climatology. It is important to make precise records of atmospheric and atomic conditions as expressed in air, earth and water, in darkness and sunshine, in rain and snow, in frost and ice, in wind and moisture.

Having in these the elements from which weather is formed, we have the important factors which make up the climatic conditions, and so constitute the *climate*. Alongside of this, day by day, and month by month, we put the records of disease, of epidemics, of death.

It is evident that this is a department of health-study very discouraging to those who would arrive at quick conclusions. The long work of science is to collect every fact and through a sufficient number of years, so as to make the study feasible. It is encouraging that such results have been secured as enable us to predict many weather changes. Yet we still feel "that the time for the deductive treatment of weather problems has not yet arrived." The relations of weather and disease are still more complex and introduce a study as difficult as it is important. Outlines are already studied with advantage, but close deduction is still much in the future. Our Board at present only seeks to put accurately on record the chief facts as to weather conditions, in order that these comparisons may be made whenever sufficient facts are secured.

We, this year, are favored with the record of Hon. Wm. Whitehead since 1838, and thus supplement the record made by him at the time of the publication of the Geology of New Jersey in 1868. We are also perfecting records at Princeton, Newton and Vineland. New York and Philadelphia will represent other points in our State, and the records of the Signal Service are also of value. We hope thus to put on record several facts as to the weather, which will furnish the data for comparisons with prevalent diseases. The climate of the State is well worthy of the closest study in its bearing on health and disease. It has far more than usual varieties. Within our own borders, we believe, will yet be found nooks and districts which will show a record equal to the purity of the Adirondacks, and to the equability of Aiken. It may yet be that the consumptive will, on the basis of weather records, be able to stop short of Florida, and the seeker of a summer resort, not only on our ocean front, but amid our pines or high up in the northern hills, be able to show both

by records of instruments of physicians and by the experience of invalids, a climate as desirable as any to be found in the States. Some special weather conditions of the year are noted elsewhere.

It is constantly apparent that diseases are greatly affected by what we term the climate and the weather. "They are concerned, says Russell, in seasonal variations, in the prevalence of disease; in regional variations of disease; in the circumstances which at one time and in one place give wings, so to speak, to the contagion, and at other places and at other times obstruct their progress. We must recognize these facts if we wish to avoid the risk of falling into erroneous assertion of success for preventive measures, and also to justify at times what might seem undue confidence or undue anxiety as to the probable course of some disease where contagia is dominated in its activities by those cosmical conditions."

\* \* \* The seasons bring their special tendencies to disease. Temperature, and rain fall and hydrometric and electric phenomena are attended by proclivities to some diseases, while they are hostile to others. Were these the only controlling agencies, as we can not control the weather, we would only study how to modify its effects or protect ourselves therefrom. But as these climatic conditions only act upon materials already in existence so far as contagions are concerned, we seek to suspend or diminish these even though we can not operate with good success upon things celestial. Our inability to control these climatic conditions is no more a reason for neglecting to study the source and causes of contagion, than it would be for the farmer to neglect all the details of preparing ground and sowing and caring for the seed because he could not know all about the weather and the coming season.

#### DISEASES OF ANIMALS.

An inquiry into the diseases of animals has always been a part of the duties of this Board. It has close relations to the public health, because of the flesh and milk consumed, because some diseases of animals are communicated to or affect mankind, and because through their comparative study we get light upon the nature, causes and prevention of some human diseases.

By an act of the last Legislature the care of the contagious

diseases of animals was committed to this Board, with special reference to contagious pleuro-pneumonia which had existed the previous year in the State. The fact that at the close of the service of a temporary bureau of the previous year, 110 herds of cattle were in quarantine, made it necessary promptly to examine into the disease as it had existed or did still exist in these herds. A full inquiry and investigation showed that any disease that had existed in these herds had nearly ceased.

Active measures were at once taken by this Board to keep apprised of any new outbreaks in these localities or elsewhere, and circulars largely distributed to aid both in the identification and prompt report of cases. It has been a year of heavy loss of cattle by reason of fire, drought and sickness, and so, many cases came under our inspection for examination which were found suffering from other causes. The chief localities of the disease have been in one township of Union and Camden county, and in some of the townships about Mt. Holly, in Burlington county.

The disease has needed very careful guarding, and in several herds in the latter county has been difficult to control. Some animals died in each of these counties, and many more were slaughtered. It has been a large burden and anxiety to this Board, but the results have been fully as satisfactory as we could have expected. We have been greatly aided by the Pennsylvania authorities. The disease still needs watchful care. The full minutes as to it, will be found, as required by law, in the Report of the State Board of Agriculture.

The collateral interests of the disease are such in respect to public health, that an article on Pleuro-Pneumonia is embodied in this Report, together with some circulars relating thereto. The whole subject is worthy of the careful attention of all of our citizens, for the terms of the disease have not been magnified. With the single exception of a difference of opinion as to the construction of a clause of the law, which was amicably settled by reference to the Attorney-General, the co-operation given us by the farmers has been complete, and we owe much to their appreciation and aid. William E. Miller, D. V. S., of Camden, J. K. Dyer, D. V. S., of Mt. Holly, and J. A. McLaughlin, D. V. S., of Jersey City, have faithfully served the Board as Inspectors, and we are indebted to other veterinarians for information and assistance.

A few cases of glanders have occurred in the State. Of these, some were disposed of without compensation by the consent of the owner. In two instances payment was made by the Board. Pneumo-Enteritis, or hog *cholera*, as it is popularly, but erroneously called, has prevailed in a portion of Warren county. Although a contagious and destructive disease, about which the farmers need information, it does not at present threaten to spread. The excellent treatise of the National Government as to it, has been furnished by us in all infected localities.

Fowl-cholera, splenic fever, anthrax and tuberculosis, and the various other comparative studies, both with reference to diseases and pathological changes in flesh and secretions resulting from disease, can not be overlooked by those who are concerned either in the art of preventing or healing disease. The recent remarkable investigations of Pasteur, Touissant, Koch, Greenfield and Fleming, as to the causes of fowl cholera which is not a cholera, but a virulent blood poison, attended with swelling of the cervical glands and duodenal inflammation, has recently been discovered by Pasteur to be capable of prevention by a "vaccine" method, and the discovery may lead to similar method, through a large range of animal diseases.

An epizootic, similar to that which occurred in 1872-3, has prevailed among horses during the fall of 1880. It had a similar direction of movement, and similar symptoms, but was not attended with so large a mortality. The climatic conditions were more favorable than during the former epidemic. There is evidence to show that at the same time a similar influenza prevailed among men. In some cases it almost seemed to have been communicated from horses.

## MILK SUPPLY.

A bill referring to the sale and adulteration of milk, was quite informally placed under the oversight of Board. A competent inspector was placed in charge of its execution. He has done all that the bill would permit, and has accomplished something in guarding the public health. It is essential that some alterations be made in it if it is to be effective for the purposes designed. The law and circulars as issued are appended to the report. The article of Dr. William K. Newton, the inspector, on milk supply contains important information, and may help to guide us to future legislation.



# PAPERS, SCHEDULES AND MAPS

RELATING TO SURVEY OF PARTS OF HUDSON COUNTY.

REPORT OF SANITARY SURVEY AND INSPECTION OF PARTS OF  
HUDSON COUNTY, AS DIRECTED BY THE NATIONAL BOARD  
OF HEALTH, UNDER THE SUPERVISION OF THE NEW  
JERSEY STATE BOARD OF HEALTH.

BY MESSRS. SPIELMANN & BRUSH, HOBOKEN, N. J.

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GENTLEMEN :—In the discharge of the duties assigned us, we have the honor to make to you the following report as embodying suggestions with reference to such questions contained under schedules “F,” “H,” “K,” “L” and “M,” as seemed to us most important and as needing your attention to be directed to them. We will confine ourselves, in our remarks, to the questions as far as they concern Hoboken, West Hoboken, Weehauken, town of Union and township of Union, the remainder of the inspection having been apportioned to the other gentlemen composing the committee. We have already in our answers, in many instances, embodied suggestions which, in themselves, virtually form the basis of a report. But in order to call more special attention to the most important items, we will take them up in regular order, and point out what, to us, has seemed the most important particulars in which the sanitary condition of these places might be improved.

In carefully reading over the questions and answers to them under schedule “F,” we find our attention directed to question 14: “Are the cellars and basements in any part of the city damp or insufficiently drained? If so specify.” Under schedule “F,” question 17: “What proportion of the area of the city is

not sewered?" We find that about one-half of Hoboken, or about three hundred and sixty acres, is not sewered at all. Besides not being sewered, it must be borne in mind that this portion is mostly meadow or swamp land, about two feet below high tide. As a natural consequence, it is constantly saturated and covered with water, which, being mostly stagnant and poisoned by the addition of sewage matter from privies, refuse and garbage from houses and animal secretions, becomes very foul, and pollutes the atmosphere in the entire neighborhood, thus rendering it unfit to be breathed.

The extent of the prevalence of these gases during the warm season may be realized when we consider the fact that the paint on the outside of dwellings, in the worst neighborhood, has become decomposed and rendered of that bluish tinge which the interior of outhouses frequently assumes. Consequently, not only are the cellars and basements in this portion of Hoboken insufficiently drained, but practically, they are not drained at all, thus leaving the cellars always moist and most of the time partially or entirely filled with water.

The detriment to health from such a lack of drainage must be apparent to all, and by reference to a report on the death rate from zymotic diseases in this part of Hoboken, read by our firm at the last annual meeting at Trenton, it will appear to have been fully twice as great during the year 1875 as in the more elevated portions of the city where proper drainage has been provided, and more attention is paid to the laws of health.

We might add a great deal to what we have already said; in fact, it is a subject upon which a great deal of interest has been concentrated lately; but will conclude with the suggestion:

That the only remedy for this grievous evil is a thorough and complete system for the drainage of the low lands by dykes, dams, sewers and pumps and such other provision as will provide for the thorough pumping out of the sewage and rain water at all times and under all circumstances. The above subject is one which has been investigated by competent engineers in this locality, and upon which plans, accompanied by full and exhaustive reports, have been prepared and submitted to the public authorities. The question remaining unsolved in the main is the one: How shall it be brought about and who shall pay for it? This we will not discuss but will leave to the persons

directly interested. We will now turn to Schedule "H," and under it to question 21—30. "In regard to use of cesspools, privy vaults and water closets and manner of constructing them and keeping them clean?" In the city of Hoboken, where sewers exist, the water closets in use in all other cities having drainage and water supply, are employed. These, although of the most approved pattern, always become objectionable when within a building, unless they are perfectly ventilated. This it is not always an easy matter to do, and provision is only seldom made for it; consequently when they are located in the interior of a building, without communicating with the outer air directly by a window, and are not ventilated by a special flue or pipe communicating with the exterior, they often become very objectionable and may give rise to disease by poisonous gases. The outhouses and privy vaults, although emptied once in several months, yet as they are located in a closely built back yard, surrounded by high walls, are not so likely to make the air in the interior of a building impure and poisonous as an illy ventilated water closet.

We would therefore conclude that the most desirable location for a water closet is entirely without a building, especially when we can have it connected with a good sewer, thus providing for its always being clean and free from the accumulation of objectionable matter. If this cannot be secured, a proper system of ventilation should be provided in every instance in which water closets are located in the interior of buildings, and especially should this be compulsory in all schools, halls, and large public buildings, for which purpose compulsory laws should be passed. Questions 7, 8, 9, under Schedule "K," "As to slaughter houses and abattoirs" have especial interest since the large abattoir and stock yards are here and constitute the chief cattle market for a large population.

It is often the case that animals are loaded, or rather packed in close cars, so that they cannot lie down, and are required to stand without either food or water for four or five days, and are then unloaded at a place of slaughter, and killed in an hour afterwards, and while laboring under an intense degree of excitement. If the consumers of beef could witness the long trains of cars loaded with cattle while being brought from the west and required to stand on sidings, often a whole day at a time, and

hear the howling and moaning of the poor suffering brutes for the luxuries, to them, of food and water, such a hue and cry would go up as would soon create some legislative action upon the subject. So long as that state of affairs is allowed to exist just so long must we expect to have meat wholly unfit for human consumption, go upon the market.

All diseases that are accompanied by acute febrile symptoms in the first stages, as well as those that are characterized by purulent collections which are afterwards absorbed into the circulatory system, will render the flesh unfit for human consumption, to wit: An animal being required to stand in an open car for a long time without food or drink, becomes in consequence debilitated, which renders it susceptible to contract colds, which is a common term for catarrh, whether gastric, nasal, intestinal or any other form, inflammation supervenes which often assumes a gangrenous nature; strumous diseases follow, and in consequence the system will soon become loaded with effete materials which permeate the flesh.

This condition may be present either in the first or acute or in the second or chronic stage."

Under manufactories and trades, (schedule "L,") we only need to say that there are very few manufactories in the section included in our territory, and that we took pains to visit them and inspect them carefully, with very gratifying results.

We found them in every case well provided with means for lighting and ventilating them, and the appearance of the operatives was in general very gratifying.

By reference to the answers under schedule "L," it will appear that no children of tender years are employed, but that the ages of the youngest are not generally below 13, and that the regulations governing their hours of work are reasonable. We only hope that other districts will show as favorable a result.

We now turn to the closing schedule "M," perhaps the most important. Much can be said upon the merits of the different items under the schedule, and still the fund of information could hardly be exhausted. We cannot refrain from acknowledging the uniform courtesy extended to us by all the principals visited and the spirit of interest manifested by them to cooperate with us.

By reference to question "3," under schedule "M," the plans of

the schools will show that the rooms are generally of good size and well arranged. Much trouble is experienced in securing proper ventilation. Our impression on visiting the different schools generally, was that the air was thick and impure because ventilation in most of them could be secured only by opening the windows. The teachers themselves do not seem to realize this fact as visitors coming from out doors do, because constant and continuous confinement indoors renders them less susceptible to notice the impurity, than those who have the advantage of being in the open air much. We spoke of this to many of them, and found they concurred with us in our views and admitted the difficulty.

As a remedy we would suggest that every room in a school-house should have a separate ventilating flue, communicating with the outer air in order that the ventilation should become comparatively self-adjusting. The lack in this respect may be accounted for in consequence of the date of construction of many of them, which was at a time when the subject of ventilation was not so well understood, and had not attracted the attention of the public in the same degree that it now does.

We cannot close without referring to the unsatisfactory answers obtained to the questions and notes under No. 44 of this schedule.

Notwithstanding the fact that we visited many of the oldest practitioners and tried to get their views on the subject matter under this question, we found that they had not had occasion to examine into it previously, and were thus unwilling to express any opinion entering into details on the subject matter.

Physicians ought to be entrusted with this very important mission in order that when another inspection may be ordered by the National Board they may be prepared to meet it.

If private corporations find it sufficiently important to warrant them in examining their servants, who are entrusted with the care of life, in regard to color blindness, then how much more important should it be for the National Government to secure similar and even more comprehensive information with reference to the public from the institutions of learning, by means of examination conducted by the medical profession.

We close our report with the above suggestions and hope that their contents will awaken a still greater interest in the subject of sanitary engineering, especially for the important section under consideration.

REPORT OF SANITARY SURVEY AND INSPECTION OF PARTS OF  
HUDSON COUNTY, NEW JERSEY, AS DIRECTED BY THE  
NATIONAL BOARD OF HEALTH, UNDER SUPER-  
VISION OF THE NEW JERSEY STATE  
BOARD OF HEALTH.

REPORT OF MESSRS. BRUSH & EDDY, OF BAYONNE, N. J.

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GENTLEMEN:—In the discharge of the duties assigned us, we have the honor to make to you the following report of the sanitary survey and inspection of the city of Bayonne, New Jersey.

The city comprises the territory formerly known as that part of old Bergen township south of Morris canal. It is surrounded by water, and is bounded on the north by the Morris canal, on the east by New York Bay, on the south by the Kill von Kull, and on the west by Newark Bay; including an area of 2,560 acres; of which about 500 is salt meadow, and about 100 closely built upon. Its topography is quite similar to the neighboring metropolis—Manhattan Island.

The city was founded in 1861, and incorporated in 1869. The population in 1870 was 3,835, and the estimated population at the present time (April, 1880,) is 8,000, of these about 700 are under 5 years of age.

The site of the city is nearly level, and the original conformation has not been materially changed.

The highest elevation above sea level is 67 feet, the lowest 1 foot, and the average level of the city is 30 feet. The direction of the general surface slope of the city is southeast.

The character of the surface soil is sandy and loamy, with occasional croppings of trap rock. About 10 acres on Kill von Kull, and about 10 acres on New York Bay, is known as made land. This "made land" is not as yet built upon, but is intended for docks and warehouses.

**WATER SUPPLY.**—The water supply is by means of wells and cisterns.

**STREETS.**—The usual width of the street is sixty feet, with a sidewalk one-fifth the width of the street. The sidewalks are paved with bluestone 4 feet wide. Forty-three miles of streets are unpaved, only one mile is paved, and that with Macadam pavement.

**HABITATIONS.**—The dwelling houses now in the city limits number about twelve hundred; these are mostly wooden buildings, two or three stories high, and nearly all, with the exception of those located in the Fourth Ward, and at Constable Hook, and a few rows of brick and wooden buildings in the Second Ward, are detached or isolated, with sufficient clear space all around them; about one-third are inhabited by the owners, and the average occupancy of each dwelling throughout the city is seven. There are about three hundred tenement houses in the city; these are located in the Fourth Ward and at Constable Hook. The tenements, at present, if we except those at Constable Hook, are not overcrowded; but as the tendency is to erect buildings of this description in certain sections of the city, especially in the neighborhood of manufactories, (which are increasing rapidly on our water fronts,) and knowing the evils which imperil health and life, in consequence of overcrowding and bad ventilation, we think it wise, in time, that municipal regulations be enacted for the proper construction of dwellings and the prevention of overcrowding.

By reference to the survey map, we see at present constructed four and one-half miles of sewers in the city. All the dwellings along this sewer line, and where practicable a short distance off the line, have sewer connections with tight drains and traps. Most of the houses off these sewer lines, except those located near the borders or water fronts, have the laundry and waste water drainage into the gutters, and the cellars in some localities are damp, by reason of insufficient drainage.

**SEWERS.**—The city has adopted a complete plan for sewerage, as shown on the topographical map, but as they have no power to enter private property, and as some of the streets through which the outlet sewers would pass are not open, they have resorted to the expedient of temporary outlets across the salt meadows; notably at the foot of Cottage street, where the sewer-

age of the most densely populated section is thrown into an open ditch, which has become reeking with filth, and a source of much trouble to the Health Board. We would recommend additional powers to local boards of health, to force the completion of sewers to their proper outlet.

**GARBAGE AND EXCRETA:**—No contract exists in the city for the removal of garbage, and the proper distribution of ashes, garbage and rubbish is becoming one of the most difficult and troublesome duties of the local Board of Health of this city. In those sections of the city adjoining farm lands and gardens, the garbage is used for compost. By some it is thrown over fences into vacant lots, to be consumed by fowls, or left to decompose. A portion of the swill and garbage is collected from house to house by persons engaged in feeding swine, but this is done in a very careless manner, with open wagons or wheelbarrows; the liquid portions leak from the rude vehicles as they pass along the streets or sidewalks, and often a considerable part is deposited on the walks or in the gutters. On the sidewalk before some of the tenement houses, the owners have placed large wooden boxes, into which is deposited all the ashes, garbage and filth accruing on the premises, but in consequence of the very irregular and imperfect manner in which they are emptied, they become worse than useless; they are allowed often to become full to overflowing, and left in this condition for days, exposed to the influence of sun and rain, their contents becoming fluid from putrefaction, leak through upon the sidewalks and into the gutters. These wooden structures are liable to become so saturated with the fluids escaping from their filthy contents, as to constitute, of themselves, a disgusting nuisance, detrimental to health. These facts suggest the necessity of adopting some temporary receptacle for garbage, constructed of a material that will not absorb fluids, and for a *regular* and *systematic* method of collecting and disposing of such house refuse; perhaps a box of proper shape and size, made of wood that has been thoroughly kyanized or saturated with carbolic acid, might be kept sufficiently disinfected to be harmless.

**PRIVY VAULTS AND WELLS.**—About three-fourths of the dwellings depend wholly on privy vaults, and a very few, if any, of these vaults are water tight, and no regulations exist, as to the method of construction or cleaning the same. The faulty con-

struction and bad management of these vaults will become one of the chief causes of disease in the crowded districts. Some of these vaults are in too close proximity to wells, and the waters are very liable to be contaminated by the infiltration, through the ground, of liquid material from the vaults into the wells. We would suggest the great importance of having all privy vaults water-tight, and, when possible, connected with the sewer. The vaults should be constructed in such a manner, by rear folding doors, sheds, &c., that they may be readily cleaned out. We would also suggest the importance, especially in the tenement portions of the district, of prohibiting the sinking of wells on the premises, and that at proper intervals or distances on the sidewalk wells be sunk, from which water may be drawn, for drinking and culinary purposes, by means of the "old tea water pump."

**GAS.**—The gas works, and the quality of gas furnished, are satisfactory on all points.

**MARKETS AND SLAUGHTER HOUSES.**—There are no public markets or slaughter houses in the city limits. The tradesmen, and many of the inhabitants, obtain their supply of meats and vegetables mostly from New York City.

**MILK SUPPLY.**—The quality of the milk supplied is very good.

**PUBLIC SCHOOL BUILDINGS.**—There are five (5) substantial brick public school buildings in the city. They are all detached, with plenty of ground and air space around, and will compare favorably, as regards location, construction, grade and course of studies, with any in the State. We append to the report the floor plan of each school, and copies of the Manual of the Board of Education.

**MANUFACTORIES AND TRADES.**—The manufacturing establishments in the city at present are mostly located at Constable Hook, on Kill von Kull, viz: Raynold's Color Works; Osgood & Co.'s Zinc and Acid Works; White's Sulphur Works; Standard Oil Company Refinery; Sea Board Refinery, and Kalbfleisch's Sons Chemical Works.

As the tendency is to an increase of manufactories of various kinds on the water fronts, proper restrictions should be imposed, to prevent the escape of noxious gases or vapors into the external air; for no business, detrimental to the public health, that posi-

tively neglects to adopt the well-known remedies that will perfectly remove all cause of complaint, should be tolerated in a civilized community.

FILLING IN OF WATER FRONTS.—As the filling of the shallow waters of the adjacent bays is becoming an enterprise of the immediate future, we would call attention to the practice of filling with New York City garbage. The area to be filled is extensive, and its value, when improved, offers great inducements to effect its improvement. The use of improper material in filling will undoubtedly cause disease when this area is occupied, and we would recommend that the Health Board be empowered to regulate the use of material.

Appended to this report may be found the answers to all the "schedule questions," as far as they pertain to this city, from "A" to "N," and a copy of the municipal regulations and ordinances relating thereto. Also, through the kindness of the Chief of Police, and the Chief of the Fire Department, we append the answers to schedules "O" and "P." We also furnish the answers to schedule "R" on public health laws and sanitary officials.

[SEE PLAN.]

We present a special map or diagram, showing two blocks or squares of tenements surrounded by privies, and the close proximity of these vaults to wells. These tenements are located at Constable Hook. They are two-story frame double houses, with halls from front to rear, and occupied by four families each, each family having one living room and two bed rooms, windows in each room. The contents of the privy vaults are liable to overflow in wet weather, garbage and house slops are thrown often from the doors on the open space in front, and the wells are becoming contaminated and unfit for use.

The diagram illustrates the evils that will arise if this manner of building is allowed in any section of the district.

# QUARANTINE SANITARY DEFENSES.

THE QUESTIONS OF QUARANTINE AND EXTERIOR SANITARY DEFENSES OF THE NEW JERSEY FRONT OF THE HARBOR OF NEW YORK.

BY ELISHA HARRIS, M. D., SECRETARY OF NEW YORK STATE BOARD OF HEALTH,

TO EZRA M. HUNT, M. D.,

*Corresponding Sec. State Board of Health of N. J.*

DOCTOR : In complying with your request in regard to a review of the questions relating to the quarantine and external sanitary defenses of the New Jersey side of the harbor and bay of New York, I am rendering a duty implied in the instructions I received from the National Board of Health, in August last.

As the harbor and port of New York touch the eastern boundary of New Jersey at the high-water line, for many miles, and as the quarantine jurisdiction of this port is now recognized throughout the coast line of the four northern counties of your State, at tide-water, namely, Bergen, Hudson, Essex and Union, the co-ordinate interest of New Jersey in the sanitary protection of the Port of New York, is too obvious to require discussion by us.

We may usefully consider these questions of co-ordinate interests and the sanitation of the entire port ; its shipping, its waters and whatever defiles them ; its shores and reclaimed grounds, and its islands and its wharves, docks and basins, as being alike important to the commerce, business and general welfare of the people of New Jersey and New York. We may estimate the strict correctness of this view by the census of the shipping in port any day in the warm seasons, as we frequently enumerated

the official shipping lists last summer and autumn. The annexed summary shows how the vessels which were accounted for on the 20th of September, 1879, as in the Port of New York, were actually distributed at that date, these numbers and their distribution being fair averages for the entire summer and autumn :

At the wharves and docks of New York.....	165
“ “ “ Brooklyn.....	279
“ “ “ Jersey City.....	39
“ “ “ Hoboken.....	23
“ “ “ Weehawken,.....	38
In the stream at anchor.....	34
“ Long Island City.....	14
“ Amboy, for cargo or repairs.....	14
“ Staten Island.....	13
“ Elizabethport,.....	5
“ Quarantine.....	14
Total.....	638

At the same time a great number of small vessels, engaged in local traffic and not enumerated in this list, were lying at various places within the New York quarantine limits, between the line of the Palisades, on the north, and that of the Blazing Star, at Woodbridge, on the south. The U. S. Customs District, of Newark, and that of Perth Amboy, comprise a tidal front, within which our enumeration of vessels was not extended, but the summary on the preceding paper is exclusively of vessels that were entered at the New York Custom House.

The one hundred or more vessels thus moored constantly at the Jersey side, while nominally at the port of New York, constitute more than a tenth part of all the vessels constantly in the port. Therefore the question, “is New Jersey concerned in any of the quarantine measures of this port and of the nation?” is to be answered affirmatively. The corollary of this question is, necessarily, “*If so concerned*, how shall this extended or most populous region of New Jersey secure all the protection needed to maintain all the safeguards which her people and their commerce and vast investment and great thoroughfares require?” Let us proceed to answer these questions by examining the facts concerned.

The sanitary interests of the entire tidal front of New Jersey,

from Sandy Hook to the northern limit of Bergen county, sixty miles nearly, are identical with those of the port and city of New York, and with some fifty miles of the Long Island and West Chester coast-lines, which complete the opposite outline of this port. The history of the quarantine system in this port, shows that in 1758, when the peninsula of Communipaw and Bergen was a wilderness, the Colonial government of New York designated Bedloe's Island as the northern limit of the quarantine anchorage grounds. In 1794, the limits and the hospital station were changed to Governor's Island, to the great peril of the city of New York, and in 1799, the establishment was removed to Staten Island. In thus providing for her own protection, the State of New York secured the necessary safeguards for the Jersey side of the great harbor, as that shore was then, and until recently, occupied.

The port of Perth Amboy had its own sufficient system of sanitary defense, its quarantine law dating from 1799, and for many years its health officers acting in harmony with those of the quarantine office at Staten Island. Though Amboy was once menaced by a very limited infected district, and had, in certain years, numerous arrivals of infected vessels at her quarantine anchorage, the statutes relating to port quarantines in New Jersey remain very simple, and as regards the vast new city and rapidly-growing commerce of Jersey City, and the entire tidal front of Hudson county, the changed condition of things will not now admit of completely adequate sanitary police measures, in the nature of quarantine defenses, unless such measures are co-ordinated with those of the quarantine system of the port of New York. Even when so co-ordinated, there still must be such a sanitary treatment of the vast area of Jersey municipal front, at and near the tide-level, as shall prevent it from becoming the very soil, and nidus of pestilential infection.

With this in view, my general report to the National Board of Health has arrayed the reasons and various facts relating to this subject which I would but refer to in this statement.

The graphic descriptions and correct maps which the engineers and surveyors in your inspecting corps have presented will fully explain the nature and importance of the points to which I refer in thus saying, without further explanations, that

the tidal front must henceforth be so treated as to be prevented from becoming the very soil and nidus of pestilent infection. That this can be done we know; and that your faithful expert assistants and you, sir, have correctly set forth and judiciously estimated the sanitary problems upon which such protection and future well being will depend, I fully believe. Millions of wealth and yearly gains, and the health and welfare of a great population which are crowding the longest tidal front of the port of New York, demand this forethought and plan for permanent improvements, and a carefully devised system of sanitary works and expert surveillance that shall extend along the entire eastern side of Hudson county, and eventually be imitated along the front of Essex, Union and Middlesex. It is to this unequalled shipping front that the largest products of the American continent will come, and there we shall see the greatest unbroken length of the world's shipping depots and accumulated products awaiting shipment. Even before a half century will have elapsed there will probably be more than a million of inhabitants in the five tidal front counties we have just enumerated. The sanitary problems are momentous to that population, and even more momentous to this nation, this metropolitan port and to the world's commerce.

We now inquire what are and what should be the exterior sanitary defences of the Jersey side of this port?

It is safe to assert that the exigencies of commerce and travel are such upon the Jersey side, as well as in New York, that no exclusive dependence on the port quarantine can give the necessary protection against liabilities to the carrying and occasional planting of certain kinds of disease poisons of germs. The West Indian commerce will menace our water sides occasionally, and other pestilent infections than that of yellow fever may come. The quarantine system of this port must be maintained most skillfully and faithfully, and yet the local sanitation and the methods of public health administration should be so adequate that any and all contagia and the causes of pestilent maladies shall be controlled, prevented, "stamped out." This is *practicable*, therefore *it is duty*.

The port sanitation and the naval sanitation will, ere long, be, to a good and efficient degree, nationalized; but even when perfect in all respects we must not lean upon quarantine solely for

the absolute protection that this vast port and, most decidedly, the Jersey side of the harbor, will require. The mere rumor, in a foreign tongue, that there is a yellow fever scare, or even a relapsing fever alarm, in New York, Brooklyn or Jersey City, Bayonne or Hoboken, will, as the stupid world of ignorant people goes, secure the blind edict of a relentless quarantine, like that which Portugal enforced against the State of New Jersey last year. Let the world be well assured that we are automatically secure and in an unbroken state of sanitary protection.

SOME OF THE ESSENTIAL CONDITIONS OF ABSOLUTE PROTECTION  
FROM EXOTIC FEVERS.

The Jersey side of our harbor has been remarkably *saved* from yellow fever, yet the entire area below the outcropping of the trap-rock, an extent comprising more than half of Hudson county, now the reclaimed grounds along the harbor are to be included, is naturally fitted to be invaded by yellow fever and other exotic infections. Systematic drainage, extended parks and good administration of public health service, will render the entire district one of the most salubrious. We have witnessed a most insignificant invasion of that little peninsula you call Caven's Point, (the most southern headland within the present limits of Jersey City,) in September, 1856. A new state-room mattress had been washed ashore in front of the old mansion, then a family boarding house, half a mile from any other dwellings. It was a tempting prize, and so freshly cast upon the tide from an infected vessel, that it was not yet sodden through with sea water. Four days afterwards, the master of the house slept upon that mattress, in an open hallway. He died of black vomit a few days later, and two or more members of his own family and six of his boarders took the fever. Two of the latter died of the black vomit, and four others recovered in the quarantine hospital, under my supervision. Another field-laborer was conveyed to the same hospital in a dying condition from yellow fever. These cases are quoted from a vivid memory of the events to show what is possibly a future peril. Be forearmed, therefore, and you will protect one of the most promising and affluent commercial districts of the world. Repeated personal inspections of the several miles of tidal fronts of Hudson county, from the time I received cases of yellow fever that were thus traced to

a bathing or boarding resort there, have enabled me to appreciate the facts to which this statement refers. The comprehensive schemes of commercial development of the entire harbor-front of Hudson county now compel attention, and invite some adequate preparation in regard to the sanitary problems that will inevitably be important to the port, as well as to the property and commercial welfare of the Hudson county front of it.

About 3,600 acres of salt marsh and tide-washed shoals are being reclaimed and will, in the course of a few years, be covered by the structures that commerce and a busy population will need to find well defended against all sources of pestilential disease. Unless so defended, those 3,600 acres and homes of a million of inhabitants of the four contiguous counties may be frequently in jeopardy. Not only may the exotic germs of yellow fever menace that extensive area of made-ground, but the sources of evil will become inherent in that ground if its very grading and substance are not protected from the errors which we already witness in various places that are now being filled and built upon, in the absence of competent and faithful engineering plans. On the other hand, we now witness good work at certain points along the ten miles of front where improvements are in progress. We would recapitulate from notes taken while on the grounds and waters here mentioned, the following points relating to the protection which *local sanitation* should add to all that any rational quarantine service of the port can render:

- 1.—The filling, grading and artificial drainage of the reclaimed ground require skillful engineering, to secure every portion of the low lands and water front from becoming sodden with filth and sewerage. Though saturated to the plane of high tide level, all these grounds should be so treated as to remain free from mephitic emanations and be as clean and dry at the surface as possible. To permit these grounds to remain undrained, as they would be if not drained by a system separate from the sewerage, or to permit them to be badly seweraged, or the sewerage to be debouched along the docked and bulkheaded front, would create an inviting nidus or prolific ground for propagating dangerous disease.

- 2.—All wooden crib structures along the tidal front or the streams, whether to facilitate the filling and bulkheading, or to

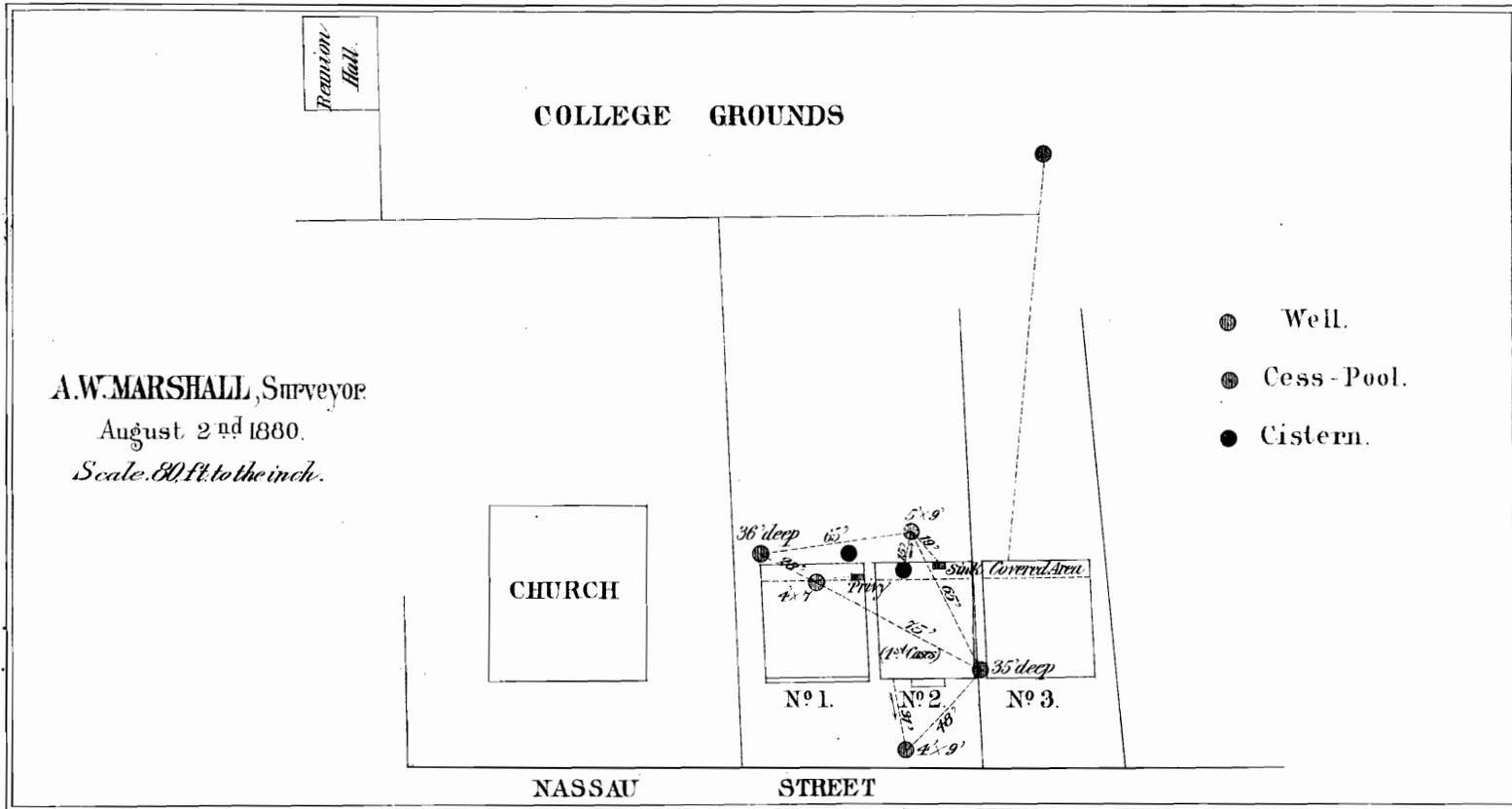
serve as the bases of docks and wharves or buildings, will prove to be snares and unsanitary conditions when too late to be prevented.

3.—The Hudson county sanitary authorities, or the State Board of Health, will need refuge or exterior sanitary station, within easy access from any portion of the region of New Jersey, comprised within the U. S. customs districts of New York, Newark and Perth Amboy. This, as a matter of prevision and specific plan and method, is all we here can mention. The facts stated by you, sir, in the Third Annual Report of the State Board of Health, concerning a temporary arrangement with the quarantine authorities of New York, convey a correct idea of both objects and means in regard to such an exterior safeguard. That which was extemporised last autumn as a substitute for an independent sanitary refuge or quarantine lazaretto and boat for the immediate segregation and removal of *infected persons and material*, may be rendered so permanently a ready method that New Jersey shall never lack a perfect preparation for this exterior sanitary police service. The peculiar advantage of such an arrangement for acquiring the benefits and all facilities of the New York quarantine islets, lazaretto and transport steamboat is that of entire fitness, certainty and promptitude of the sanitary duty itself, especially if Hudson county will maintain a convenient boat landing at its old alms-hospital front. These facilities would give some very desirable kinds of protection to the Jersey side of this port, and would prevent needless and harmful alarms and exposures as regards the portable pestilences to which the shipping and the railway depots may at times be subject.

4.—In conclusion we notice that the method and almost undefined limitations of the *riparian* titles and properties, as at present acquired by individuals and corporations, under the New Jersey statutes, do not seem to recognize the obligations which may become due to the sanitary authorities. This is not here mentioned as a criticism, but simply as a fact which readily may be remedied without any impairment or invasion of the riparian rights. To protect by the safeguards of law and of official surveillance all and any of the extended harbor front of your commercial districts, is tantamount to a protection and insurance, and even an enhancement of the cash values of every

portion, while by this means all burdens of quarantine and of nuisance litigations may be prevented. But it is less the present than the future interests we here allude to; and we must consider that as the State is now rapidly selling these riparian properties, as mere property, without reference to the sanitary questions which will be important in a near future, the present is the proper time for this suggestion.





## ENTERIC FEVER AT PRINCETON.

BY EZRA M. HUNT, M. D.

The State Board of Health of New Jersey commenced an examination into the sanitary condition of Princeton, on Tuesday, May 25, 1880. Vague reports had reached us that a fever of an intermittent or remittent variety was prevailing among the students of the College. One student had died a week after removal to his home, but it was claimed that the fever had no special type, and the fatigue of transfer had increased the severity of the symptoms. The disease was spoken of as malarial fever, a term not in use in any diagnostic sense in medical nosology. No case dates earlier than March 23d, probably none earlier than April, during the first week of which several cases commenced.

### THE TYPE OF THE FEVER.

Careful inquiry as to the symptoms and cause of the disease, led other physicians, as well as myself, to entertain the belief that all the cases could not be identified as of the usual periodic type.

There seem to have been no new and well-declared cases in April, after the first week. It would appear from inquiry among students that many were complaining of headache and a depressed condition of vitality, and many were taking some tonic medicine. But few were interrupted from class attendance until about the 8th to the 20th of May, when there was a decided increase of sickness.

On the night of the 25th, a student died somewhat suddenly, after a sickness of ten days. His case had been called malarial fever, or towards its close typho-malarial. The State Medical Society of New Jersey was holding its annual session, at Prince-

ton, at this time. Some of its members, who had sought careful detail of this and the previous cases in April, were convinced that the fever was endemic in its character, and not of the usual remittent type. The case referred to had been seen that day by one or two of our most competent medical men. They had no doubt that the patient died of typhoid fever.

In addition we have reason to think that a majority of the students were not in a condition of health, such as generally exists in this college.

During the months of April, May, June and July, there occurred, in all, about forty cases of this, or a kindred type of fever, and eight deaths. The physicians of Princeton, some of whom regarded their first cases as remittents, and some of whom claim that there were cases that showed no typhoid element, nevertheless recognize that in the cases that proved fatal and some others, the fever was distinctly typhoid.

Of one of the first, if not the first case, I have the following detail from his own brother, an able medical practitioner.

PATERSON, June 5, 1880.

DEAR SIR :

Your letter to Dr. H. of Glen Gardner, was forwarded to me with a request to reply. My brother left Princeton April 8, 1880, reaching home in afternoon of same day, very much exhausted. He had complained of being sick some two weeks before leaving P., though able, through considerable effort, to prosecute his studies. While in P., his symptoms were loss of appetite, alternating diarrhœa and constipation, headache, slight fever and general prostration. Upon his arrival home, he at once took to bed, complaining of general lassitude, nervous irritability, fretful, and fearful concerning his recovery. My brother was telegraphed for on Saturday, the 10th, but did not get there until Sunday, the 11th. He found him as above described, except a sore throat. His first impression was that of typhoid fever, but on the following morning, he noticed what seemed to be the remains of a diphtheretic membrane with general pharyngitis. The next day, Wednesday, I was telegraphed for. I left immediately, arriving there at 11, P. M. I found him with temperature  $105^{\circ}$ , pulse, 140. He had been delirious all day, and was partially so on my arrival. Under large doses of quinia and sponging, his temperature marked  $103\frac{1}{2}^{\circ}$ , at 8 o'clock, Thursday morning; in the evening of this day, it reached  $104\frac{1}{2}^{\circ}$ . On Friday morning it again fell to  $102\frac{3}{4}^{\circ}$ , but in the afternoon and evening of this day it again went to  $105^{\circ}$ . Saturday it continued

nearly the same. Sunday there was no accurate temperature taken, as you will observe the reason where a full history is noted. He died early Monday morning, (1 A. M.) April 19th. The pulse, during the days before Sunday, ran from 120 to 140; but on Sunday it reached 160 and 180, and so feeble and rapid that an accurate count could not be made. There was delirium all this time of an active character. He was, until Sunday, able to recognize an acquaintance, and call out the name when requested, though he was unable at any time to understand a conversation or to make an intelligent reply, or in condition for any one to converse with him the last four or five days before death. The tongue was exceedingly dry, swollen and cracked; the fauces red, and the same general appearance as the tongue. There was, at times, a considerable secretion of yellow, tough mucus in his throat, which caused a good deal of choking. It was necessary, at times, to clear his fauces and mouth with the fingers and wet rags. Sordes covered the teeth. There were involuntary discharges. On Friday, the stools were largely of blood, and were quite copious. The abdomen was tympanitic and very markedly so Friday, Saturday and Sunday. Milk and other fluids were vomited the last two days. There began, on Thursday, a considerable jaclitation. The flexor muscles of the arm and fore-arm were in an almost constant state of clonic contraction; this extended to the muscles of the neck, face, jaw and eyelids. This agitation increased in extent and violence each day until his death. The hands were fixed firmly upon the fore-arm, the fingers left their imprint on the palms of the hands and the fore-arm upon the arm. He needed constant assistance and great force to control the constant movements. The muscles of the lower jaw were in such a constant tremor that it was almost impossible for him to swallow. The muscular spasm did not extend to the lower extremities until the morning of the 18th, the day preceding death, when the flexor muscles were more or less involved. There was none, or at least very slight, oposthrotonos. I think the head was thrown back slightly, though probably due to the spasm of the muscles of the neck. There were a few (three or four) rose-colored spots over the abdomen, which resembled typhoid fever spots; they disappeared under pressure; they were not seen only three or four days. The vomiting was probably partially due to the extreme tympanitic condition. His tongue was exceedingly dry and cracked, and at times he was unable to protrude it between the teeth. The teeth were completely covered with sordes. My diagnosis was typhoid complicated by irritation in basilic and upper spinal region. If there is anything more you would like to know, address me here and I will write at once.

Respectfully yours,

G. W. T

Two cases which I saw in the earlier stages, about May 27th, were distinctly typhoid, and were so considered by the attending physician. On May 31st, being summoned by telegraph to see Dr. Wycoff, who had been taken ill, I saw for him his fever cases, six in number. Of these, four had the typhoid rash, and all had the symptoms generally accompanying typhoid fever. Prof. Austin Flint and Prof. E. G. Janeway saw other cases which satisfied them that the disease was enteric fever. I have heard directly from several cases which were treated by able physicians, at the homes of the students in other places, and which were distinctly recognized as typhoid. In the cases of death, most of them had serious hemorrhage from the bowels, and in one case death was sudden, as believed, from perforation of the intestine. Most of the cases had the rose-colored or lenticular eruption. The only case in which a post mortem was hoped for failed by delay of communication, but it scarcely seemed necessary to confirm so many agreeing diagnoses, except as such evidence is always valuable as corroborative. There were, in some cases, variations such as raised the question whether there is a fever which may be called sewer fever, in which the blood poisoning is modified from the abdominal typhus of the Continent or the typhoid of Great Britain; also whether in two or three of the cases there was a malarial element sufficient to justify the term typho-malarial.

Two years previously we had under observation, under similar circumstances, over one hundred cases of typhoid at the Reform School, at Jamesburg, which, like some of these in their inception, were regarded as remittent. A study of the details of that endemic, as given in the State Report of 1878, is an instructive introduction to the etiological study of this Princeton outbreak. Its last page of warning may get new emphasis from this trying repetition. The study of the two, side by side, while showing some of the milder types of the disease, some of those variations which are recognized, do not affect the identity or the identification of the fevers.

#### COURSE OF INVESTIGATION.

From verbal inquiries made, I became so concerned as to the probability of local existing causes, that I remained after the adjournment of the Medical Society, on the 26th of May, for the

purpose of knowing as to the water supply, and examining into the sewer and indoor appliances of the college building, so as to confer with the other members of the State Board of Health. It did not take long to discover some serious local defects, and such as made it evident that it would be our duty to make an examination in detail. A note addressed to our Board the next day, by the City Clerk of Princeton borough, asked an investigation in the interests of the town. The death of one student on the 25th instant, and of another on the night of the 26th, who was suffering from fever, together with the opinions expressed by many physicians, caused much alarm. On the 27th, I telegraphed to the City Clerk to hasten forthwith the organization of a Local Board of Health, which had been neglected. The 28th I returned to Princeton to carry on the work of investigation, and continued the examination of the water supply of the college buildings, and its entire system of sewage.

#### WATER SUPPLY OF THE COLLEGE.

The supply of water was derived from a spring on the ground in the rear of the college buildings. This spring was carefully covered and protected from all outside contamination. The fall previous it had threatened to fail in furnishing an adequate supply of water, and so had been enlarged into a kind of well. It was about eight feet deep, and collected the surface-soil drainage from the direction of the college property, through a soil fairly adapted for percolation, along the row of buildings nearest to it. Several hundred feet distant had formerly stood the privy resorts of the college. It was known to the secretary that several months before, in an examination of the underground of a dwelling house on this line, there had been found an amount of organic material out of all proportion to any natural condition of decaying substances in soil. The examination had been made on account of sickness in the family. While it was alleged that this was local and that the trend of the underground was such as to feed this large surface-well from another direction, it was plain that such a source of water supply can only be relied upon when it came from surface soil kept clear of organic filth of all kinds.

So long as such a spring or surface-well is in an open country district, and so long as the ground soil through which it perco-

lates is fitted to act as a filter, and is itself free from undue organic matter, the water is likely to remain pure as this seems to have done. It had of late been carefully watched and examined by the Professor of Analytical Chemistry. There is not reason to believe that up to this time it had suffered from the infusion of any sewer material into it, or that it had become fouled by organic matter in the soil. Yet as increase of population in a town like this always subjects natural surface springs to sources of befoulment, it is not safe to rely upon such an one for a large permanent water supply in such a locality.

#### RESERVOIR.

Another question as to water supply arises from the method of storage. This water was carried by an iron pipe to a reservoir, situate about fifteen feet from a large artificial pond, formed by the damming up of the storm and drainage water from the direction of the college buildings. At one time more recently, the water in the reservoir was found on chemical test to be of a lower standard of purity than that of the spring tested at the same time. The amount of water used in the college buildings also leads some to believe that the reservoir obtained a supply not only from the spring but also from the adjacent pond and grounds. It was not a cemented reservoir.

It is probable that the reservoir had, at times, some supply from such sources. Although this might give more of the products of vegetable decomposition, it is not so seriously different in source from the spring supply as to furnish adequate reasons for the prevalent sickness. The water from this reservoir was pumped, by an engine, into one of the colleges, and from tanks, distributed to the various buildings. These tanks were never intended to become dry, and have never been known to be but once or twice. The tanks were not, in every respect, the best, and yet nothing was found in these to account for the sickness. While then this water supply, as a permanency, cannot be depended upon, it is not believed that, up to this time, it had been the cause of any sickness of a typhoid character.

## IMPERFECT DRAINAGE.

A question here arises whether any evil results, in the form of fever, did occur from the ponding of water and the interference with natural drainage, which is to be found in the rear of the college buildings. Since, it is claimed that, beside typhoid, there were some cases of remittent and intermittent fever.

The ground below it in the vicinity, is wet and somewhat marshy, and is in a condition favorable to interrupted or abnormal vegetable decay. Water is now believed to be a conveyancer of miasma, when it is derived from low ground and from a marshy vicinity. The evil cannot be detected by chemical examination. Both the well which furnishes water to the college, and the undrained ground which furnishes malaria to the air, could easily furnish elements which, combined with local complication of a nosocomal nature, must give rise to a fever of typo-malarial character. Princeton is naturally one of the healthiest of towns, and free from malarial influences, as the testimony of all the resident physicians shows. It can only be made unhealthy by neglect of, or interference with natural drainage, and by the accumulation of evils incident to congregated life. While we believe the drainage of all this district has been somewhat neglected, and much construction done without proper preparation therefore, it is not probable that this was the existing cause of the outbreak.

While thus presenting the facts as to the drainage and water supply of the college, our conclusion is that we were unable to find in it adequate reasons for the outbreak of disease at this time.

## HEATING AND VENTILATION OF THE COLLEGES.

As the fever had occurred in the spring, it was not found necessary to make an exhaustive examination as to the modes of heating and ventilation in the college buildings. The heating of all the dormitory buildings is by open grates or stoves, with the exception of Reunion Hall, which is heated by steam coils. While some defects might be noted by experts as to facility for natural ventilation, yet none of those examining the buildings were disposed to attribute the sickness to structural defects as to these matters.

## SEWERAGE AND WATER-CARRIAGE SYSTEM.

Our first examination, made on May 26th, was in three of the buildings, commencing in Witherspoon Hall. It was found that each entry was supplied with a small iron trough, similar to a kitchen sink. Over each of these was an iron pipe with a faucet communicating with the tanks and water-supply already described. All water used in the college was furnished from these. These troughs received all the liquid slops of the college, including all waste and chamber water. These had the S or Adee trap and ended in an upright soil-pipe. This passed from the various stories of the building into the continuous soil-pipes, until from the various directions they united at the Witherspoon Hall, carrying the liquid refuse, and also receiving the storm water from the leaders in time of rain.

Near where the soil-pipe and water closets pipes join, and on the inner side in Witherspoon Hall, there had been built a ventilating flue connected with the chimney, for the purpose of securing perfect ventilation between the large sewer main and the buildings. There had also been made a man-hole or ventilation opening into this main sewer, a few hundred feet in the rear of Witherspoon Hall. The workmen seemed to have mistaken the ventilating flue for a part of the chimney stack, and had gone round it with the sewer or soil pipes, avoiding connection. The man-hole outside had also been made tight and covered with ground and sod. So there was no inlet for air between the sewer main and its cesspool, and the water closets and entry sinks of the colleges, save what might be furnished by the storm leaders near the roofs; these, in times of storm, might siphon the ventless traps. The pressure of the sewer gas must often have been sufficient of itself either to siphon the traps or to force itself through. It is known that these traps were, at times, empty. This is made still more obvious, as we follow on, to notice the condition of the cesspool at the terminus of the sewerage system. This tank was built underground, beside the railroad track; it is an oval, fifty feet long, eleven feet deep, and eleven feet in its oval diameter; at each end it had a man-hole covered with a heavy iron lid closely fitted and covered over with earth. This cesspool was not cemented on the bottom, and was laid with loose stone part of the way upward; the sewer system from the

college entered it by a pipe about four feet from the top ; there was an overflow pipe at the other end, two feet from the top, which thus made a water seal, and had generally served to carry off the super-abundant sewage by a pipe running for a few hundred feet underground and finally discharging itself along the railroad and upon the surface of a low tract of land. It apparently had been thought that the cesspool with its uncemented bottom would absorb much and that the rest would easily flow off, and that if, at any time, the floating matter in the cesspool become solid or cake-like, so as not readily to flow off, the flush of storm water from the roofs, at intervals, would answer for this purpose.

Prof. Brackett and myself first got access to it May 27th, one lid having been loosened the day before. This large cesspool was full nearly to its top with a black, tarry, offensive sewage. This covered the incoming sewer pipe from the college to the depth of two feet with a semi-solid mass, from which the foul escaping gases were bubbling. It was so tenacious as to stop up the entrance of the sewer pipe from the college, except as the back pressure become sufficient to cause an intermittent discharge. All sewage came from that direction without getting vent. The pent up gas in the pipes had but one ready escape and that was into the college buildings. Thus the soil pipe and water-closet system of the college was but an elongated cesspool with full arrangements for gas-discharge on each entry, both from the slop and water-closet apparatus, as the pipes of the latter joined the former near the buildings. Although the large cesspool had at its lower end an overflow pipe, intended each day to carry off any surplus, in the warm months of this spring, and the absence of rain, the mass between it and the sewer pipe had become too solid to be easily flushed off and too putrid to be retained.

With right traps in the buildings, with perhaps the addition of opening to the soil pipes on the roofs, and also vents to the traps as recommended of late, with the intended attachment to the chimney flue, and an open man-hole for free access and egress of fresh air, with watchfulness over the cess-pool to see that it was in working order, and with emptying when required by contingencies or by lapse of time, we can easily see how such a system might have been operated. But as it was it had been converted into a complete system for the storage of the

fouler part of sewage, so that its gases might be sent to the college buildings with the same precision with which lighting gas is kept in a reservoir and distributed through houses. Only in this case there must have been more constant escape. At the time of emptying this cess-pool, immediately after the adjournment of the college, there was also some sewage inflow from the direction of the colleges. All the buildings known as Wither-  
spoon Hall, West College, Reunion Hall and East College, as well as the University Hotel, were connected with this system.

The School of Science and some other buildings were connected with just such a system and with like defects, which had its terminus in a smaller cesspool on Smith street, and was in no better condition. It is easy to see how, by such a state of affairs, the air of the college buildings could be laden with particles or so impregnated with aerial sewage and gases as to be deleterious to health. There can thus be no doubt that in the college buildings, in the University hotel and in one of the Professors' houses, there were found soil-pipe and water-closet connections highly favorable for the introduction and extension of foul air in the form of aerial sewage.

Only two questions confront us: As a matter of fact, did the disease commence in the college, or from a similar or still worse condition, in a students' boarding house? Wherever it commenced, was it of spontaneous or local origin, or was it introduced from some other focus, and then spread by these favoring and fertilizing provisions therefor?

#### FIRST CASES.

To throw light upon these questions, an examination of the earlier cases is of primary importance.

By the kindness of the college authorities, I early received a list of all known cases, with the places of rooming and of boarding specified, and have verified the dates of attack. These are given without repetition of the names, and with some slight alternating corrections, as furnished by personal inquiry and correspondence.

	ROOM.	CLUB.	REMARKS.
THE SMITH WELL CASES.	A House No. 2.....	House No. 2.....	Remittent fever; Scarletina, (?)
	B 13 S. E.....	".....	Left here April 8th. Died 19th.
	C 10 W. M. Witherspoon...	".....	Left here sick early in April. Had Typhoid fever at home.
	D Dohm's.....	".....	Left here April 5th or 6th. Typhoid fever at home. Dr. Fay, Altoona.
	E 10 N. R. H.....	".....	Sick in Princeton with Typhoid fever early in April.
WITHERSPOON HALL.	6 N. M. R. H. Colored housemaid.	".....	Left April 1st. Sick at Auburn with nervous fever. No Typhoid fever. April 29th, removed. Sick two months. Chill May 10th. Died May 26th
	F 10 E. W. H.....	Univ. H.....	
	G 12 E. W. H.....	".....	Went home sick May 24th. Typhoid fever at home, Madison, N.J.
	H 5 E. W. H.....	".....	Went home sick May 25th. Sick at Manhattan Beach Hotel.
	I 4 W. M. W. H.....	".....	Sick here May 12-26th. No Typhoid development.
	J ".....	".....	Sick May 23d. Still sick here, (Aug. 20).
	K 2 E. M. W. H.....	".....	Sick and went home about May 24th. Came back about June 1st for part of two days. Returned home and died June 6th.
REUNION HALL.	L 5 S. M. R. H.....	Jesse Williams.....	Sick here from May 9th to 27th. No decided typhoid symptoms.
	M 15 N. M. R. H.....	Univ. Hotel.....	Went home sick May 24th. Had Typhoid fever. Wilkesbarre.
	N 7 S. R. H.....	".....	Taken sick about May 15th. Went home May 22d. Died June 10th. (?)
EAST COLLEGE.	O 13 N. E.....	Lavake's.....	Took cold, April 1st, lying on ground. Went home May 20th. (Doubtful case).
	P 18 N. E.....	Univ. Hotel.....	Went home sick May 17th. Had Typhoid fever.
WEST COLLEGE.	Q 3 N. W.....	Mrs. Harvey's.....	Taken sick about May 20th. Very marked case. Died July.
	R 6 N. W.....	Univ. Hotel.....	Same as above. Died July.
	S 1 S. W.....	Clow's.....	Left about May 15th. Returned May 20th. Went away again May 25th. Sick in Newark. Died June 5th.
ROOMING AND BOARDING IN TOWN.	T M. House, No. 22.....	Parkhill's.....	One of the first sick, about March 14th. Went home about April 12th. Returned to Princeton about April 17th, and was again sick for a few days, but recovered here. Attended by Dr. Wikoff, who says his was not this fever.
	U M. House, No. 19.....	Univ. Hotel.....	Went home sick May 26th. Called Remittent fever up to May 31st. Died June 6th.
	V Mrs. L.'s.....	".....	Went home sick about May 26th. Typhoid fever in New York.
	W Mr. L.'s, Canal street, previously at Lavake's.	".....	Had chills and fever about March 1st. Went home, returned, and was taken sick about May 10th. Typhoid symptoms.
	X Univ. H.....	Univ. H.....	Complaining during second session while in 12 W. W. H.; moved to hotel about April (?) 21st. Died May 26th.

It is at once noticeable that the first seven cases of sickness occurred among those who cannot be associated as in any one part of the college buildings, or in any one place in town as to rooms, but who were alike in the one particular that they all ate in the same house. Of these, two lived only in the house, and one other had a room in town elsewhere. The others were in three different college buildings. One student was slightly sick in April who was not of this group—although named in another part of the list, it is evident from the account of his brief indisposition that he had no typhoid symptoms. Of these seven, six are reported to me as having had typhoid fever, unless one called nervous fever is an exception. Four of these were taken to their own homes and recognized as typhoid fever by their physicians there. The seventh one is claimed to have had remittent fever, and to have broken out with scarlet fever after he had been in his room over two weeks. His case was reported as beginning March 23d. The first student who died, and whose case has been already related, was taken sick March 26th, or as the brother's letter would date it, about two weeks before April 8th. Four other cases were taken so simultaneously, April 5th, as to lead the physician to suspect that there was some local cause and to make inquiries as to the well water, etc. Previous to these cases there were none of earlier date, which, before or afterwards, were identified as typhoid. These facts are so significant as to invite to close inquiry.

#### HOUSE NO. 2.

This boarding house was situated on the main street known as Nassau street, being the second house west from the First Presbyterian Church. One student boarded with the family and roomed in the house. The family consisted of four adults, including *servants, one of whom* had typhoid fever about April 25th. Two clubs boarded in the house, one consisting of thirteen college students and the other of thirteen seminary students and a college tutor. Why none of the seminary students sickened can be accounted for, the same as why only seven out of the whole number in the house sickened, or on the hypothesis that college students sickened because of the additional and constant exposures in the college buildings, or on the hypothesis that the cause of the sickness was only in the

colleges. Against this latter is the fact that so many sickened here and here only at first; that one was a servant in the family, and that one other not including the remittent fever case, roomed as well as boarded outside of the college. As two other houses were in close proximity and had either water or cesspool relations, we show on the accompanying map their position, the middle house being the place of sickness.

[SEE MAP.]

This house, No. 2, derived its drinking water and its upstairs wash water from a well located between houses No. 2 and 3, the houses being separated just enough to allow space for the well. The well is about thirty-five feet deep, and very old. The first sickness led to an examination of this well. The water, although it had not been complained of, was found so bad on chemical analysis, that Professor Cornwell thought that it could not be defiled by sewage alone. We tasted it in June, after it had ceased to be used, and could detect no foul taste, although it was chemically impure. In the front yard of house No. 2 was a covered cesspool, forty-eight feet from the well. This received the water-closet excreta of the house, and the bathtub water. The size is about nine feet deep by four wide. When examined, about one foot of semi-solid fetid matter was in the bottom. As the structure directly beneath is rock, the cesspool matter all along this section is only absorbed and disseminated laterally.

The next nearest cesspool is in the rear of lot No. 2, nine feet deep and five wide, and sixty-five feet from the well. At the time of examination in June, it had seven feet of water and filth.

In the yard of house No. 1 was another cesspool found in a still fouler condition, into which both the kitchen slops and water-closet refuse was received; this was seventy-five feet from the well of No. 2, with a foul privy in between. It was only twenty-eight feet from the well of No. 1, which was foul, and which is of the same depth and same water-bearing strata as the well of No. 2.

The only chemical difficulty in discovering whether sewage matter was percolating from these three cesspools into the well of No. 2, arises from the fact that there was a dead cat in the well. There was so much cat as to make it difficult to determine whether three cesspools, distant forty-eight, sixty-five and

seventy-five feet respectively, were also fouling it. The Chemical Professor thought there was more of the chlorides and albuminates than the cat would account for. The well is large and deep, (thirty-five feet,) and like most of the wells of Princeton, of this depth, cannot be pumped dry by usual method.

This water was used for drinking purposes and to different amounts by different students. Some of it was each day pumped into the up-stairs cistern for general water supply, communicating chiefly with the room in which one of the students was sick several weeks.

Besides these conditions, as to water, the house was provided with unusual facilities for the introduction of foul air. The cesspool of house No. 1. was in the area, within twenty-eight feet of house No. 2, with the privy a few feet nearer. The rear cesspool of house No. 2 was fourteen feet from the house, and had from it an untrapped pipe in the area basement for receiving slops thrown into the sink. There was a rain water cistern under the piazza, which had its overflow pipe into the cesspool, and which thus let foul air into the area. Then in the brick floor of the basement there was an outlet for slops. In heavy rains the cesspool overflowed its filth water into the area so as to cover it. The dead mawkish odor, peculiar to confined sewage, had been frequently observed. As the property, when purchased, had these conveniences, the localities of cesspools, pipes, etc., and their connections were not known. The soil, beneath and about the building, was saturated with organic matter. The condition of the water supply, added to that of the cesspools, presented a more flagrant and dangerous complication than any found in the college dormitories. Both Professor Janeway and myself, who had occasion to act with E. S. Philbrick, of Boston, as a committee for advising what changes should be made, came, therefore, to the conclusion as herewith expressed.

“The disease was typhoid fever, caused in the first instance by the use of water from a well, which was proven by chemical analysis to be impure, in which a dead cat was found, and having such relations to cesspools, as shown by subsequent investigations, as to render its contamination by them extremely probable. We have been forced to this conclusion by the fact that the first cases of typhoid fever amongst the students during April, occurred in those boarding at the house using this well water, and

because these students who became ill lived in different buildings. Moreover, it has since been ascertained, that a servant who worked at this house, became ill at this same time, was removed to another house, and is considered by her physician to have had typhoid fever.

The evacuations from the students who had become affected in this manner were thrown without disinfection into the sinks and water-closets in the dormitories, and gained access to the sewer system of the college, and to the cesspools which formed a part of it. A subsequent outbreak of the fever occurring in May, was caused by the infection of the sewage of the college, contained in the aforementioned cesspools and pipes. On this occasion the disease was not limited as before, but followed the sewer distribution. The poison gained access through the sinks, water-closets, and the pipes connected with them.

The spring water used at the college has been analyzed a number of times, but without affording any evidence that it was contaminated; and we are informed that it has been used at several houses having a total population of about seventy persons, but having no connection with the sewer system, and that there has been no sickness in these houses. The view might be entertained that the foul-air conditions of the house co-operated with the water conditions and shared prominently with it in incipient causation, but at any rate it seems well-nigh certain that the local structural conditions in and about the house were the exciting cause whether through fouled water or fouled air."

WAS THE FEVER SPONTANEOUS IN ITS ORIGIN AS AN ENDEMIC  
HERE?

The question now arises whether the enteric or typhoid was implanted in such a favoring soil from some other person or locality or whether it originated amid these favoring conditions. It is well known that on such a question there are still two opposite opinions. One class of medical observers maintains that like small-pox "the disease breeds so true that no fresh case is known to arise except by contagion or infection from some previously existing case." As the view has gained ground that the specific element in the communication of diseases associated under the name "zymotic" is not volatile but "particulate" in that it is in substance not gaseous but solid, and so a particle, it must

be conceded as Russell has recently expressed it, "that the progress of discovery on the laws of the particulate theory of the contagia makes constant inroads upon the domain of the spontaneous or transcendental in the origination of communicable disease." So there is maintained "in the mind of the ætiologist a wholesome attitude of thorough skepticism as to the spontaneity in any instance of diseases known to be in some instances lineally propagated from pre-existent cases through ascertained media."

Dr. William Budd may be quoted as representing those who always look for a pre-existing case from which the infective particle was derived, either in person or through air or water, contaminated by the fecal discharges of the patient, while Sir William Jenner and Dr. Murchason represent those who, while recognizing this source, also believe that it may be generated independently of any previous case, and especially from excretions and from sewer fermentation and decompositions.

Dr. George Wilson, in his recent book on "Healthy Homes," says, "some writers maintain that genuine typhoid fever can only be propagated from a previously existing case or cases; but there is a constantly increasing amount of evidence which goes to prove that it is often induced by sewer air, foul effluvia from cesspools or polluted water, independently of any previous cases." (pp. 293.)

It therefore becomes the duty of any investigator—even if finding conditions highly favorable to the epidemic extension of any disease—to inquire whether its origin, after all, was not from some place, whither it had been brought either by a person sick of the diseases or by some medium that might have been infected from him or from his sickness. It has been said that enteric or typhoid fever is the most versatile of all the communicable diseases in its choice of a medium. (Russell.)

Since the conveyance of typhoid fever through milk that has either been watered with fouled water, or has absorbed infectious material from typhoid surroundings, has been proven, our first inquiry was in this direction. No clue could be found to any possible derivation from the source. Care was taken to trace the first cases to their home relations, to their absences from college, or to some other circumstances that might furnish evidence of transportation. While in the case of so composite a gathering, and of so many conflicting statements which have to be elimi-

nated, it is well nigh impossible to make such an inquiry exhaustive. After tracing carefully every possible or suspected source, we were not able to identify this as an imported disease. Several suspected sources failed under extended investigation. The next natural inquiry was, whether cases of typhoid fever had previously occurred in other parts of Princeton, the infection of which might have, in some hidden manner, reached the locality of house No. 2, so as partly to assume an epidemic form.

It was found that it is true of Princeton, as it is of most such sized towns with no Boards of Health, that causes for local diseases exist. Also that occasional cases of typhoid fever occur as brought from without. By careful inquiry of the resident physicians, and examination of the vital records, it was found that there had been no case of typhoid fever in Princeton previous to this outbreak, within two years. Six years ago, and again five years ago, cases occurred in town which were known to have been brought from other places. Three years since there were five casés in one family. In these cases it was believed at the time, after chemical analysis, that a filthy cesspool had found its way into the well, so as to foul the drinking water.

Two years ago last March, there were two cases in a professor's family, who lived in a hired house in the town. The well had gone dry, and it was necessary to blast in order to deepen it. After the water was secured it began to taste badly, and an odor was perceptible from the well. The sickness soon occurred. It was believed in the blasting a crack had been made which communicated with a cesspool. The well was abandoned and afterward filled up because of its odor. We could not obtain any clue which would, after so long an interval, associate any of these cases with those now occurring.

As it has been alleged that low forms of fevers have before prevailed at Princeton, we examined closely the records so far as available. We found ex-President MacClean, from a ready memory, able to give details which were corroborated by Dr. Stephen Alexander and others. The record, both of the college and the town, has, with rare exceptions, been one of remarkable health. It is said that twenty years at a time have elapsed without a single death of any student from any sickness at Princeton. Remittent fevers, except about the time of the digging of the canal, long years since, have been almost unknown. This year,

in the surrounding country, there has been more than usual of remittent and intermittent fever. It has generally been so rare that all the physicians have regarded any occasional case as an importation. Yet it is evident that structural changes, excavations and interferences with natural water-courses need here, as elsewhere, to be guarded against or compensated for. Three cases of typhoid fever occurred in the house of Dr. Farmer. He died, as did also one student of the college.

In 1835-6 occurred what has been spoken of so frequently since this outbreak as the *Princeton fever*. It was confined to one house and this happens to be house No. 1 of our map, and what may be regarded as a part of the same plot in which the first case occurred this year, since it is only separated by a few feet used in common. In the house, now occupied by Dr. S. Alexander, there were then five deaths from typhoid fever, and one or two more who recovered after prolonged illness. One student died and two physicians in succession. The sickness was attributed to the well, which was found to be receiving the household slops. The well was long known as the *sickness well*, and was abandoned for about two years, but is now used, although found in bad condition at the time of our examination. No sickness has occurred in that house since, which could be attributed to any local causes, although the family of adults is believed to have suffered in general health from impure air and water. The fact of locality, so far as the present epidemic is concerned, we can only regard as a coincidence, and as having no causal relation. The fact of a graveyard having once existed in the rear of house No. 2 was also brought to our attention. It was found that some seventy years ago there were, several hundred feet from the house, five or six gravestones, probably the remains of some family ground before the college was located at Princeton. "There have been," said President MacClean, "no burials there in the memory of man."

It would seem, from all the facts that we gathered, that typhoid fever commenced here only because of certain more recent and local structural conditions, and was extended into an epidemic by prevalent conditions in the college, as also in a few houses in town.

That the fever did not get a more rapid and disseminated hold at the time, is to be accounted for by the fortunate occurrence of

the Spring vacation, and the fact that none of the earlier cases remained in the college buildings. About two weeks after the return of the students, April 22, new cases began to appear, which might easily occur from excreta, or the continued operation of the same causes, or from the predisposition which had been established.

So soon as the cases were recognized as typhoid fever, dependent upon local causes, all officers of the college were prompt in ordering an adjournment. We believe thus only was it saved a far more wide-spread and fatal epidemic. At the very day of adjournment we found the excreta of typhoid fever patients being emptied in a common water closet, and believe that the seed had been sown for a prolific harvest of death. However sad the record, with all the facts in evidence before us, we rejoice that the scourge was not more intense in its virulence and more wide-spread in its desolation.

#### CLIMATIC OR WEATHER CONDITIONS.

The question occurs whether there were at this time, either in thermal or atmospheric conditions, any reason why the material of cesspools or sewers should thus become operative, or why soil or air or water should be unusually impregnated, or persons have an unusual predisposition to such influences here. It is fully recognized that conditions of temperature, moisture, and prevailing winds may determine the outbreak of an endemic or epidemic disease. These would be inoperative without the necessary materials to operate upon were present in the soil, in the atmosphere, in the food or drink, or in the person. On the other hand the material might be present in any one or all of these, but be restrained in operation because of the absence of the heat, moisture or other conditions necessary to development.

A record of the meteorology of the year from July 1st, 1879, to July 1st, 1880, and especially of the latter six months, shows some exciting causes well worthy of attention.

We refer our readers to our tables for this period as worthy of study on another page. The winter was an unusually open one, with much less frost and ice, and with a smaller amount of rain than usual. The average temperature of February, March, April and May was much higher than ordinary.

The deficiency of rain was such as almost to occasion a March drought. The accompanying graphic map presents the lines of temperature, humidity and rain-fall from January 31st to May 31st, 1880.

The failure of flushing the sewers of the college, which depended so much on sluice-water, has already been noticed, and no doubt contributed much to the filling up of pipes and the influx of sewer air.

It affected still more the wells which are the vertical drains for an area of which they form the center. If the ground about them is filth sodden, or abounds in organic matter, or if having combined with cesspools it is never so sure to pollute the water supply. The favorite and only and time-honored method of sewage disposal in Princeton Borough is by uncemented cesspools in the rear yard and often in the front yard, and sometimes in both, nicely covered over and sodded. They are expected mostly to take care of and empty themselves. That means that the ground soil shall so absorb the liquid and muck of the semi-liquid and fecal matter as to make the need of emptying the exception. This may do for a time where population is sparse and regulations enforced, or longer where the water supply is not derived from wells. But it is a most hazardous experiment when it is followed up in a compact town, and only awaits favoring warmth and weather to stir these multitudinous cauldrons into activity, and with a soil unusually and unseasonably dry and warm, the first natural diversion is the well. As this cannot afford full relief, the air undertakes to be a corrective and so becomes the common carrier of whatever effluvia may arise. Some parts of Princeton are kept with scrupulous care, and the objectionable conditions are flagrant only in one or two small sections, or in here and there two or three adjacent houses as they were in the two houses shown on our map. A dead animal in the well—three cesspools within seventy-five feet, tainted air from these and from the overflow in the house, and the previously favoring weather conditions seem to have precipitated the crisis. The condition of the college sewers and of some town localities favored the progress of the infection.

The college having been dismissed and this deportation as the first thing resorted to, it is proper to note some of the means advised to overcome the disease, and to insure against recurrence.

1st. The cesspools were emptied, cleaned and disinfected.

2nd. All the sinks and the water-closets, and the pipes which connected them with the cesspools have been removed from the buildings; and the pipes outside of the buildings have also been taken up.

3d. The rooms have been cleaned, and those in which sickness occurred have been disinfected.

4th. The use of cesspools has been given up and a temporary arrangement provided which will avoid liability to disease. A permanent system of sewage and slop disposal is in course of construction, which is in accord with the development of sanitary science. Mr. C. E. Philbrick, Civil Engineer, of Boston, Mass., has charge of the construction of the new system. The water-closets are located in a separate building and have no connection with the dormitories.

5th. Two large cisterns have been built to hold filtered rain-water, collected from pure sources, to be used as drinking water.

6th. The house where the disease originated has been thoroughly overhauled.

7th. It was recommended that students be prohibited from boarding at houses in a defective sanitary condition.

This latter was rendered necessary from the fact that very insanitary conditions were found on the premises of several boarding houses. The location of many wells and cesspools was such as to make it obviously unjustifiable to expose students to the possibility of such soil and water contamination. This was made the more obligatory from the fact that scattered cases of typhoid fever had occurred in the town during the vacation, and even when college assembled, although it had been put in so thorough a sanitary condition, the fact of existing cases in town made it necessary to protect the students from such possibilities. It was unfortunate that the Health Board of the borough did little during the summer, but we believe that it is more alive to exigencies which exist and which must be remedied upon a plan.

#### FUTURE WATER SUPPLY AND SEWER SYSTEM.

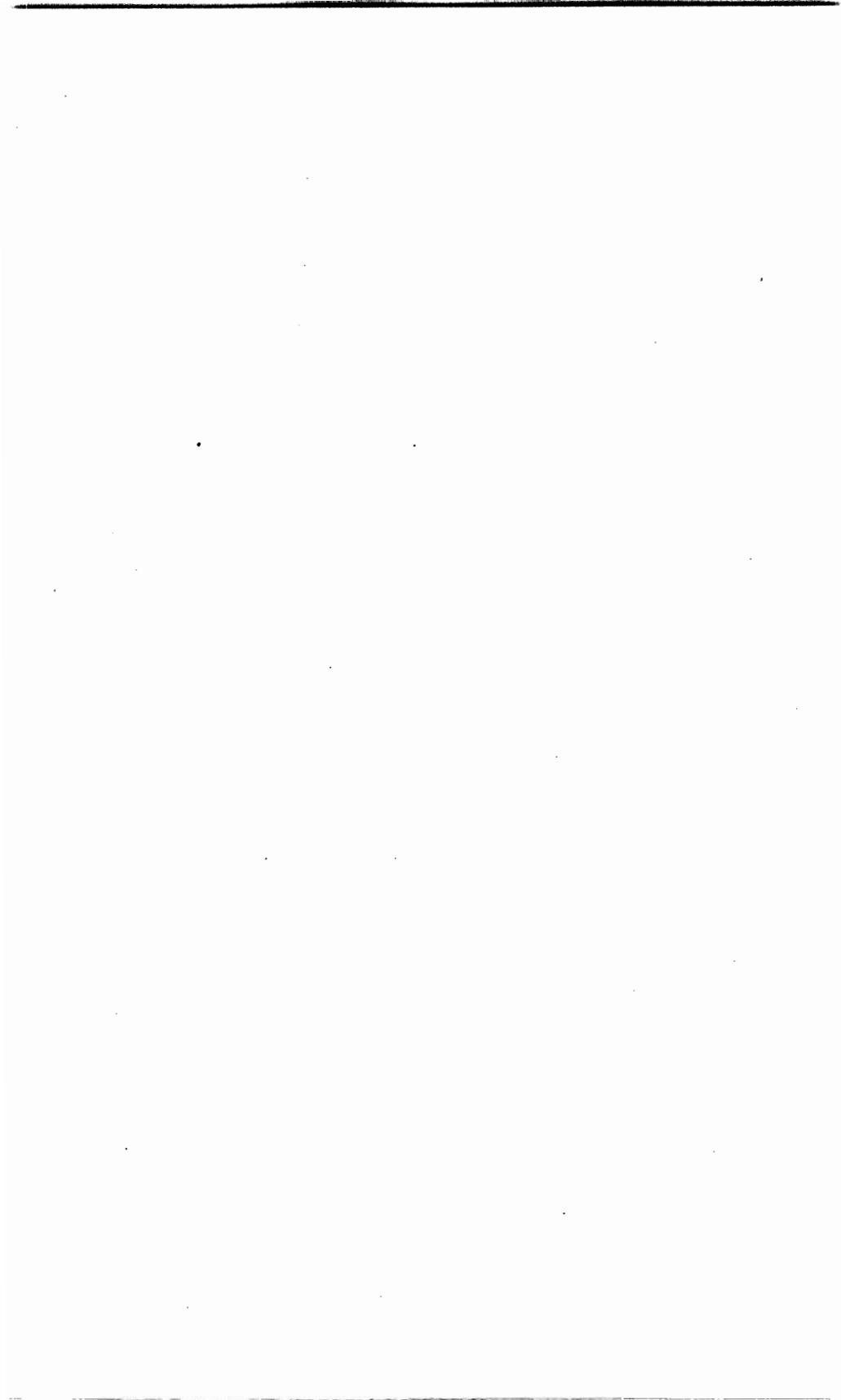
Either the uncemented cesspool system, or the wells must be abandoned in Princeton. It is hazardous to secure drinking water from the same soil in which these exist in near proximity;

with the soil and understructure of Princeton it is absolutely unsafe.

The water-bearing strata of the borough is nearly the same in its most closely inhabited sections; it is reached through deep wells and rock, so hard as often to require blasting; the water as thus secured would be good if no surface matter could reach it, but the rock extends within a few feet of the ground surface; it is a hard shale arrayed in layers. This compact rock causes organic matter to remain near the surface, or if liquid or semi-liquid, as it must become through accumulation and by storm water, it forms into streams or little trickling rivulets along the surface of the rock. It is found that this rock is blocked off, or has frequent seams or joints, so that at points not suspected and sometimes quite distant from some series of cesspools, the foul substance can find exit and so reach wells, and mingle at the water bearing strata. These joints are much more frequent than in trap rocks. Here and there a well is thus known to be impure where there are no cesspools immediately adjacent. Such a condition as this demands either a constant watching and testing of almost each well used, or the prohibition of uncemented cesspools, or the use of cisterns, or the procurement of a water supply away from any possible household or populous complications. The risks are greater to the town than to the college, since the buildings of the latter need not be closely located, and its facilities for collecting and storing water from the buildings are greater.

In reference to all that relates to this outbreak of enteric fever at Princeton, it must only be said, that in its chief feature it is only a repetition of what has elsewhere occurred over and over again from similar causes and complications. There are many towns that just after this fashion are storing up material for just such sickly and deadly use in the future. By a want of co-action or co-ordination of conditions of water, soil and weather and susceptible live material, the evil day has thus far been postponed. Some have postponed the evil by securing a separate water supply. Although still polluting the ground, its results are, for a while, delayed by nature's conservatism, or by flight to the sea shore, or other methods of avoiding the continuous inhalation of polluted air, or when such air is inhaled, if it is common foulness and has not yet attained to specific contagion, it only causes

that general malaise and weariness and half force which devitalize and demoralize population, and so is now sapping vital power by insidious inroads, instead of decimating by virulent epidemics. There was no other way to convert New Orleans and Memphis to correct hygiene except to have yellow fever. It may be that our New Jersey cities, will continue to foster insanitary conditions until they too have some significant losses, or until there is a general reduction of the standard of good health, so pronounced, as to exhibit itself in the statistics of mortality. Still with the noble advance made in our own State in the last three years, and with an increase of intelligent popular sentiment and official power, we cannot but hope that many of our cities and townships will, more or less rapidly, put themselves upon a better health basis, and secure for themselves and for their homes, that blessing which, more than any other human gift, tends to life, liberty and the pursuit of happiness.



# SANITARY INQUIRIES INTO ALMS- HOUSES AND JAILS.

BY WM. M. BAIRD, M. D., WASHINGTON, N. J.

With civilization we have the care of the criminal and dependent classes to engage our attention ; and that they may be cared for at the least expense to tax-payers is an important consideration. But a higher and more important consideration is the giving of such care as will lessen the numbers of these classes in the future. Indeed, as a matter of economy to tax-payers, it is not so much what it will cost per diem to support these classes, as what measures shall be inaugurated to make the greater number of these dependents self-supporting, and to cause the largest proportion of the criminals to lead honest lives, that society will not be forced to protect itself by confining them.

The part that race, inheritance and various physical defects have to perform, I take it is the part of the subject our State Board of Health wishes to grapple with. That these, in various forms, have much to do with producing these social diseases is only too true. As directed by the Secretary of the Board, I made a visitation to several counties and only confirmed my previous opinion that many needed reforms were necessary before New Jersey would be up to the times in the care of her dependents and criminals. The majority of the people and, indeed, of officials appear to think that if they are well housed and fed that is all that is necessary ; that to consider the subject in its higher relations is superfluous. The consequence is that a needless expense is entailed on the tax-payers of our State, and the prevention of pauperism or crime receives but little attention from the masses.

## JAILS.

I visited the jails of Warren, Morris, Essex, Union and Somerset counties.

## WARREN COUNTY.

Warren county jail is in the Court House, at Belvidere, the county seat. A recent Board of Freeholders remodeled the Court House and rebuilt the jail. It was originally built in 1825, and rebuilt in 1870; constructed of brick, it now consists of a new and old part. It is seldom that more than a few prisoners are confined in it. Cells are built so that the back walls of two cells abut each other. As soon as prisoners arrive, they are taken to a bath-tub and given a bath, and then assigned to their cells. The court surrounding the cells in the new part is quite well lighted, and natural ventilation has a fair opportunity to do what common sense failed to do. In the old part the court is not so well lighted or aired, but the height of ceiling, the cleanliness observed and few occupants, make the air supply very good during the day. The cells are ventilated by a hole opening in an air flue, common to the cell and the area back of it. I found no draught at the air holes on holding a lighted match to the opening. No arrangements are made for forcibly removing the air, and the ventilation of cells is sadly defective. The cells in all prisons visited by me are small and the arrangements for thorough change of air should be very complete. In this jail a frequent whitewashing does much to keep the air sweet; the excretions at night are received in tin pails with covers. In the jails are water-closets for use during the day. There is a privy in the out-yard. The water-supply is from the Delaware river, and is furnished by a water company supplying the town. A plentiful supply of water is had for cleansing purposes and for flushing pipes. Slop water and excreta are carried into a large cesspool in the back yard. This pool has no ventilation other than through the ground covering it. The jailor says there is *said to be* a cistern under the new jail. This, being confined and without ventilation, may be the means of not only breeding disease to certain criminals there confined, but to others whose province it is to mete out justice in the rooms above. The danger from this is not so great, however, in your reporter's opinion, as it is from the fact of having a good water-supply and very bad method for the disposal of sewage. The officials stated that they believed they had good traps. But when sewage is run into a cesspool tightly covered and there generates gases, and

when more sewage is run into the pool, this will either compress the gas or it will escape somewhere. Undoubtedly a great deal gets through the tank and passes off through the pores of the soil, but, unfortunately, the covering does not always permit it to pass off rapidly enough.

When pressure is brought to bear by this compressed gas in the trap, I fear the trap that will prevent its escaping in the apartments behind it has not yet been patented. The county is not so much to blame for this negligence as the town, for it is the town which will have to suffer in the future by its soil becoming thoroughly impregnated with sewerage matter.

#### DIETARY.

No regular dietary is had for each day, but the aim is to give the prisoners a change of diet. A physician is appointed by the Board of Freeholders, and is required to attend whenever called or when he deems it necessary; he is also required to furnish his own medicines without extra pay. The only labor imposed on inmates is caring for their apartments and cleaning up, white-washing, &c. Tobacco is furnished to those who use it and the amount expended last year for this important article was \$9.35. Alcoholics are not furnished. The people of the town occasionally hold services there on Sunday afternoons. A few papers are given them by officials and some sent in by friends or others. There is a hose to attach to water supply in case of fire. Lamps and kerosene oil are used for lighting.

No register is kept of inmates as to their habits, cause of dependence, mental condition, &c. The sick are treated in their cells, and nursed by other inmates, as there is no hospital. No witnesses have been detained the past year.

Prisoners are allowed to smoke and make ablutions in their cells. I remember, with pain, a visit I made to a prisoner, a couple of years since, who was confined for official malfeasance, and whose cell was ventilated so badly that the foul air from tobacco smoke and his own rebreathing made it impossible for me to endure it even for a few moments. He was suffering from palpitation of the heart and decided anemia, and gave a vivid description of symptoms plainly due to a vitiated atmosphere.

If prisoners are taken sick at night they have to knock and

call keepers. Prisoners are fed at a common table, and cells have iron bedsteads. Very little sickness occurs here. Outside the main jail, but in the building, is a cell containing, possibly, two thousand cubic feet of air space. I was informed it was customary, formerly, to confine tramps in this cell, and frequently they were packed in until they were crowded. This, without any means of ventilation except through a grated door, must have made it a veritable "Black Hole." The building is heated by steam.

MORRIS COUNTY JAIL.

This is situated in Morristown, and, as at Belvidere, is a part of the court house. It is built on soil of drift formation and constructed of brick and stone.

The walls are finished by plastering on the brick or stone; iron bedsteads are used. The cells open on an airy court, well lighted. So long as the jail is kept clean, a pure, natural ventilation is such that a sufficient change of air is had. The jail receives its water from the city pipes. As in the previous case, the sewerage system in vogue in Morristown, is by cess-pools. A large pool is situated just back of the jail and covered with plank and soil. The keeper has had considerable experience in prisons and understands the virtue of good house-keeping, and the general air of the jail was good. There is a water-closet in the back part of the jail, and he only allows the excretions of the body to go in this. Slops from bath tubs, &c., run in the gutters, and after emptying slops he flushes the gutters thoroughly with water, so as to cleanse them of all traces of slop-water.

The water-closet contains a trap but in spite of this foul gases are sometimes forced back through the trap into the jail. The keeper recognized the cause of this, and for this reason runs his slops in the gutter so as not to fill the cess-pool so rapidly, and thus force the gas to pass through the trap for an escape. If they will have cess-pools they should certainly run a pipe up to the top of the building as a ventilating pipe to it.

The health of the jail is reported excellent. The keeper says that the only sickness is from tramps and those brought there sick. In white-washing he insists on having the old scraped off and new put on.

Heating is by stoves. No regular dietary but a change is given. Medicine is furnished by the county on physician's prescription. No system of employment for inmates except cleaning up around; no tobacco furnished inmates. The prisoners' moral and intellectual welfare is looked after by the Y. M. C. A. and ladies who supply them with pamphlets and papers. No provision is made in case of fire. Lighting is by lamps. The sick are treated in their cells. Prisoners are allowed to smoke but not to wash in cells. There is no chance for change of air in cells but through doors, except in top tier of cells where there is hole 4x4 opening in attic.

One person was detained as witness during past year, but allowed to go around the grounds. No record is kept as to their habits, cause of becoming criminals, &c. Excretions at night are received in chamber vessels.

#### SOMERSET COUNTY JAIL.

Court house and jail are situated in a large square in the town of Somerville. They are constructed of brick and stone. They have to accommodate a large number of prisoners. Water supply is by well, for kitchen and drinking, and large tank at top of building for flushing sewer pipes. Sewage is conveyed by means of large pipes to a brook about a half mile from building. Sewer pipes are ventilated by pipes carried up to top of building. Water closets, &c., have traps. Sewers have good fall. Slop water is conveyed to a cesspool which leads to a gutter in the street; this they aim to keep well disinfected. Building is heated by stoves. No light allowed in the jail. Oil is used in court house and sheriff's apartments. No regular dietary, but a change is given as far as practicable. Medical attendance is had when called on, and medicines are procured at drug store on physician's prescriptions. No employment for inmates. No tobacco is furnished inmates. No witnesses have been detained the past year. Excretions at night are received in ordinary chamber vessels. Prisoners are allowed to smoke and wash in their cells. Ventilation is only to be had by natural methods, no provision made for change of air. No record is kept as to habits, cause of becoming criminals, &c.

## UNION COUNTY JAIL.

This is situated in Elizabeth city and is a part of the Court House. The building is of stone and brick. The jail for males is a large court yard with cells in the centre abutting each other. This is, I may say, the common plan for jail and prison construction in this State. There is a bath room and water-closet in corner of jail. Warden keeps this thoroughly cleaned with lime, and it had a clean appearance and good smell. The water-closet arrangements seemed of approved pattern and effective working. Excreta pass into city sewers. These are not ventilated between traps and sewers. There is also a water-closet in the kitchen. Water supply is by city water and is brought on all floors of the Court House. They also have a well which they have to use in very dry weather as the city water at such times gets to smelling. The building is heated by steam. There is a regular dietary for each day, and a change in diet is given. Prisoners are fed at a common table. The jail physician attends whenever called on, and medicine is procured at drug store on his prescription. They report very little sickness and nothing that appears to originate in bad sanitation of building. No tobacco is furnished except to a few who work, and they get a little smoking tobacco. Building is lighted by gas. In the male part the court is well lighted and natural ventilation has a fair chance and besides there are air flues in the walls of each cell. The female part is constructed on the same general principles, but is so surrounded by buildings that a change of air is not so easily brought about through windows and doors. The air of this part on this account had a close smell.

Witnesses are detained in a room up stairs, but as this entails solitary confinement, they sometimes prefer to be put in with the other prisoners where they have more company.

Buckets with covers are provided for cell use. Lime is kept in these all the time, and they looked clean and pure. Prisoners are not allowed to smoke or wash in cells. The sewerage on the male side empties in a cess-pool, and from this into the city sewer. This has to be occasionally emptied, and should be permanently closed or frequently cleansed.

## ESSEX COUNTY JAIL.

This is situated in the city of Newark, and, of course, they have to provide for a greater number and a different type of criminals than in agricultural districts. Essex county has a penitentiary, and as soon as the courts sentence them they are removed to this institution.

The general plan for arrangement of cells is the same here as in other jails, but much more extensive. Prisoners on their arrival are taken to a bath-room and given a bath. Bath-rooms and water-closets are kept clean and carefully inspected daily by the officials. Prisoners are required to do the cleaning of the jail. Whitewashing is repeated at frequent intervals.

The excreta are run into the city sewer, and the closets and sewers are kept well flushed. Separate apartments are had for detention of witnesses and for hospital accommodation. Heating is done by steam. Water supply from city pipes. Ventilation of cells by the usual method of air-flue between two cells and opening from each cell into the air-flue.

The principal sickness is from the tramp class or from those brought in sick. The warden appreciates the necessity of keeping everything clean and using plenty of lime and water to accomplish this purpose.

## ESSEX COUNTY PENITENTIARY.

This is situated between Montclair and Caldwell. It was constructed in 1873-4, and receives the prisoners from the jail after their sentence, instead of sending them to the State institution. It is built of stone and stands against a gently sloping hill. On the top of the hill is the reservoir for reception, storing and distribution of water. The prisoners on arrival are received in a bath-room, and given a bath, and their height, weight and appearance taken. Their clothing is done up in a package and marked so that they can have it when they leave the prison. A prison suit is given them of striped clothing; underclothing is given them every two weeks; shirt, socks and towel every week. Coats, pants and shoes are repaired when needing it. Each cell contains wash basin and water closet, with free water supply, for flushing pipes. Besides this there is a bath-room in the prison for the use of the prisoners. Sewerage is disposed of by the

Waring method, and the receiving cess-pools are a couple hundred yards from the building. The sewers are ventilated by pipes leading up to the top of the building.

Water is supplied by large well and by springs, pumped from them into distributing reservoir. They have plenty of water for all purposes, but during the recent dry weather, when the whole country was short of water, they were forced to be economical with theirs. The physician in charge says that at no time have they had, apparently, any sewage gases entering the cells, unless it was when the water supply was low. He thought that the lack of plenty of water made itself felt by a close smelling air in the cells. This is important as showing the importance of plenty of water with the best sewerage system. The sewage formerly ran into a main pipe and then emptied in a creek at some distance from the building.

The doctor states that he found organic matter in the water of the creek, some distance below where the sewage emptied into it. When that system was in vogue, though they had no low diseases, yet he found a lower vitality among prisoners, showing itself by ophthalmia trouble, &c; this has disappeared since the present system has been inaugurated.

The building is heated by steam, and cells are ventilated by the usual method. There is a hospital for sick, with ventilation openings in the floor, but no openings at top of buildings. A regular diet list is had for each day and they aim to provide a change. Medical attendance is arranged for by daily visits from the appointed physician. Medicines are furnished by the county and drugs are kept on hand, and room is provided in the building for them.

Deaths last year were three in number; one dropsy, one heart disease, and one brought there with typhoid fever died in two days.

Prisoners are kept busy at quarrying and breaking stone. The warden informs me that they almost invariably gain weight. The building is new, and if our present system of caring for criminals is the proper one, it certainly comes as near being the model institution as it can well be made. We can easily see that they should gain weight. With wholesome food and plenty of exercise, they can hardly help but be in good physical condition.

No tobacco is furnished to prisoners. A library is provided for their use, and religious service is held on Sunday. No register is kept as to habits, cause of committing crime, etc. Plenty of sunlight can enter the halls, and of course shine in cells. Night watchmen parade the halls, and if prisoners are suddenly taken ill, they can call the watchman.

#### AIR SUPPLY AND VENTILATION OF THE VARIOUS JAILS.

The air space of cells ranges from four hundred to five hundred cubic feet of air space for each prisoner in the various prisons visited by me. This is increased by the doors being of grating, and by opening on large halls. Ventilation of cells, when provided for at all, is by flues between cells, and carried to top of building. In many of these a lighted taper failed to show any current of air. As these flues are always small, and as these buildings are usually heated with steam, a current of air could be easily provided by carrying a steam pipe into the flue, and thus providing for a current of warm air continually.

Examination of air was had in nearly all institutions. The lime water test showed no impurities, but I have tested in cells that had a foul smell, and yet found no change, indicating that there are other impurities of the air than respiration.

#### CAUSE OF CRIME.

Any statistics that I was able to gather, concerning this important subject, were necessarily imperfect this year. No inquiry is made by officials into this, when prisoners are received by them. All keepers agreed, however, that intemperance is, of all things, the most fruitful cause of crimes. This is not strange, when we think of its well-known power of lowering the moral sentiments, and elevating the passions unduly. Undoubtedly the majority of these persons are born with selfish propensities over developed, and with limited ideas of their moral responsibility. This is not improved by their education. In the opinion of the writer, inheritance and intemperance should be considered together, for these persons are, as it were, on a pivot, liable to go either way. If they observe temperate habits, are steady and frugal, they will pass through the world as honest men and women; but if their education has been such as will

develop the passions, and create habits of intemperance, they will take the other side, and become criminals. They are evenly balanced when sober, but when stimulated with alcoholics, their moral sensibilities are loosened, and they easily slide over to wrong-doing, and thus commit many crimes against society.

In this manner alcoholics act as the exciting cause. The fact that they inherit low ideas of their moral responsibilities is the deeper cause. Thus alcoholics become the exciting cause of from seventy to eighty per cent. of all crime committed. I do not think this is putting it too high. One warden said that ninety per cent. of the criminals was made, so he felt sure, by alcoholics; he made this estimate after years of experience with this class. His experience here had been mainly with short commitments, such as occur in county jails, but he had been a keeper in a penitentiary and thought that this same percentage would apply there.

The deputy warden of the Essex County Penitentiary, who has been connected with that institution since it was built, and, prior to that, with the penitentiary on Blackwell's Island, N. Y., put the percentage much lower, but thinks alcohol is a fruitful source of crime. But this evident cause of criminals is worthy of the closest study by statesmen and legislators.

As to inheritance, though many criminals are such from birth, following the same line of criminality that their parents did, yet the masses of criminals, we doubt not, are recruited from the lower social classes.

Children born in tenement houses and educated in the gutters will have little inherited idea of right or wrong, and their education will drive out what little moral sensibility there is remaining. What can we expect but that these children will become criminals and dependents?

The writer could find but few facts regarding race. Intemperance, inheritance and education are the main factors to be considered in reference to diminishing the criminal classes. Regarding the latter, I do not think that mere intellectual education is all that is necessary by any means.

Unfortunately, society has not yet reached the point at which it is agreed as to the proper manner of cultivating the moral qualities, but it is just as much the duty of the State to do this

as it is to educate the intellect, and to do it for self-preservation. At the same time their physical nature should be looked after.

The work of the State Board of Health here makes itself felt. The better instruction of the people in sanitary laws, and self-care will, I doubt not, be shown in a few years in lessening the proportion of the criminal classes. The proper education of the child is to give it an "all round" education. While we are looking after its intellectual and moral education, its physical should be looked after as well.

Therefore, it is the duty of the State to provide for the education of its children into the laws of their physical being. After the care of self and after reading and writing, the first thing taught should be physiology and hygiene. This may seem sentimental and ahead of the times, but that it would lessen criminals, I feel sure.

In the prisons visited by me I think I always saw evidence, on the part of the officials, of diligent effort to keep their charges in good sanitary condition. There might be some improvements made in all the prisons visited, in some sanitary details, and in the construction of buildings; but in all there was good house-keeping, and the absence of disease spoke well for their sanitary condition. The officials of the Essex County Penitentiary should be commended for their prompt change in sewage disposal, when they found that the original plan was inefficient. Unfortunately committees and other governing boards are not always so prompt in making needed changes, for fear of losing votes at the ensuing election.

If the present plan of confinement and punishment is the proper method for caring for criminals, then I have but few suggestions to make. A plentiful supply of water and lime and good food will make up for many deficiencies of modern sanitary appliances. Of course such a condition of sewage pipes as exists at the Warren and Morris county jails should be at once remedied (where sewage passes into tight cesspools and these as well as pipes not ventilated) but this is the fault of jail committees and not of the jailers. It may be that all of our care of criminals is defective. While it cares for them and punishes them, yet it might be well to inaugurate a method having more reference to the cure of their social condition and the prevention

of crime in the future. That this will be the method of the future we do not doubt. The education of the youth properly belongs to the public instructor, but after they leave his care, it might be well to have some system of visitation that would look after young persons who are committed for the first time for some light offense, as drunkenness, vagrancy, assault and battery and petty thieving.

The plan I suggest would also look after the discharged prisoners, seek for them employment and help to make them respectable citizens and to forget their past life so far as possible. The medical profession is recognizing the great importance of preventing disease in order to prevent crime, and are studying side by side these great social problems, which have for their aim the physical, moral and industrial elevation of the masses.

#### ALMS-HOUSES.

In country districts these buildings are often situated some distance from towns, and are, therefore, not subject to the frequent inspections that jails receive. Among many officials there seems to be almost an opinion that anything is good enough for the pauper. This is not true, according to my experience, of the official having direct charge of those people, but it is true of the governing boards in many instances. The sanitary condition of alms-houses will not compare at all favorably with the jails. The latter are far better constructed and better provided with sanitary appliances than the poor-houses.

#### WARREN COUNTY POOR-HOUSE.

This is situated on the road leading from Hackettstown and Port Murray to Belvidere. There is a large farm, which is worked by pauper labor principally. The building is old, having been built many years ago. Some one hundred feet from the main building there is a two-story building of more recent construction, which serves as dormitory for some of the men.

The inmates in the summer get reduced to less than ninety. In the winter they are added to until over one hundred and

twenty have to be accommodated. It will accommodate eighty or ninety inmates quite comfortably, but as built and arranged it is not adapted to hold over seventy-five. In a letter to the *Washington Star*, of January 23d, 1880, I made a detailed report on the sanitary condition of the house. At that time there was one hundred and thirteen inmates. This made less than three hundred cubic feet of air space for each inmate. No provision is made for ventilating rooms other than by valves over the doors. These are sadly insufficient for the purpose. In addition to its overcrowded condition, the building is heated by stoves, and not only is the air consumed by the inmates, but by the stoves. These are cared for by inmates, and the amount of coal gas thrown out generally by each of the stoves is fearful to contemplate. I give the dimensions of one room, on the men's side, of the foul condition of which I have a vivid remembrance:

It is room No. 2 containing nineteen hundred and seventy-five cubic feet of air space. One stove, two windows, one door, six inmates, three hundred and twenty-nine cubic feet air space per inmate. Very close. Nine thousand and fifty-four (9054) respiratory impurity per one thousand volumes. This room is invariably foul. It is used during the day as a sitting room and smoking room, and usually in cold weather there are ten or twelve sitting in it, making less than two hundred cubic feet of air space per inmate during the day. There are here a couple of old men chiefly confined in their beds. I have noted the fact that these inmates complain more during cold weather than during warm, when they can be out. The stove here gives off great quantities of carbonic oxide, which decidedly helps to make the room unbearable to those used to pure air."

I was the attending physician for two years. In the winter time, when doors and windows were closed, I could not stand it in this room at all; it could only be appreciated on being inhaled. The truth is that the ventilation of the whole building is as bad as it well can be, and in the winter months it is much overcrowded. The mortality to children was great during my attendance. In case of sickness in adults or children, the vitality would be so much lowered, and this, combined with foul air, made it almost impossible to rally them. The Steward was par-

ticular in keeping the house well cleansed and whitewashed, and this, I believe, prevents an outbreak of septic disease.

The water-supply is by a spring, about seventy-five or one hundred feet north of main building this is lower than basement of building a few feet further on, and on six or eight feet higher ground, is situated the privy. On first glance, this would seem criminally close and in just the position to contaminate the spring; practically, however, this seems never to have occurred, and the lay of the ground would seem to carry all drainage in a direction from the spring. Recently, the authorities have brought the water from the spring down into the house, and it is hoped they will soon distribute it through the house.

The present management have arranged the privy so as to remove its contents and spread on the soil every few weeks or months. Still the chances for contamination of spring remain, for it is difficult to tell how many crevices may be in the rock and what direction they may take. This privy vault may have contaminated the soil for many feet around. A large spring against the hill, a quarter of a mile from the house, could be easily conveyed to and through the house.

Slop-water from the kitchen is thrown into drains in front of each kitchen door. The soil is of gravel drift, and the drain leads some distance down the hill and empties itself into the soil. This provides quite efficient disposal of kitchen waste by irrigation. Excreta is emptied in a privy vault, from which it is spread on fields. Ordinary chamber vessels are in use for the night time and for the sick. The need of more space, better ventilation and more water-supply is sadly felt.

The children are sent to school at the public school about a mile distant. Places are found for them as fast as possible. The arrangement of the building and its overcrowded condition make it impossible to separate the sexes entirely. Every effort possible is made to keep them apart, but they succeed in getting together at times. I clip from my letter in the *Star* the following, which tells its own story:

DEATHS.

Deaths from June, 1878, to January, 1880.....	16
Those having one or both parents paupers.....	6
Percentage of those dying having pauper parents.....	37.5

## BIRTHS.

Number of births from June 1, 1878, to January 1, 1880..	6
“ “ conceived in the house.....	3
(These conceptions took place prior to present management.)	
Percentage of births that were conceived in the house.....	50
Percentage with Irish parents.....	66.6
Percentage of illegitimate.....	16.66
(The small number makes the above of but little practical value.)	

## STATISTICS OF WHOLE NUMBER IN THE HOUSE.

At present in the house.....	113
Conceived and born there.....	8
Born there.....	16
Having pauper parents, one or both.....	32
Foreign born—Ireland, 25; Scotland, 2; England, 2; Ger- many, 5.....	34
Native born.....	79
Percentage of inmates conceived and born in the house...	7.07
Percentage of inmates born there.....	14.15
Percentage having pauper parents, one or both.....	28.31
Percentage foreign born.....	30.08
Percentage native born .....	69.91

## STATISTICS OF ADULTS IN THE HOUSE.

Adults in the house.....	84
Adults conceived and born there.....	2
(In addition to this there are a number of doubtful cases.)	
Adults having pauper parents, one or both.....	6
(All the foreign born deny it, as a matter of course.)	
Percentage conceived and born there.....	2.38
Percentage having pauper parents.....	7.14
Percentage to whole number in the house.....	74.33

## STATISTICS OF CHILDREN IN THE HOUSE.

Number of children in the house.....	29
Number of children born there.....	14
Number of children having pauper parents, one or both,	26
Number whose parents are both there now.....	11

Number of children conceived there.....	6
Number of children of illegitimate birth.....	12
Percentage of children to whole number of inmates.....	25.66
Percentage of children conceived there.....	20.68
Percentage of children born.....	48.27
Percentage of children that had pauper parents, one or both.....	89.65
Percentage of children that are illegitimate.....	41.37

## MORRIS COUNTY POOR-HOUSE.

This is situated two or three miles from Boonton, and the county owns there a farm of two hundred and forty acres. Building is of wood, and the main part is old, and though in good condition outwardly, the walls and floors are poor.

There is a new building, perhaps seventy-five feet from the main building, and this serves as a dormitory for men. There is provided from five hundred to six hundred cubic feet of air space per inmate; no arrangements are made for change of air other than by openings over doors and through windows and holes in ceiling opening in attic. The air of the new part seemed pure, but in the old or main building it was close and had a bad smell. Air, however, on my visit showed no excess of carbonic acid gas. Rooms are frequently and thoroughly whitewashed, but in spite of this the general air is bad, indicating that a thorough remodelling of the building is necessary. Kitchen slops empty in pipes leading to a creek, possibly two hundred feet distant. Privies, with vaults under them, receive the excreta; these are emptied every few months. No indoor water-closets are provided; chamber vessels are used for night use. There are a couple of closets in the house in which buckets are kept for use of inmates, and these they are required to remove daily and cleanse.

The old building had originally vaults under one side of it so that each room on one floor of that wing had a privy adjoining it. This became so great a nuisance that these vaults were filled in some years ago and the lids of the privy holes screwed down. Water is supplied from four wells; in the wash-room of the new building water is led in by pipe from a reservoir.

Iron bedsteads are used. A portable bath-tub is in use for inmates. They are fed at a common table. Cellars are under

nearly the whole building. Some difficulty has been experienced in keeping meat in one of the cellars. Water does not come in the cellars and they were clean and well aired.

Three ward-rooms have fire places. Heating is done by steam. No regular diet list is had, but a change is provided. There are five insane paupers and eleven demented or foolish. All are considered harmless, and they are not kept separate, but the Steward thinks they should be. Male and female are locked in separate apartments at night, but mingle freely together during the day. Steward believes this should be different, and that they should be kept separate at all times; but he could not well do this in the present building. With the exception of having more space, this institution is not near so well arranged as the Warren County Poor-house.

The children are taught by a pauper in the building, and they are bound out as soon as places can be had. The attending physician states that they have had "no diseases for many years directly traceable to sanitary defects."

Inmates are required to work on farm and garden when able. Tobacco is furnished to about thirty. Kerosene lamps are used for lighting. No register is kept as to habits, cause of dependence, mental condition, &c.

#### ELIZABETH CITY POOR-HOUSE.

This is situated on the border of the salt meadows, just out of Elizabeth city limits. It is built of stone and brick walls are hard finished.

Most of the children are vaccinated, but it is not seen that they are vaccinated when they are brought in. Iron bedsteads are in use. Bath-rooms are provided for inmates. Sewage runs in pipes and empties about two hundred feet from building, on the salt meadows. Buckets are in use in case of sickness.

Privies are in use out of doors, and excreta drops in vaults. These are cleaned every winter, but not ventilated. Water-supply is by well and cistern. Heating is by steam.

The average number last year was forty. There are three insane paupers. An inmate's arm was broken a couple of years since, by an insane pauper. As far as possible, the sexes are kept separate. Medicines are kept in the house, and a phy-

sician visits them every two days. Tobacco is furnished to those that use it.

No arrangements are made for schooling children. As soon as old enough they are put in the various asylums. Kerosene oil is used for lighting. No register is kept as to habits, course of dependence, &c. Over one-half are foreign born.

Heating is by hot-air furnaces, and ventilation is through windows and doors. The house, at time of my visit, was certainly not crowded, and air of apartments was pure, so far as sense of smell was concerned.

Paupers are required to work on the farm and garden when able. The institution is reported healthy.

ESSEX COUNTY POOR-HOUSES.—NEWARK CITY ALMS-HOUSE.

This is situated on the Elizabeth avenue and adjoining the salt meadows, and at extreme end of city. Buildings are owned by city, and are built on sand and gravel drift. City has here about thirteen acres of ground, which are used for most part for trucking. Building is constructed of brick; originally erected about 1840, and rebuilt and enlarged 1868. All children are vaccinated. Iron bedsteads are in use.

*Inmates, on their arrival, are given a bath,* and their clothing is boiled and pickled in alum and hot water to destroy the vermin. The steward says that he had great trouble to keep vermin out for a while, but they stopped the rolling up of old clothes and putting them under the pillows, a custom very common with this class; since that time, by observing strict cleanliness, there has been little trouble with vermin. Every inmate is required to take one bath every week. Inmates are fed at common table.

All sewage runs in city sewers; all openings are well trapped. There was formerly a large vault under the centre of the building, and water-closets over it. There was a well about sixty feet from vault, and a gradual slope from vault to well. The present management had this vault carefully cleaned and filled in with dry earth. This was five years ago, and at that time the well-water had bad taste and there was a smell from privies through the house. Then was inaugurated the system of sewerage now used, which remedied the evil. The Steward and Governing Board has aimed to have all sewer openings well trapped. Sew-

ers are ventilated only by openings where surface water runs in, and are ventilated also by tin pipes carrying roof washings in the sewer.

The average number the past five years (since present management came in) has been about the same.

Death rate in 1875 was at the rate of 78 per thousand.

Death rate in 1876 was at the rate of 54 per thousand.

(This was after vault was cleaned and sewer put in.)

Death rate in 1877 was at the rate of 48 per thousand.

Death rate in 1878 was at the rate of 28 per thousand.

Death rate in 1879 was at the rate of 23 per thousand.

The Steward attributes this (and I think correctly) to the improved sanitary condition of the house. During this term the yearly average was about two hundred. This being the case, we find a reduction in the death rate of the house from thirty-nine per cent. to eleven and five-tenths per cent. Certainly this reduction is worthy the study of some poor-house officials, who think sanitary authorities are visionary when advocating improved sanitary measures. I think the above figures tell their own story, and that the moral is plain. Ventilation is by fanlights over doors, and halls have ventilating opening through ceiling, and ventilators on roof. At my visit I found the air of rooms good, and they were not in a crowded condition.

The water-supply is from city water-works; there is a receiving cistern in the attic. There is also a well which is used some for cooking purposes. The city water can be used by using from storing tank in the attic or directly from city main. Steam is used for heating purposes.

A change of diet is provided and fish is given on Fridays. A number of harmless imbeciles are kept here, and the Superintendent thinks it not essential to keep them separate.

Sexes are kept in separate apartments, and while out of doors a high board fence separates them. Nursing of the sick is by inmates. Medical attendance four or five times weekly, and oftener if necessary. Medicines are furnished by the city on requisition of alms-house physician. Officials complain that the alms-house is made the receptacle of nearly all the incurable poor from their hospitals.

The need of Newark seems to be a city hospital for the poor. No hospital is provided in alms-house, but a room is provided

as lying-in room for women. Inmates are required to work on the farm, trucking, &c. A few have tobacco furnished them. Children are sent to public school near by, and they are apprenticed out when places can be had. About twenty were born in the house last year.

Oil is used for lighting purposes. No register is kept as to habits, cause of dependence, mental condition, &c. Although there are many errors in construction of building, &c., yet this institution is, in its general condition, far superior to the average poor-house.

Franklin township, Essex county, supports its poor at the Belleville poor-house, but the greater portion of its poor is given out-door relief by its Overseer of the Poor. They have but one in Belleville poor-house, for which they pay two dollars per week. Overseer said he had about thirty to whom he was giving relief. Of twenty out of these thirty, the cause of their dependence was either directly or indirectly to be found in alcoholic drink.

Belleville township has a poor-house. Overseer of Poor has control of it, and lives about one-quarter of a mile from it. It had seven inmates on my visit, and the overseer furnishes food and fuel and other necessaries, and they keep boarding-house for themselves. The overseer has been the same for very many years. Says house has usually been healthy since the typhoid fever prevailed, twenty years ago. Most of sickness is brought there. Children are bound out as soon as proper homes can be found. Of the seven in the house, four were Irish born, two American and one English. The overseer thinks debauchery and dissipation the most frequent cause of pauperism, and says he estimates eighty per cent. of paupers are made so by drink.

Bloomfield township has an alms-house, but they aim to help, by out-door relief, as far as possible. At my visit the house was closed and I did not inspect it.

Montclair gives out-door relief, and has poor-house which has an average of ten inmates. It is under the control of the Overseer of the Poor. The building is on a lot, or small farm, and is like many cheap farm-houses; everything about the house was neat and clean, and while here, I felt strengthened in my belief that to scatter the poor, and each township to care for its own in

small buildings, is, after all, the better way for agricultural districts.

Inmates here are not allowed to leave the premises. The overseer thinks this works well, as they do not like the confinement and are apt to seek work.

They have a room set apart for the sick, and this contains an earth commode. There is an out-house for lodging tramps where they are put without pipe, tobacco or matches, and they are given but little to eat.

#### GENERAL REMARKS.

To my question asked Superintendents and Overseer, "What do you consider the most fruitful cause of pauperism?" the reply *always* came without hesitation, "Drink." This was estimated as the cause of from sixty per cent. to seventy per cent. of pauperism. Taking the opinion of all the men having charge of alms-houses, jails, and out-door relief and with whom I came in contact, I am safe in saying that at least eighty per cent. of crime and pauperism, is due to alcohol. The Steward of the poor-house, at Elizabeth, gave me a case to the point: A man with wife and four or five children, a workman in Singer's Sewing Machine Manufactory, able to earn thirty dollars per week, became so dissipated that at last himself and family became inmates of the poor-house. Although not a member of any teetotal organization we are forced to admit that *alcohol is the cause of by far the greater proportion of crime and pauperism.* It has a more direct relation with pauperism, than with crime. In men of bright intellects, alcoholics elevate the passions and debase the moral sentiments, and crime is the result. In the lower ranks and among men of low intellects, though it has the same action, yet they do not become criminals, but all shame and sense of degradation is lost in the desire for drink, and they become paupers. The aim of alms-houses seem to be to give a home to the unfortunates who are forced by reverses to become dependent on charity.

In reality, they are the home for the low debauched. Race becomes more prominent when we consider pauperism than in considering criminals. Inheritance undoubtedly plays an important part in the production of pauperism. A year ago, in the Warren County Poor-house, I found over twenty-eight per cent.

had pauper parents. (See figures above.) I believe the proportion will fairly hold out over the State. Venereal diseases have been quoted as a cause of pauperism, but I am inclined to consider them the result rather than the cause of pauperism.

So far as my inspection is a criterion then, it shows that the system for indoor relief in this State is to care for those becoming dependent, and has no reference to present or future prevention. This seems a vital error. Full statistics should be kept so that accurate knowledge could be had as to habits, cause of dependence and mental condition. As to sanitary condition, without doubt, they are, upon the whole, bad. The only reason that septic diseases are so few, is, no doubt, due to the cleanliness and strict oversight of the Superintendent.

In the city of Newark, the Overseers of the Poor have full charge of out-door relief; they make visits and inquiries before extending relief, give coal, bread tickets, and a little cash. Overseer thinks this much better than orders on groceries and market. The careful oversight of Overseer seems to have materially lessened cost of out-door relief. Economical out-door relief, with some provisions for in-door relief, seems to be in accordance with the most enlightened views on the subject of pauper relief. The buildings for reception of paupers in counties visited by me, are arranged with little reference to the needs of such institutions. The writer favors the cottage or pavilion plan, but the model poor-house is not in these counties.

A question of vital interest is the tramp question. I was agreeably surprised to find a unanimous opinion among officials that something should be done to lessen the amount of crime and pauperism. The matter is worthy of the closest scrutiny by legislators.

With carefully-collected statistics, and with popular opinion aroused, this State could revise its poor laws, and in other ways do much to not only better the condition of the paupers and criminals, but what is far more important just now, do a great deal to lessen these social disabilities. In some of the public institutions improvements could be readily and economically made in sanitary measures, but for the most part the governing boards of these institutions are little acquainted with sanitary laws, and these are made secondary to other considerations.

The many thousands spent for poor relief in this State, should

be lessened in some way. A very large proportion of our pauper population is of foreign birth. Some measures taken by our National Government to limit this class of emigration would no doubt benefit the tax-payer.

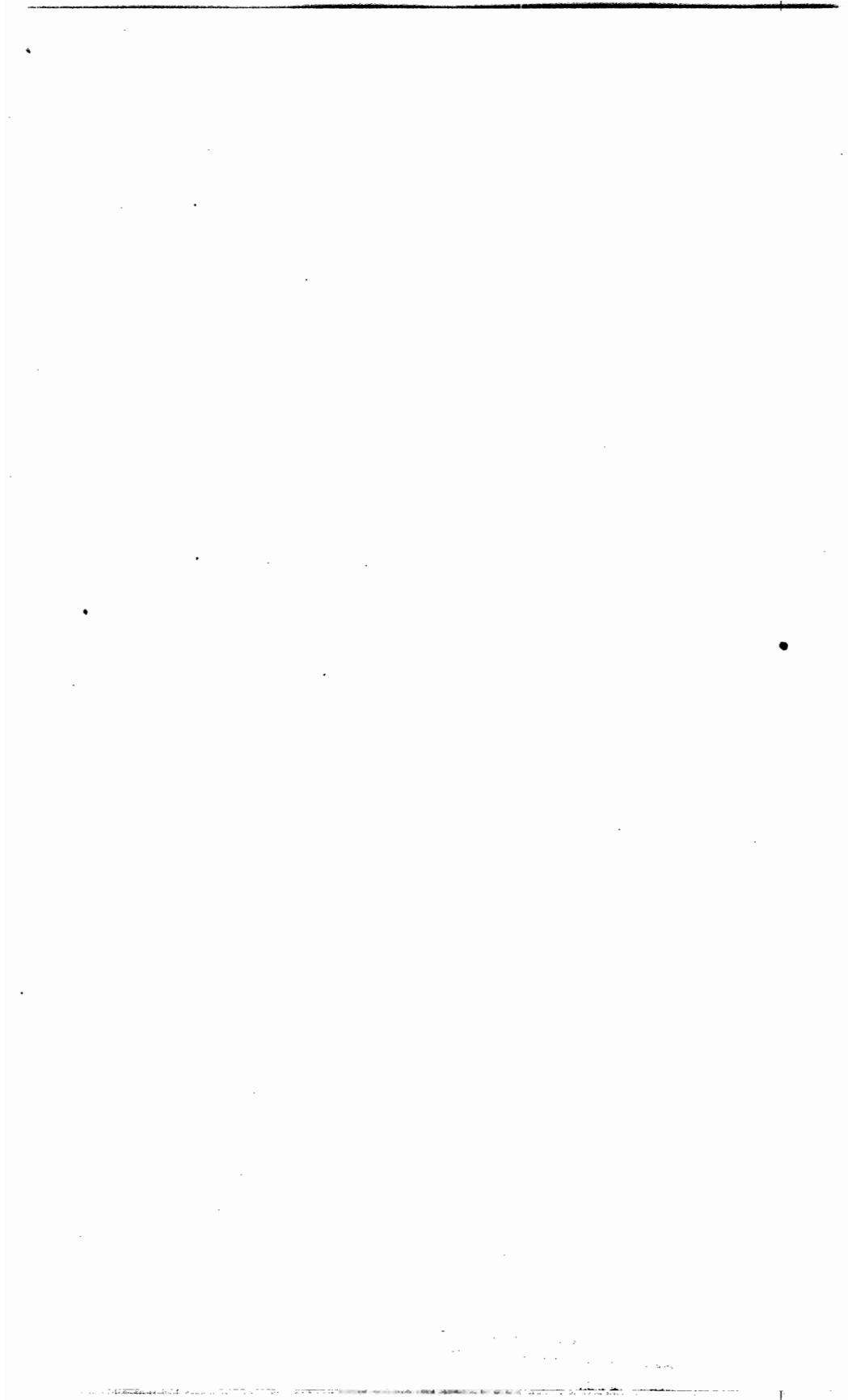
The measures taken to diminish crime and pauperism go together. The care of insane paupers by the counties themselves, instead of caring for them at the State institutions, is attracting considerable attention. I frequently had the lessened cost to Essex county quoted to me and visited the Insane Asylum at Newark. If other counties will provide equally good accommodations and supervision, I should advocate the scattering of our pauper insane, but to take them from the comforts of a well-regulated State Asylum to some of our poor-houses would be actual cruelty. Many forget that the needs of Essex county, with a large city and its populous suburbs, are different than the needs of an agricultural county like Morris and Warren.

What has already been said regarding education, when treating of the criminal classes, will apply as well to the pauper classes. Though our overcrowded poor-houses should be relieved, and many changes made in their sanitary arrangement, as well as in that of the jails, yet I feel assured, the really important thing for public spirited citizens of our State to consider, is more enlightened methods for the care of these classes that their numbers may be diminished, and that those once discharged may not again become criminals or paupers.

In conclusion, I should like to express my thanks to all the officials with whom I have met. I was treated with uniform kindness, and not only allowed to make inspection, but had extended to me valuable assistance in many of them, while closely following existing methods, yet express themselves defective. If, at any time, it should be deemed advisable to gather more accurate statistics regarding this vital subject, none will more heartily concur than these officials, many of whom will be able to give valuable hints.

The jail of Middlesex county was examined by the Secretary of the Board and found in good condition, with a few minor exceptions.

The description of Warren county Alms-house well applies to that of Camden county, which will be noticed in the next report.



# LOCAL HEALTH BOARDS.

WHAT THEY CAN ACCOMPLISH IN THE INTEREST OF PUBLIC  
AND PRIVATE HYGIENE AND SANITATION.

BY H. A. HOPPER, M. D., HACKENSACK.

If the diffusion of knowledge pertaining to private, and through it to public health, be the lever by which communities can be moved in the direction necessary to secure their present and prospective comfort, it becomes plain that the domain of the local health board is not alone the correction of existing evils, but the use of all legitimate means within reach to inculcate the truth that *preventable* diseases cause a large share of the discomforts and sufferings of the human race. As sanitary science progresses and opens up new fields for investigation year after year, new demands are continually being made for the development and utilization of the best methods to be employed, in the application of newly discovered scientific laws, to the daily requirements of domestic and public life. Health Boards are at present the recognized instruments for the emergencies of the situation.

It may be safely said, what the unit is with its fellow in the statement and solution of a mathematical problem, so also is the relation of a properly organized Local Board of Health to the value and efficiency of both State and National Boards, in the collection of data for the intelligent and satisfactory enforcement of all sanitary regulations within their jurisdiction. It is a self-evident proposition, that all circumscribed areas of human habitations have their especial wants, which are best understood by the intelligent observer, whose constant association with a particular population and their habits of social and domestic life, and whose knowledge of topographical and prevalent meteorolog-

ical influences enables him to estimate the especial needs in such localities. Special commissions of investigation must frequently fail of accomplishing the object of their creation, where either ignorance or indifference and often the opposition of prejudice withhold needed information, or interpose obstructions to the pleasant working of public machinery. The value and importance of a Local Health Board cannot be over-estimated if the true spirit and object of its work be appreciated, both in relation to home improvements and the collection and summarizing of correct data for the annual report of the State Board. To render such service in keeping with its importance, the Local Board must at its earliest opportunity, push forward the work of making a sanitary map, by actual survey of the territory within its jurisdiction, defining the topography, including sub-soil advantages for draining, together with notations of changes which have been made, or which should be made, by the filling in and obliteration of water-courses, suggestive of the requirements not yet met, and in all matters to study and define the specific demands of such locality, growing out of the sanitary relations of the population to the soil covered, and to be covered, by their habitations. Social and domestic habits can be pretty effectually learned without intruding, offensively, upon individual rights. Exposures of unsanitary conditions connected with the dwelling are so frequently spontaneous, that they make their own suggestions. A surface house drain reveals itself by projecting its waste beyond the house enclosure, and by its offensiveness calls for the attention of the Health Board. The neglected cesspool and privy vault regale the nostrils, and cry out for relief. Many other tacit exposures of domestic indifference and carelessness, attest the value of corrective supervision. The duty and work of the Local Health Board appears plainly to be first to learn the necessities of the population which dwells within its jurisdiction, and then to devise the most prudent, as well as the best means to meet such necessities; but in the exercise of authority, to make it successful, rather by the force of sanitary education, than by the exhibition of imperious power; always tempering the corrective with something of the "*argumentum ad hominum*," persuading by appeals to selfish impulses, if need be, including the argument for the protection of self and home, that private interests may be made subservient to the public weal.

When recourse must be had to legislative power, in the event of other failures, let the broadest construction and application be made without reserve.

The foregoing treatment of the subject is rather a generalization of its importance than a detail of the practical work which it suggests. For example, the importance of a private system of drainage for every home must be insisted on, and when hesitancy or delay retards the necessary improvements, the local board must point out the necessity and establish a system applicable to individual cases, without regard to special locality. The danger of allowing garbage or wash waste from houses to be thrown carelessly on the surface, or to be conducted into a badly-constructed cesspool, must be met by instruction, or by ordinance compelling the abandonment of the one and the construction of both cesspools and privy vaults with water-tight bottoms and side walls, to avert the danger of well-water pollution; and so to apply a system of pipe ventilation that atmospheric poisoning may be prevented inside of dwellings.

Another subject imperatively within the province of the local board, is the important one of particular supervision of public buildings, both as it relates to the method of conducting sewage matter from such buildings, the mode of heating, and the application of the best-known methods of ventilation to all the apartments of those structures.

In this category must be placed court rooms and jails, when they are within the limits of control of the board. Hotels for the accommodation of boarders, churches and public assembly rooms of any kind, and notably school buildings, which are not to be passed over with an inspection as to general plan, but should include the detail of examining class-rooms, in relation to ventilation, as it may be applied to the requirements of an average number of pupils occupying such rooms during school hours. From the local board should emanate suggestions to principal and teachers for the detection and stamping out of contagious and infectious diseases when they make their appearance in the school. Where vaccination has been neglected, no better opportunity for the discovery can be found than by the roll-call from the teacher's desk. The application of our State laws, as provided for in such cases, becomes a comparatively easy matter by such supervision.

Verbal advice, judiciously given by an authorized committee from the local Board, will accomplish great things by challenging attention to the constant neglect of the plainest, as well as the most intricate laws of public and private health, but in addition to this, recourse should be had to the local press whenever the columns of a newspaper can be employed, to reach a larger number by the discussion of subjects pertaining to the sanitary needs of your people. At stated periods printed circulars should be distributed, containing health ordinances for the guidance of all concerned in the promotion of the best sanitary interests of the community, both general and special.

Appended is a specimen of the plan, indicated in the above consideration, which has been found to work admirably under the direction of the Board of Health of New Barbadoes township, especially in its application to the town of Hackensack, N. J., where, in the period of six months, neighbors who were for a long period of years indifferent to each other's surroundings, have become vigilant advisers for their mutual benefit.

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CIRCULAR OF THE BOARD OF HEALTH OF NEW BARBADOES TOWNSHIP.

At the last session of our Legislature, particular attention was given to the pressing wants of the people of the State, looking forward to a more perfect system of sanitation for both town and country. Laws were enacted for the compulsory organization of a Board of Health in every township in the State.

Under the provisions of the laws alluded to the township of New Barbadoes has organized our Board of Health, and we now appeal to the people of the township for your co-operation in carrying forward a work which is in every way calculated to secure a better and more permanent condition of the public health.

At the outset we are thoroughly impressed with the importance of the truth that a proper education of our people in sanitary matters lies at the foundation of a successful enforcement of that system of individual restraints which is the great factor in making up the sum of community profits from a well-regulated public hygiene.

So many sources of atmospheric and water pollution exist in every community unheeded, that familiarity with their presence begets an indifference to the fact that, every week and month of the year, such sources of danger to health and life are multiplying; and unhappily the force of this truth is often realized only when some devastating pestilence numbers its victims by dozens, and sends distress and mourning into as many households.

As the preventive is always more satisfactory than the remedy, we desire to call your attention to some of the more common and unsuspected causes of bad health, and advise their immediate removal by individual effort, in order that the powers conferred by law may not be required for coercion by the Board of Health :

Outside of dwellings, badly constructed and much neglected cesspools and privy vaults pour out the poisonous gases of organic decomposition to vitiate the atmosphere you breathe in your houses, while through their uncemented bottoms streams of corruption percolate the soil and find the outlet for their polluting matter—held in solution or suspension—in wells which supply families with water for drinking and cooking.

As the season is advancing and summer will soon follow spring with increasing high temperature, when putrefactive decomposition of waste matter is certain to be rapidly increased, it is the part of wisdom to begin at once our efforts for the removal from our houses of every source of such contamination.

We call your attention to some advice given by our State Board of Health in the following paragraph :

“Look to the condition of your house. Begin at the cellar or basement. Have nothing there that can decay or that causes foul odors. If damp, let in air or sunlight; or drain the surroundings if needed. If by cleansing by whitewash, or by repeated airing, there is not agreeable air, speedily use some disinfectants. Look to the kitchen; let all sinks be kept sweet by scrubbing, by hot water poured down every day or by the free use of disinfectants when needed.”

Be sure that the sink is properly trapped and that a ventilating pipe is carried from the waste pipe of the same size, to the top of the building and above it.

Have the dwelling and sleeping rooms well aired every day; shake up the bed clothes freely every morning after sleeping in

them, and air them well by windows widely opened so that free ingress may be given to outside air, in order that organic particles, which would otherwise accumulate and cause atmospheric pollution, may be neutralized and driven out.

In your attention to the out-door arrangement of your home—see to it, first, that the privy vault and cesspool are not in too close proximity to your own or your neighbor's dwelling; second, that it is constructed with masonry, water-tight in both side walls and bottom; that filth accumulations may be thoroughly removed at stated periods—and pollution from such sources of your own and your neighbor's water-supply may be prevented.

Both of the filth receptacles just named should be supplied with ventilation high enough to avoid throwing offensive gases into your own or your neighbor's windows.

In all cases where new vaults are built, the old one must be thoroughly cleaned before being filled with earth. All these conditions will be strictly enforced in the future.

To avoid future complaints to, and attention from the Board of Health, it is suggested that immediately after the present cleansing, tight bottoms be made to all filth receptacles.

Any suggestions needed for sanitary management will be freely given by the Advisory Committee of the Board of Health. H. A. Hopper, A. S. D. Demarest, M. W. Heath.

A list of the best and cheapest disinfectants may be had at any time from the same source.

H. A. HOPPER, M. D.,

*President and Medical Superintendent;*

M. W. HEATH, *Vice President;*

H. H. ZABRISKIE, *Secretary;*

A. S. D. DEMAREST, *Treasurer;*

JOHN SCHMULTS,

Board of Health of New Barbadoes Township.

# SECRETARY'S SUMMARY OF REPORTS

FROM LOCAL BOARDS OF HEALTH, WITH COMMENTS.

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One hundred and eighty-seven formal reports have thus far been received by the State Board from local boards.

Twenty-six more report boards as formed, but they have had occasion to do so little that no special report was rendered. A few townships, understanding the law to be permissive and not compulsory, have failed to organize. It is believed that another year will witness the formation of boards in all townships and towns of the State. While in some there will be need of very little service, it is the right of every citizen to have thus a constituted authority to which to appeal in case of need. Besides the existence of such a board leads its members, as well as others, to be more inquisitive as to matters which concern the public health. This is sure to result in greater intelligence as to the avoidable causes of disease. No one could read the reports received, and some of them from very sparse districts, without recognizing that the subjects of inquiry are many, and that needs may arise for oversight in localities which seemed protected.

The form of schedule sent out was as follows:

## ANNUAL REPORT

Of the Local Board of Health of (city or township).....  
county of.....for the year ending October  
1st, 188

NAMES AND POST OFFICE ADDRESS OF MEMBERS.

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## SCHEDULE OF SUBJECTS FOR REPORT.

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

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.

A.

B.

This order has been carefully adhered to by most of the Boards, with much additional information in some of them as to present condition of health or local evils.

The amount of information returned was far greater than had been anticipated, and if printed in full would be of permanent value to the State.

On some of the subjects collateral to health interests, such as A, B, F, K, L, M, N, Q, etc., we have collected a body of definite information of much value in any statistical inquiry into matters of local conditions, prosperity and local development. On matters relating to the public health, the information is far more extensive, reliable and instructive than any heretofore collected. It is the purpose of the Board so to complete this as to make it accessible to citizens who would closely estimate the material desirability, development and healthfulness of the State.

We desire to make acknowledgements of indebtedness to all these Boards who have so fully and faithfully responded. It is impossible to publish all the material thus furnished. We shall only seek by a few specimen reports and by abstracts bearing on particular subjects to show how important is the full information thus secured.

The reports of Newark and New Brunswick will be given in full as specimens of valuable city reports. A few townships will be selected as models in the same way. From others we can only cull a few sentences, and pass many only because there is no specialty of condition or disease requiring our immediate notice. We ask careful attention to these brief notices, as many of them refer to valuable points in local needs or local experience, and so help all in the study of health matters.

After the full reports of Newark and New Brunswick, the rest will be given in the order of counties.

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## REPORT

OF THE BOARD OF HEALTH OF THE CITY OF NEWARK, NEW JERSEY, TO THE BOARD OF HEALTH OF THE STATE OF NEW JERSEY, FOR THE YEARS 1879 AND 1880, ENDING OCTOBER 1, 1880.

BY CHARLES M. ZEH, M. D.

In compliance with a request of the State Board of Health, the Health Board of the city of Newark, N. J., present the following

### REPORT:

The Board of Health of this city is composed of the Mayor, who is President of the Board, the Health Physician and the members of the Committee on Public Health, of the Common Council.

The members of the city Board of Health for the present year are: William H. F. Fiedler, Mayor, who is their President; Isaac A. Nichols, M. D., Health Physician.

Alderman MARTIN B. PROVOST,  
PIERSON G. DODD,  
JOHN S. CLARK,  
Committee on Public Health.

### A.—LOCATION, POPULATION AND CLIMATE.

The City of Newark is situated on the west bank of the Passaic river, about eight miles from the City of New York, in the county

of Essex. Its northern boundary is the township of Belleville and one of the great flexures of the Passaic; on its west lie the townships of Bloomfield, East Orange, South Orange and Clinton; on the south are the townships of Clinton, Elizabeth City and Newark Bay. The Passaic River and Newark Bay form its eastern boundary.

The population includes nearly all nationalities, and by its easy access to New York City, furnishes pleasant homes for a large number of people who transact business there.

Its climate is mild and temperate, having an average temperature of  $51.75^{\circ}$ —its high range is  $100^{\circ}$ , and its low range, zero. Its rain fall during the year has been 44.6 inches. With a few exceptions it is delightful and healthy. During seasons when easterly winds prevail, catarrhal difficulties are aggravated by the moist salt air, and in the latter part of summer malarial troubles are increased by miasmata emanating from the great salt meadows, which lie between this city and the city of New York. These cover an extent of ten or twelve miles in length, and seven miles in width, with a soil composed, almost wholly, of vegetable matter, at all times saturated and partly covered with fresh water, which undergoes rapid evaporation and decomposition the effect of which is experienced in the upper portion of New York City and Long Island when westerly winds prevail. The recent diking of these meadows, preventing salt water from flowing over them, which would naturally retard fermentation and decomposition, may possibly be charged as the cause of any excess of malaria here, and for twenty miles or more around us, over that of the years preceeding the diking.

#### B—GEOLOGICAL.

The soil of the city is composed of red and yellow loams and sand, alluvium and drift, sandy clays, trap rock, shales and conglomerate red and brown sandstone, from which are quarried large quantities of brown stone, of a superior quality, used here and elsewhere for building purposes.

#### TOPOGRAPHY AND CONTOUR.

In general outline the city is very irregular. Its easterly, northerly, and southeasterly line conforms to that of the Passaic

river and Newark bay. Its longer axis is northwest and southeast. The older settled portion of the city lies about twenty or thirty feet above the sea and river. Thence westerly, quickly attaining an elevation of one hundred to two hundred feet, extending back on this plateau, to Bloomfield, the Oranges and Clinton townships. Its southern, southeastern and southwestern portion is situated on low meadow or flat lands, which are nearly on a level with the bay, and only about twelve feet above the ordinary tides, and during high tide it is partly covered with water. The length of the city is five and one-quarter miles; its width is four and three-quarters miles, and its area about eighteen square miles.

#### C.—WATER-SUPPLY.

Our water-supply is mainly from the Passaic river, a part from driven wells, and some from wells in various parts of the city, and is at times of an inferior quality.

That taken from the river and driven wells, is collected in reservoirs in different parts of the city, brought from the township of Belleville, through large iron pipes.

The admission of about two million gallons of water from the driven wells, into nearly ten million gallons used by the city daily from the reservoirs, has, in a measure, improved its quality, but there are times when its odor and taste are unpleasant; when chemicals and other substances, soluble and insoluble, are observed. Water, so important an element in our subsistence, when not pure, must necessarily prove deleterious to health and life, and unquestionably serves to increase the percentage of mortality.

#### D.—DRAINAGE AND SEWERAGE.

Underlying the more thickly populated, and to some extent, the less thickly settled portions, the city is extensively and fairly well drained by a system of sewers, which aggregate forty-eight miles, built of brick and pipe.

All improved streets, paved or unpaved, have stone gutters, which connect with sewer basins, and the water with that of the sewers, emptied into the river and bay, where the drainage soon becomes neutralized by the salt water of the tides. There are,

however, sections which are not thus favored, particularly the southwestern part of the city, where a creek receives the drainage of about twenty-five hundred acres of land, fifteen hundred of which are in the city of Newark, and one thousand in the township of Clinton. The drainage from Newark terminates by two main sewers, and is discharged into a ditch leading to Bound creek near, and west of the crossing of the Pennsylvania Railroad. This crossing has a culvert with a capacity inadequate to admit the free flow of the creek, when swollen with high tide and heavy falls of water; the drainage thus obstructed, causes a deposit of sewerage upon the low lands in the neighborhood, giving rise to bad odors, and must prove most injurious to the health of those residing in the vicinity.

This unfavorable condition has been presented to the attention of the Board of Health and the city authorities at several different times, who are now considering how best and speedily to remedy the evil, but up the present time, no definite action has been determined upon to secure this much needed relief. While our sewerage is fairly extensive, the sanitary requirements are increasing, and demand a more extended sewerage and more thorough drainage to decrease the list of mortality, which has been observed, especially in epidemics of scarlet fever and diphtheria. In some localities where sewers have not been laid, privy vaults and cesspools are defective in drainage, in consequence of rocky and clay bottoms. There are, in different parts of the city, vacant lots, which from their location and surroundings, are covered with stagnant water, producing complaint and disease, but the Board of Health are unceasing in their efforts to correct this condition, by draining, disinfecting and filling.

#### E.—STREETS AND PUBLIC GROUNDS.

The streets are generally laid out at right angles, broad, and to a large extent shaded by trees. The combined length of graded and paved streets is one hundred and seventy-seven miles—one hundred and thirty-one miles graded only, and forty-six miles paved with cobble stone, block stone, macadamized, Telford and wood. These wooden pavements, now condemned from sanitary considerations, and from want of durability and safety, are giving place to block stone.

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## PUBLIC GROUNDS.

The public grounds are enclosed parks, large and small. Three of them contain from three to five acres; four are much smaller. The larger parks are elegantly shaded, traversed by paved walks, lighted by gas, drained and furnished with seats. One only has a fountain of constantly flowing water.

## F.—HOUSES AND THEIR TENANCY.

In the central portion of the city, included in the fire limits, the buildings are principally of stone and brick. Beyond this limit, they are of stone, brick, wood, &c., generally large, airy and commodious, and well ventilated, supplied with water from the reservoirs and many with drainage, which connects with the general drainage system of sewers, and others with cesspools. Most of the tenement houses are large, comfortable and cleanly, seldom, if ever, overcrowded. Some have modern arrangements for ventilation, but generally doors and windows are the only ventilators. No families live exclusively in cellars. Cleanliness of premises is either voluntary or compulsory.

## G.—MODES OF LIGHTING.

Gas and kerosene are the common means of lighting. Electric lights are being introduced, and one of the public markets is wholly lighted by it; also one theatre and other buildings. All other public buildings and streets are lighted by gas. Two and a half million feet of gas is used for this purpose during the year.

## H.—REFUSE AND EXCRETA.

Refuse which accumulates in the streets is carried out of the city or deposited in designated places within its limits, for filling low places, daily in nearly all, and two or three times a week in the more remote streets, in wagons for that purpose.

The streets are thoroughly and well cleaned at intervals, but the large surface of cobble-stone pavement, irregular and uneven in many places, requires more frequent attention than is given, for the securing of health and comfort. And there can be bu

little doubt, that from the want of more attention in this particular, the malaria of our locality is increased.

The refuse from butcher and meat shops, under constant inspection by intelligent officers, is never allowed to accumulate or become offensive, but is removed in wagons to be utilized. If there should be exceptions to the rule, it is so by criminal negligence of parties who create the refuse.

Excreta is removed from the city in covered tubs or casks or tight box-wagons, when required by individuals, or by order of the health officer upon complaint.

#### I.—MARKETS.

There are two public markets, which are well managed institutions, conspicuous for neatness, good order and system. They are large, convenient and scrupulously clean.

#### J.—DISEASES OF ANIMALS.

The diseases of animals have been through the year, of a mild and ordinary character, till within the month of September, and to this date, an epidemic influenza or epizooty of a contagious character has prevailed. Fortunately recovery is the rule.

Dead animals, whenever reported, are removed at once in closed ambulances, to be utilized, or by scavenger wagons with refuse.

#### K.—SLAUGHTER-HOUSES AND ABATTOIRS.

Slaughter-houses and abattoirs are under the constant observation and control of the meat and health inspectors, who compel cleanliness and inoffensiveness. There are two slaughter-houses within the city.

#### L.—MANUFACTORIES AND TRADES.

This city is essentially a great workshop, and is one of the most extensive manufacturing cities in the Union; it includes nearly every variety of trade known in any civilized country, with artisans and workmen from every nation. The structures are generally supplied with most modern and improved machinery, and arranged for the convenience, health and safety of their occupants. In a city so large, so wealthy and enterprising, all

trades must and have exhibited a most rapid growth, and commerce has assumed large proportions.

#### M.—SCHOOLS AND PUBLIC BUILDINGS.

Our schools are under the management of the Board of Education. The number of teachers in the employ of the Board is two hundred and seventy, of which twenty-six are males and two hundred and forty-four are females. The Board occupies twenty-eight buildings for actual class-room work. The enrollment in the day schools is eighteen thousand five hundred and twenty-three, and the evening, nine hundred and fifty-five; in the normal school, sixty; high school, four hundred and eighty-nine; grammar school, four thousand six hundred; primary schools, twelve thousand seven hundred and sixty; colored schools, two hundred and twenty, and industrial schools, three hundred and ninety-four. The work of teachers is earnest and successful. The school buildings are large, elegant and expensive, intelligently designed for healthfulness, safety of their inmates and convenience for pupils and teachers.

These, and all other public buildings, possess most of the modern improvements that the tests of time and experience have approved, for ventilating, heating, lighting, draining and other necessary sanitary arrangements, and under the constant vigilance of the Health Physician and officers of each of the departments and interested citizens, are becoming more schooled to the necessity of preventing diseases, and increasing the means for promoting health and comfort, safety and convenience.

#### N.—ALMS-HOUSES, HOSPITALS AND CHARITIES.

There are many charitable institutions in the city, one of which, the alms-house, is a large building, situated on the outskirts of the city, from which drainage is easy. It is commodious and under good sanitary arrangements and regulations. No epidemic diseases have occurred during the year. There have been twelve deaths of adult males, four females and six children. The alms-house sick are under the direct care of the alms-house physician. An eye and ear infirmary has been established during the year by enterprising benevolence, and is thus maintained. A corps of capable surgeons is in daily attendance in this in-

stitution, who receive and treat all applicants for services, free. Over three thousand patients have received treatment during the year. The city has no hospital, but contributes the sum of \$5,625 (for beds) annually, in equal amounts to St. Michael's Hospital, (R. C.) which institution is under the care of the Sisters of the Poor; the Hospital of St. Barnabas, (Episcopalian) and the German Hospital. There is also an Alms-house Hospital, which is used as a pest-house, when circumstances require.

A dispensary is open daily with a corps of physicians in attendance upon those who are not able and not required to pay for medical services. Besides hospitals, dispensary and eye and ear infirmary, the benevolent institutions include The Female Charitable Society, Orphan Asylum, Foster Home, Home of the Friendless, Women's Christian Association or Home for Working Women, Boys' Lodging House and Children's Aid Society; nine temperance benevolent societies; Roman Catholic; Society for the Relief of the Poor, three Orphan Asylums, Hospital and Industrial School, Schools of Brothers and Sisters of Charity, Home for the Aged, House of the Good Shepherd for the wayward. Two police stations afford temporary relief to wayfarers, and during the past year has given lodgings to 20,432, of which number 19,775 were males and 657 females. Eight city physicians attend at their homes, all the sick and injured poor who apply to them.

#### BATHING HOUSES.

There are two bathing houses (public.) The bathers number this year 112,164 males, 16,608 females. Total, 147,762.

#### O.—POLICE AND PRISONS.

Eighty-two miles of streets are under police supervision. The police force at present is one hundred and fifty men, uniformed, drilled and disciplined, daily in attendance at each of the two police stations, day and night, under the direction of sergeants, captains and chief of police. In the station-houses are lodging rooms for policemen, wayfarers, offenders of the peace and prison cells for criminals, for both males and females. In these buildings are running water, wash basins and water-closets, as

well as other necessary conveniences, well appointed, duly inspected and fairly clean.

P.—FIRE GUARDS.

The Fire Department consists of a Chief Engineer, four Assistant Engineers, one Superintendent of Fire Alarm Telegraphers, and an acting force of one hundred and ninety-eight men, of which thirty-eight men are permanent; ten steam fire engines, ten hose carriages, two hook and ladder trucks, one supply wagon and one gig, thirty-nine strong and capable horses, a fire alarm circuit of sixty miles of wire, ninety-two fire alarm boxes, one thousand one hundred hydrants, and fifty-two public cisterns. At all fires is a salvage corps, maintained by the Insurance Underwriters' Association. The Fire Department will compare favorably with the best in this or any other country in organization, discipline, appliances, bravery and efficiency.

Q.—CEMETERIES AND BURIALS.

Within the city limits are three cemeteries and several burial grounds. The cemeteries are laid out and arranged with great care and expense, beautifully shaded, traversed with labyrinths of avenues and walks, ornamented with flowers and shrubs, and containing reception vaults; under the care of superintendents and keepers, and these under the control of the city health officers and common council.

There are also burial grounds which are in disuse, but well preserved and enclosed, and a city or public burial ground, (Poters field) where burials are free.

R.—PUBLIC HEALTH LAWS AND REGULATIONS.

The laws and regulations of public health here are necessarily extensive, an epitome of these may be obtained from the powers and duties of the Board of Health, and of officers who constitute that Board, whose meetings are held at such times and places as they may deem proper to provide for the protection and maintenance of the health of the city, by compelling cleanliness, preventing and abating and removal of nuisances, by sending non-residents with infectious diseases to the pest-house or hospital.

The removal of residents to the hospital upon recommendation, the removal of all or any residents to the pest-house who have infectious diseases, upon the written certificate of two physicians and of the Health physician, declaring the removal necessary for the preservation of the public health, the removal of disinfected goods when suspected of infection.

The purchase of medicines and remedies under the direction of the health physician, who also has control over the crews and passengers of vessels and crafts suspected of having infectious diseases on board, entering the city except by permission under penalty.

By causing to be displayed conspicuously upon houses where small-pox and other infectious diseases exist, signs, which shall not be removed without permission, under penalty.

The providing of suitable nurses for pest-houses, and by preventing any person from throwing offensive or unwholesome substances on the streets, ordering cesspools to be built and kept in order, sinks cleaned at night in an inoffensive manner.

Giving permission to clean sinks or privies by day, by certain processes, and by appointing sub-inspectors of health, and meat inspectors. These inspectors are under control of the health physician and Board of Health who hold their regular meetings monthly, and preceding the meeting of common council.

#### S.—REGISTRATION AND VITAL STATISTICS.

Records are required from clergymen, of marriages, and from physicians of births and death, at stated intervals, to be sent to the City Clerk. The number of people in this city, according to the last census returns just made, is 137,163; of these 66,407 are males, and 70,756 are females; 96,841 are natives, 40,322 are foreigners; 133,874 are whites, 3,308 are colored (blacks and mulattoes); 10 are Chinese and 4 are Indians. The number of children between five and eighteen years of age is 41,935. The number of births during the year was 3,693. The number of deaths 2,851, and the number of marriages, 1,225.

#### U.—SANITARY EXPENSES.

The appropriation for the present year to the Board of Health is \$9,000.

## V.—HEATING.

Nearly all the public buildings and many private dwellings are heated by steam, others by furnaces, but the greater number by stoves; the fuel is coal.

## ITEM.

It will be observed that the list of mortality in this city, from October 1st, 1879, to October 1st, 1880, is 2,851 which number 200 includes still-born, and many from the three hospitals, county insane asylum, county jail and soldiers' home, who were non-residents. Deducting these, our rate of mortality which is now 20.8 per 1000, would be somewhat decreased. In presenting this first report of the City Board of Health to the State Board, we have endeavored to give a fair and just report, so far as observation and limited data could aid us.

We regret that the health physician, who has filled this position, ably and well, for many years, could not have given to your board, the result of his intelligent observations and experience, acquired from unceasing and untiring efforts, moral and physical, to enhance and improve our sanitary condition. His seriously impaired health has left the acting physician wholly dependent upon other resources, which necessarily render these papers less complete, and less perfect than a report from his hands.

Respectfully submitted,

C. M. ZEH,  
Acting Health Physician.

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ANNUAL REPORT

OF THE BOARD OF HEALTH OF THE CITY OF NEW BRUNSWICK.

BY H. R. BALDWIN, M. D.

NEW BRUNSWICK, N. J., October 1, 1880.

*To the Honorable, the Common Council of the City of New Brunswick:*

GENTLEMEN: The act entitled "an act concerning the protection of the public health and the record of vital facts and statistics relating thereto," makes it the duty of the Board of Health

of the City of New Brunswick to submit to your honorable body, on or about the first of October of each year, an annual report of the condition of the public health in our city, with other facts of interest in that connection.

The present Board of Health was organized under the provisions of the said act, on May 8, 1880. The gentlemen composing the Board, nominated by the Mayor and approved by Common Council, are Prof. D. T. Reiley, Mayor of the city, Drs. Henry R. Baldwin and Nicholas Williamson. *Ex-officio* members: Edward Tindell, Recorder of Vital Statistics, and Dr. Staats V. D. Clark, City Physician. The officers elected by the Board were D. T. Reiley, President; Edward Tindell, Secretary; S. V. D. Clark, Treasurer; Edward A. Reiley, Inspector.

Since the date of organization, stated meetings have been held weekly and semi-monthly, and considerable work has already been accomplished through the active agency of the Health Inspector, in regard to all forms of nuisance and matters deemed detrimental to public health. The Board was compelled to plan its work with some care. It was necessary, at first, to understand the general provisions of the act referred to, as well as of the new ordinance for the prevention and correction of nuisances, etc., approved September 16, 1879. Committees were appointed to hold conferences with the Commissioners of streets and sewers and the City Attorney, the object being to define the relative duties of the two Boards. By adopting this course, there has been no conflict of authority, but unity of action in the important work of guarding the public health. The members of the Board have cheerfully given their time and attention to a careful investigation of all matters of complaint, unpleasant as the nature of many of these complaints have been. This work, as your honorable body understands, is gratuitous, no member of the Board receiving any compensation whatever. As there was no appropriation voted by the people to prosecute this work, although five hundred dollars was recommended for its accomplishment, it was necessary to ask your honorable body to make some provision for the pay of the Health Inspector, (an office created by the law, above referred to,) and a prompt compliance on your part with the request enabled the Board to go on with its work.

We do not deem it necessary to specify the various nuisances

that have been abated during the past summer. A record of all forms of inspection and complaint has been carefully preserved by the Inspector, and all important reports, papers, etc., have been filed by the Secretary for convenient reference. Whenever it has been necessary the Board has directed the application of legal force, under the direction of the city attorney. The complaints, fortunately, in but one or two instances, only being prosecuted under the provisions of the ordinance of September, 1879. In this connection we annex the number of inspections made, permits issued, and complaints investigated, from May 18 to September 30, 1880, inclusive, as follows:

Complaints.....	91
Inspections.....	278
Permits.....	237

Care has been exercised to conduct this work so as to avoid, as far as possible, unpleasant feelings between neighbors, and to exercise compulsory force only when absolutely necessary.

At a meeting of the Board held on May 24, the Health Inspector was instructed to inspect the First and Second Wards, with special reference to the condition of drains and the facilities for the escape of waste-water and sewage. A report was made showing the result of this inspection, which was approved by the Board. A committee was subsequently appointed to make a further examination of these water-courses, particularly what is known as "Fisher's Brook." An important paper on "Disinfectants, and How to Use Them," was also prepared by the Inspector and approved by the Board; also a paper on the "Condition of the Gutters of this City," by Dr. Clark.

The above reports or papers were furnished by the Secretary to the newspapers of the city for publication, and the proprietors of these journals, recognizing the importance of intelligent suggestions touching upon sanitary precautions or recommendations, cheerfully made room in their columns for these papers. These suggestions were thus brought to the homes of our people and made of practical benefit to them.

A record of vital statistics, as reported to the Secretary of State, by the City Clerk, for five months, or from April 15 to September 15, inclusive, we here annex, as follows:

Number of marriages, 52; number of births, 173; number of

deaths, all causes, 197; number of deaths of children, under five years, 96; number of still births, 19.

In reference to the general health it becomes our duty to report any serious deterioration thereof or hazard thereto; and in accordance with this enactment we beg to report as follows:

We are happy to say that there has been no more serious deterioration of the general health than has heretofore existed, save with two exceptions. The usual amount of infantile disease has existed, but not in malignant form. Still during the early summer the extreme heat was quite inimical to the lives of infants. Contagious and infectious diseases have also visited us, but not in such form as to be beyond control. One of the above exceptions has reference to the unusual prevalence of malarious diseases, which have been present in a degree unknown in this community during the last quarter of a century. Frequent cases of intermittent and some remittent fevers have called for the timely aid of the physicians. This seems to be largely due to the character of the last winter, and the absence of severe frosts, and somewhat also to the subsequent drought. The soil being saturated with vegetable matter in condition for decay, and the summer sun liberating the emanations, which have produced their characteristic effects. It may also be stated that the recent raising of the dam, at the site of the water-works, and the consequent flooding of new meadow land, may have so impregnated the drinking water with vegetable matter as to afford a suspicion that some of the intermittent may have arisen from this source.

The second instance of deterioration of the public health may be noticed as the prevalence of a number of cases of typhoid fever. As this is classed among the preventable diseases, it should exist only in the least possible degree; and whilst in the absence of positive statistics, it is unsafe to state positively the amount of typhoid prevailing in our midst; yet from inquiries directed to several physicians, whose practice covers a considerable portion of the town, it seems that we have more cases of this disease than belong to a city of good sanitary condition; but it is safe to assert that a general absence of the conditions of salubrity must exert a powerful influence in producing the disease, such as water taken from impure wells, bad sewage, and the foul condition of the gutters, which latter exists to an outra-

geous extent, and in the absence of legislation empowering the Board of Health to act promptly, must necessarily continue. Regarding any hazard to the public health, we are happy to say that an abundant supply of water, in general of wholesome character, (with the exception of the hint above given, and which is only temporary) has afforded a great protection ; yet there are some portions of the town in which the water is drawn from wells, which are liable to all the deterioration arising from soakage of the soil with detrimental substances. We cannot pass by another large danger to the general health of the city, from our imperfect system of sewage which now exists, viz : the emptying of our sewers, as well as all the surface drainage of the streets into a slack water, (the Delaware and Raritan Canal). It will be readily seen that the deposit of animal and vegetable matter, the refuse of a large town, must contain elements most prejudicial to health. When, therefore, this basin is exposed to the sun as is occasionally the case, with its bottom covered with reeking filth and human excreta, can we conceive a more unwholesome state of affairs. It is not asserted that the germ or poison of typhoid is thus propagated, still there can be no doubt that the influence upon the general health is such as to favor the development of whatever specific causes of disease may either exist or arise.

#### SUGGESTIONS.

The Board of Health suggests the following amendments to the present ordinance :

To Sec. 3. And anything whatsoever that shall be deemed by the Board of Health prejudicial to the health of the community.

To Sec. 9. That no animals be buried within the city limits without the permit of the Board of Health.

To Sec. 10. That the Board of Health at any time may require the owner of any cesspool and privy-vault to cement it in such a manner as to make it water-tight, and that all cesspools and privy-vaults hereafter constructed to be under the same authority.

To Sec. 18. The carrying on of all occupations should be under the control of the Board of Health so far as they may judge them to be nuisances or injurious to health, and permits must be obtained from the Board of Health for carrying on such business.

The right of the Board of Health, or their officers, to enter premises, has been omitted from the new ordinances and should be inserted.

Persons should be required to use disinfectants upon their premises according to the judgment of the Board of Health. Quicker action should be possible than a three days' notice, as in case of an epidemic or a recently created nuisance. The Board of Health should have the fullest power to vacate, disinfect and cleanse premises, or cause them to be so vacated, cleansed and disinfected.

Houses occupied by two or more families (tenement houses) to be furnished by the owners with proper means for carrying away waste-water, slops, etc., to be constructed in accordance with the directions of the Board of Health.

Whenever sewers exist, the Board of Health should have the power when they deem necessary of compelling connections to be made therewith.

The following points can only be reached by application to the Legislature:

1st. Greater power and clearer procedure of the Board of Health when nuisances are within the domain of the commissioners of streets and sewers.

2d. Physicians should be obliged by law to furnish reports periodically of contagious and infectious diseases to the Board of Health.

Respectfully submitted,  
D. T. REILEY,  
HENRY R. BALDWIN,  
EDWARD TINDELL,  
Committee.

Attest: EDWARD TINDELL, Secretary.

Accepted and ordered filed by Common Council, October 4,  
1880.

EDWARD TINDELL, City Clerk.

## ATLANTIC COUNTY.

ABSECON. - - *Report from E. H. MADDEN, Absecon.*

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ATLANTIC CITY. *Report from THOMAS MCGUIRE, Atlantic City.*

C.—The water-supply at present is from cisterns. The carelessness of many of the old inhabitants in not attending to their cisterns properly is the cause, no doubt, of some sickness. Others not having cisterns, use the surface water, and, I think, in the fall of the year this causes malaria. I am in hopes before another year we shall draw our supply of water from the mainland or artesian wells.

V.—One of the most important functions of the Board is that concerned in the investigation and suppression of nuisances. There are a number of cases reported, and some are so complicated that they involve careful and patient investigation and assiduous care in their management. A great deal of unnecessary, as well as unpleasant labor, is forced upon the Board by the refusal of persons, after proper notification, to abate nuisances for which they were responsible, thereby obliging the Board, in furtherance of the public weal, to authorize the work to be done, and institute proceedings at law for the recovery of the expense. We feel that there is a straight line of duty to pursue, and as far as we know the right, we mean to pursue it.

The importance of a sewer system based upon a regular established grade is insisted on. This illustrates how important it is that every city should have a complete sanitary sewerage and map as preliminary to all drainage, sewerage, or grading plans.

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BUENA VISTA, - - *Report from JOHN FAUX, Vineland.*

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EGG HARBOR TP., - - *Report from L. CONOVER, Absecon.*

The only prevalent disease reported is that of chicken cholera. It may be said here that under the head of diseases of animals, many of the reports from various sections of the State allude to the disease and the serious loss to farmers thereby. A new

interest attaches to it from the fact that Touissant and Pasteur seem recently to have shown that the disease is owing to an oval-shaped micro-organism. Pasteur has taken this and cultivated it in other media, such as decoction of muscle. The germs from a decided case are made to multiply in a muscle-decoction or culture fluid. If this fluid is used at once it produces a severe form of the disease. But if allowed to stand for months and then used, it produces a very mild form of the disease, which protects the fowl from another attack, just as vaccination protects from small-pox. Pasteur is believed by many to have discovered a method not only of preventing the virulence of fowl cholera, but also that of hog cholera, pleuro-pneumonia, and many other diseases of animals. The subject is of the greatest interest, not only pecuniarily, but in its bearing on human diseases.

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GALLOWAY TP., - *Report from* GEORGE W. ALLEN, *Oceanville.*

The report notices pulmonary diseases as affected or produced by the heavy sea air.

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HAMILTON TP. *Report by* D. B. INGERSOLL, M. D., *May's Landing.*

The report presents answers to all the schedules, and is emphatic upon the increasing evils arising from the use of tobacco as an "injury to the health of community and especially to the youth and children of our land." The increase of this use by those young in years is certainly a subject worthy of the attention of our citizens. Some cases of typhoid-malarial fever, a disease unusual in that section, are noticed.

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HAMMONTON TP. - *Report by* M. L. JACKSON, *Hammonton.*

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MULLICA TP. - - *Report by* W. S. MILLER, *Pleasant Mills.*

The report properly protests against the careless deposit of the garbage of Atlantic City, brought to it, under contract, on cars, which themselves become offensive and hazardous to the public health. This township was one of those in which, at first, a Board of Health was felt to be unnecessary, but soon had an

illustration of how important it is to have some health authority in every district.

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WEYMOUTH TP. - *Report from ANTHONY J. PARKER, Tuckahoe.*

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BERGEN COUNTY.

LODI TP. - *Report from JOHN VANBASSUM, Coroner.*

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MIDLAND TP. - *Report from JOHN G. ZABRISRIE, Areola.*

The report notices nothing unusual, save the uncommon prevalence of malaria.

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NEW BARBADOES TP. *Report from H. H. ZABRISKIE, Hackensack.*

The prevalence of malaria is noticed. We quote from the close of the report as follows:

"The operations of our Health Board since its existence, have been satisfactory in good results, by awakening the attention of our people to the existence of unsanitary conditions in their midst; many of which have been radically changed.

"If our Legislature will make more definite the manner of prosecution for delinquencies in regard to sanitary observances together with a much needed provision for the appropriation of pecuniary means by the township committee, for securing needed reforms, we have before us, through the increasing sanitary knowledge of our population, the prospect of good work soon to be reported, for the whole field of our supervision."

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PALISADE. - *Report from PETER BENDER, Schraalenburgh.*

The report refers to malaria as common, although not so severe as the previous summer. Bronchial and lung troubles also seem on the increase, as is generally the case where there is imperfect drainage and accumulations of vegetable matter.

140 REPORT OF THE BOARD OF HEALTH.

RIDGEWOOD, - - - *Report from I. A. MARINUS, Ridgewood.*

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SADDLE RIVER, - - - *Report from W. H. GILL, Ridgewood.*

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UNION, - - - *Report from G. R. ALYEA, Rutherford.*

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BURLINGTON COUNTY.

BEVERLY CITY, - *Report from ELIAS LONGSTREET, Beverly.*

The Board has inspected the cellars, wells, privies and drains of a large part of the town, and requested citizens to report all nuisances on public or private grounds.

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BORDENTOWN TP., *Report from LUCIEN HUNT, Bordentown.*

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BORDENTOWN CITY, *Report from DANIEL G. WALKER, Bordentown.*

The town is defective in its drainage and sewerage.

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BURLINGTON CITY.

The report shows a well organized Board, but owing to the lateness of its organization, full items could not be furnished.

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CHESTER TP., - - - *Report from I. C. STROUD, M. D.*

There has been intermittent fever of an unusually severe type. A fever would set in and last for forty hours, and the patient would be very delirious \* \* We have a low, flat stream of water, very sluggish in its motion, and an abundance of weeds and grass all along the stream for seven or eight miles, to which has been attributed the great amount of fevers in our neighborhood.

CHESTERFIELD TP., - *Report from CHAS. D. LIPPINCOTT, Crosswicks.*

CINNAMINSON TP., - *Report from I. D. JARNEY, M. D., Cinnaminson.*

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EASTAMPTON TP., - *Report from WM. G. LIPPINCOTT, Mt. Holly.*

Some malaria this year, and a severe type of diphtheria.

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LITTLE EGG HARBOR, - *Report from T. T. PRICE, M. D., Tuckerton.*

The report speaks of the uniform health of the township: "Its mild, marine climate renders it a favorable abode for consumptives. We have no malaria."

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LUMBERTON, - - *Report from ISAAC FENMORE, Lumberton.*

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MANSFIELD, - - *Report from AMOS BLAKE, Columbus.*

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NEW HANOVER, - *Report from GEORGE C. DAVIS, Wrightstown.*

"There is no system of drainage or sewerage other than by natural means, or what may be built and used by private parties as they may individually think necessary, refuse and excreta being disposed of as is customary among farmers. I would here just mention to the Board the great neglect of farmers owning marshy and low lands, in not draining them. Almost every farm in the township has several acres of that kind of land, which could be converted into good land for pasturage, worth more, acre for acre, than any on their farm, besides making their plantations more healthy. In fact, I believe these low, marshy places, running up, as they do in many instances, back of the dwellings of those that live in them, are the cause of so many diseases. The water becomes stagnant and polluted with all the foul gases of the air, therefore creating the very germ for malaria, &c. I would here call the attention of your honorable Board to the necessity of having a uniform system of drainage throughout the State, both for the interest of the farmer and the welfare of humanity in general. I would here suggest to your honorable Board that it appeal to the Legislature, at its coming

session, to make a provision in some way to encourage a system of thorough drainage throughout the State."

"Some of our school-houses are badly ventilated, being built in olden times, when people built school-houses to correspond with their out-buildings on the farm, not caring for the health and comfort of their children any more than they did for their swine, crowding their children together in low, cramped-up buildings, inhaling the same air over and over again, until sickness came upon them, to be taken home to be physiced up, to go through the same process again."

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NORTHAMPTON, *Report from F. ASHURST, M. D., Mount Holly.*

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PEMBERTON, - *Report from WM. P. MELCHER, Pemberton.*

There are no other public buildings except the Burlington County Poor-house, situated two and a half miles east of the borough of Pemberton. This institution was founded in the year 1800. The farm comprises six hundred acres, of which four hundred and thirty is tillable land, the balance brush and woodland. The institution comfortably accommodates three hundred and twenty-five inmates. The number at present is two hundred and seventy, females being slightly in the majority. Number colored, forty. In the insane department there are: males, twenty-three; females, forty-five. Number discharged, improved, during the last six years was twenty-nine; males eight, females, twenty-one. Of this number (29) eleven (two males and nine females) came from the State asylum. Average number of inmates for year ending May 12th, 1880, three hundred and fifteen; number of deaths, twenty-seven; births, seventeen.

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RANDOLPH TP., - *Report from CHAS. T. ALLEN, Lower Bank.*

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SOUTHAMPTON TP., - *Report from J. H. BROWN, Vincentown.*

The only thing that we are bothered with as a prevailing disease is the ague.

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WASHINGTON TP., *Report from CHAS P. NICHOLS, Green Bank.*

## CAMDEN COUNTY.

CAMDEN, - - - - - *Report from* ALEX. J. MILLIETTE, *Camden.*

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CENTRE TP. - - - - - EZRA C. BELL, *Mt. Ephraim.*

There have been some cases of malarial fever this year.

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DELAWARE TP. - - - - - ABEL HILLMAN, *Haddonfield.*

The prompt action of this Board, in reference to a case of small-pox which occurred in a laborers' boarding house, no doubt prevented the extension of the disease.

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GLOUCESTER CITY. - - - - - ALFRED HILLMAN, *Haddonfield.*

This Board has issued every precaution they thought necessary, looking to the city's welfare. Communications from the City Physician, with reference to nuisances and of parties having them, having been received, their places have been visited by the Board and the evil abated. There were one thousand (1,000) circulars printed and distributed throughout the city, calling the attention of citizens to the uncleanliness of yards and other places.

The Camden county Alms-house contains one hundred and fifty-five patients, and a new hospital has been erected during 1879, having a capacity for forty beds, and will probably be opened for the reception of indigent patients during the year. On the same county premises, there has recently been built an asylum for the insane, with accommodation for seventy-five patients. Present number, fifty-eight.

The Board made a careful inspection of these two institutions, and found the sanitary condition good, except the ventilation and sewerage of alms-house, which are sadly defective. The asylum was found perfect in every respect, except [a proper ventilation of water-closets, these being inefficient to convey off the various odors emanating from them. The local Board of

Health respectfully refer the same to State Board of Health for their investigation.

The general health of these two institutions has been impaired by the prevalence of malarial fevers, which are endemic to the locality, and cannot be prevented only by large expenditure or removal of the buildings from their present sites, which are located on the south side of a drained meadow, receiving all the decayed vegetable matters for several miles up the stream. Their drinking water is obtained from a pond covered, during the warm season, with algae, and when carried to the respective buildings contains the deposit to a visible extent. No epidemic diseases have prevailed and the inmates have been thoroughly vaccinated. All our school trustees have, within the knowledge of the Board, complied with the requirement of the law in having all the children in the respective districts vaccinated.

As a supplement to this report, permit us to refer briefly to a circumstance by which a timely precaution and investigation has averted an outbreak of typhoid or typho-malarial fever. At the County Insane Asylum a well was dug in July, eighteen feet deep, outside of main building but inside of a rear annex, in close proximity to a main sewer pipe; the water, after a few days, became intolerably offensive to taste and smell, so that it was advised by the attending physician to abandon it and close it securely. Various theories originated in reference to the impaired quality of water from this well; some attributed its offensiveness due to organic matter from the old pauper graveyard, upon which the building was erected in 1879, others to a leakage in the main sewer pipe, which had either accidentally been struck in digging the well, or from fracture of pipe, caused by settling of foundation walls of the building. The latter supposition we regard as most probable, and a careful analysis of the water, made by an expert chemist, reveals its constituents as phosphates, sulphrates, and a large per cent. of organic matter.

The officers of institution propose having sewer pipe carefully examined. Signed

R. B. STEVENSON, *Chairman.*

E. J. COLES, *Secretary.*

J. W. MCCOLLOUGH, M. D.,  
*Township Physician.*

Dr. McCullough also furnishes the following account of a number of severe cases of sickness that occurred in Gloucester and Centre townships.

BLACKWOODTOWN, N. J., September 29, 1880.

DEAR SIR: Excuse delay in complying with your request, in contributing to you the desired information in reference to a sickness which prevailed in this locality. The cases occurred in the townships of Centre and Gloucester, which are situated five to ten miles southeast of Camden city, bounded west by Timber creek, (a tide-water creek,) flowing into the Delaware. The inclosed map, hastily drawn, for your better understanding of the situation, will also give you a correct idea of the geographical limits of the fever.

I have a record of thirteen cases, personally treated, and as many more occurring in the same locality, and treated by my colleague, Dr. H. E. Brannin, also Doctors Shivers and Quint; total, thirty cases. The first cases occurred about the first of August, 1879, and obtained the greatest prevalence in September, with a few cases in October, and all ceased in November. The area of county infected was two miles in extent, and as near as I am able to estimate, one person in six and two-thirds of population contracted the fever, and the death rate was nearly nineteen per cent. The deaths in my practice, from the so-called typho-malarial fever, were two, and total six in the practice of all the attending physicians.

The incipient stage was marked with the usual premonitory symptoms of languor, mental depression, feeling of coldness down the back and persistent headache, with succeeding febrile symptoms, furred tongue, frequent pulse, epigastric tenderness, and urine scanty and high colored; the diurnal remissions occurring in the morning, and exacerbations taking place towards evening. This condition remained for an indefinite period, until the remission became less noticeable and until the thermometer failed to detect any but a steady and unvaried course of fever of a typhoid character. The principle features were a pulse varying from one hundred and twenty to one hundred and fifty, temperature one hundred and two to one hundred and four, dry, red, and brown tongue, generally a bronchial complication, tympanitis, and often profuse diarrhœa, slightly hemor-

rhagic, delirium relapsing into stupor, and the cases terminated before twenty-first day, in death or a tedious convalescence. The treatment pursued was the alkaloids of cinchona, first, and alteratives, and after assuming the typhoid character we abandoned quinia and substituted the acids with stimulants, beef tea, milk, &c., with turpentine and bromidis and opium, to meet local indications. These cases occurred in a malarial locality, along the east side of Timber creek, where intermittents every year prevailed and afflicted the old residents all their lives.

It was the frequent observation of watermen, who followed the creeks, and the residents, in close proximity to the same stream, that the tides were lower last season than any previous period in their recollection, which would account for the greater prevalence of malaria; but this theory is not well sustained, and, in my opinion, there was less intermittent in 1879 than in the present year 1880.

To properly and effectually solve the real origin of the typhoid element, which was one of the conspicuous features, we must search for the principal cause, viz: The use of material which had been hauled from Philadelphia, and extensively employed by farmers and truckers on their lands, and from deposits on the various landings on the creek. These fertilizing manures were ill-smelling and offensive at considerable distances, and consisted of street dirt, blood from abattoirs, and soap fat, &c., from Philadelphia. The majority of cases occurred in the vicinity of a putrid heap of manure, and all fatal cases, with one exception were in the same locality as the manure pile.

A farmer who dealt extensively in this latter material lost a son, and his two daughters were simultaneously seized and prostrated with the same fever, recovering, finally, after a tedious convalescence. Another farmer, his nearest neighbor, quarter of a mile distant, was stricken, afterwards a daughter, both of whom died. Directly across the road, a young married lady was prostrated and died; many others, at close distances from the first outbreak, were taken. It has been suggested that impure water might have been found at the door of these families, and the water might have developed, by analysis, some organic matter, as hog pens and barn yards were sufficiently near three places, where the fever occurred, to give a semblance of truth to this

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theory; but these families had been drinking water from the same wells for many years and the water was apparently healthy in quality. I cannot share in the opinion that this was the chief cause. There have been no cases of fever of a typhoid grade in this locality the present season. The inhabitants are drinking the same water and throw their deposits of house on the soil near the house. No more of these offensive manures have been used in the neighborhood since 1879, and since we have had no outbreak of fevers.

HADDON TP., - - - J. STOKES COLES, *Haddonfield*.

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STOCKTON TP., - PHILIP W. BEALE, M. D., *Cramer's Hill*.

Three cases of small-pox which occurred were promptly attended to, and houses fumigated and vaccination performed. There was no further spread.

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#### CAPE MAY COUNTY.

CAPE MAY CITY, - - - ELDRIDGE JOHNSON, *Cape May*.

The Board has several times abated nuisances. The following is a part of their ordinance and their form of notice:

SEC. 2. *And be it further ordained and enacted*, That the Board of Health shall have power, and it shall be their duty, to make and by order direct to be made, through the Mayor, by the Marshal or any police officer, diligent inquiry with respect to all nuisances, of every description, which are or may be injurious to the public health, and to abate the same in any way or manner they may deem expedient. Second—to stop, detain, examine, and by order to direct to be stopped, detained and examined for the purpose of preventing the entrance of any pestilence or contagious or infectious disease in the city, any person coming from any place infected or believed to be infected with such disease, and to prevent such person from coming into the city. Third—to remove from the city or cause to be disinfected or destroyed any furniture, wearing apparel, goods, wares, merchandise, diseased animals or other property of any kind landed by railroad or

steamboat or other conveyances, or stored in the city, which shall be suspected of being or sworn to be tainted or infected with pestilence, or which shall be likely to pass into such state as to generate or propagate disease.

SEC. 3. *And be it further ordained and enacted,* That every person who shall be served with a copy of any order made by the Board of Health, under the powers conferred by this ordinance, and shall neglect or refuse to obey, or comply with the same, shall forfeit and pay, upon due proof before the Mayor or Alderman, a fine of twenty dollars for every offence, and stand committed until fine and costs are paid.

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LOWER TOWNSHIP, - - - CALEB WOOLSTON, *Fishing Creek.*

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CAPE MAY POINT, - - - D. C. GODFREY, *Cape May Point.*

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CUMBERLAND COUNTY.

BRIDGETON, - - - DANIEL B. GINENBACK, *Bridgeton.*

The report furnishes particulars, valuable for future reference, as do many others from which no special extracts are made.

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DEERFIELD, - - - JOHN W. AVIS, *Deerfield.*

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HOPEWELL, - - - CHAS. H. DARE, M. D., *Shiloh.*

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LANDIS, - - - WILLIAM ROBERTS.

A full report of all details as to the township.

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MAURICE RIVER, - - - ISAIAH LORD, *Heislerville.*

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STOE CREEK, - - - EPHRAIM MULFORD, *Roadstown.*  
 Millville and Downe report Boards of Health.

## ESSEX COUNTY.

BELLEVILLE, - - - D. M. SKINNER, M. D., *Belleville*.

The report notices improvements being made in the condition of streets and in drainage; the good arrangement for preserving life and property in case of fire, and the need of improvement in one of the school buildings.

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BLOOMFIELD, - - - JOSEPH K. OAKES, *Bloomfield*.

U.—We have spent sixty dollars the last six months, the most of which was expended in ditching a piece of ground (about six acres) near the centre of the town. The sewerage from neighboring houses was deposited on it. By making this ditch, we get rid of this sewerage in a great measure, and have made the land through which it passes comparatively dry. We think it will be the means of increasing the health of that part of the town. We expended ten dollars in another part of the town, to cut a ditch so as to drain a stagnant pool of water. The Board has had a number of complaints on account of nuisances. The Secretary has written notices to those persons complained of, who have, in most instances abated the same. We would suggest that the Board of Health have power to appropriate money for sanitary purposes. It might be limited not to exceed a certain sum, say one hundred or two hundred dollars for one year.

W.—Complaint was made to the Board early in the season, of the condition of the water in Toney's brook. The Board investigated the matter, and came to the conclusion that the impurities of the water were caused mostly by factories in Mt. Clair township. On the stream, in Mt. Clair, there are two factories; the upper one, where they make and print labels for all kinds of goods, the refuse coloring matter they throw in the stream. The lower factory in Mt. Clair, is a straw-board factory; in preparing the straw and reeds, (from the salt meadow) they use alkalies and acids, and a considerable portion of the refuse gets into the stream. Also, over the stream, in Mt. Clair, there is quite a number of privies. The consequence is, when the water gets in the next pond below, which is in Belford, it is pretty well satu-

rated with impurities. There are three ponds in a circumference of half a mile in Bedford. When these ponds are low, in warm weather, it takes some time for them to fill up; in the meantime, the sun acting on this mass of polluted water, causes a smell or gas, which is injurious to the health of the place. We wrote to the Montclair Board of Health, to ask them to co-operate with us in the abatement of the nuisance. They appointed a committee of their Board, (Dr. Pinkam was chairman) who examined and analyzed the water in the ponds of Montclair and Bloomfield. In their report, they state that the water in the Bloomfield ponds is far more impure than the water of the Montclair ponds (the water is so bad that there is no living fish or snake in it). The committee also recommended the factory owners to keep their refuse matter out of the stream. Do not think this has been done to any extent. The question arises, what can be done to abate this nuisance? We should be pleased to have the counsel of the State Board of Health, so that next summer we may be prepared to take some measures to abate this evil.

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CALDWELL, - - - - C. M. HARRISON, *Caldwell*.

During the past year several cases of malarial fevers occurred on the line of a small stream flowing through the village of Caldwell. It was noticed that the waters on a small pond nearly in the center of the village were coated over with a peculiar growth of algæ. Mr. H. H. Rusby, a botanical expert, made an examination of this algæ under a magnifying power of four hundred diameters. He found nine species.

The existence of this algæ I took as being evidence of something more than a condition of stagnant water; for they had not been observed before. Of course no evil could result directly from these growths *per se*, but the contamination of the water proved that an evil was to be remedied. An examination of the stream above, showed that at one or two points, privies were located nearer the brook than they should have been, and that the overflow from cesspools on the grounds of the penitentiary, reached and poisoned the waters of the brook. At points in the stream, where the flow was very slug-

gish, the water was found to be swarming with animalculæ. The wastage from the cooking and washing rooms of the penitentiary for the past two years, has in unreasonable quantities, escaped into this brook, and no doubt the cases of malarial fever referred to can be directly traced to this source. Parties were notified, but the evils complained of have been mitigated only—not removed.

During the heated term in August of the present year, two cases of typhoid and several of malarial fever occurred at Newark City Home. This institution is beautifully located on a shelving portion of the eastern slope of the Second Mountain. The institution belongs to the city of Newark, and our local Board here refers to the matter only because the facts developed are pertinent to such a report as this. The examination was made by our secretary who was recently appointed to take charge of this institution. He found the plumbing exceedingly defective, and that portions of the building were infected with sewerage gases. The traps of the pipes were no where ventilated, and in some cases the pipes themselves were filled with noxious matter and unserviceable. Alderman Chas. Marsh, of the Trustees, took the matter in hand in an energetic and business like manner, changed the system of drainage throughout, and provided proper ventilators. The sanitary condition of the building is now, in most respects, excellent. It is worthy of note in this connection that the most malignant case of fever was developed in a young lad of fifteen years, whose bed was next adjoining a most defective water-closet. These facts are worthy of attention, because their study enforces truths which must be regarded in the construction of public dwellings.

The healthfulness of the township has been unusually good for the year past. The farmers have had no contagious diseases among their cattle or other stock. The so-called epizootic during the fall months, was of the lightest type, and produced no disarrangements among the teamsters. Chicken cholera has raged here and there, involving small losses, but, beyond this, we have nothing other to report.

With ample facilities for thorough drainage, Caldwell may place herself in an enviable position so far as a clean, pure and dry local atmosphere is concerned. Herein we have the first condition of general healthfulness.

CLINTON TOWNSHIP, - - - D. S. SMITH, M. D., *Irvington*.

A communication from citizens, was made stating their grievances, arising from the sewerage deposits upon the meadow lands of the township, by the city of Newark, it being, in their opinion, health-destroying, through exhalations from such noxious materials, and praying this Sanitary Board to take cognizance of, and if possible, deliverance from the same. The communication was accepted, ordered on file, and a copy to be sent in the report to the State Board of Health.

At a meeting of the citizens residing in the southeastern portion of the township, holden this day, October 9th, 1880, at the house of Caleb Earl, for the purpose of deliberating upon the deleterious effects of the sewerage deposits upon the meadow land, by the city of Newark, and consulting together as to the propriety of taking action thereon, Mr. Henry Meeker was appointed chairman, and Dr. Isaac M. Wood, secretary of the meeting. After a full and free expression of opinion as to the health-destroying exhalations from such noxious materials, attested by the production of miasmatic disease through the neighborhood, as well as blasting (by the nauseating affluvia engendered) the character of this section of the township, so hindering its material prosperity, it was unanimously

*Resolved*, That the Chairman and Secretary be instructed to present in our behalf, our grievances to the Sanitary Board of the township, praying them to take cognizance of the same; and in if their wisdom, deliverance from it be possible, to interpose, in our behalf. With the request that our Secretary present this our appeal to the Sanitary Board, at their first meeting, duly signed by the officers of this meeting, the same was adjourned.

Several Freeholders appeared and presented complaints against three parties for receiving foul or noxious materials, and allowing the same to be deposited upon their lands. The Clerk of the Board was directed to serve notices upon the several parties (excepting the sewerage nuisance of Newark) demanding removal and discontinuance of the same.

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LIVINGSTON TP., - - - S. H. BURNET, *Livingston*.

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MILLBURN, - - - A. J. R. SIMPSON, *Millburn*.

NEWARK, - - - - C. M. ZEH, M. D., *Newark.*  
 Report already given.

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SOUTH ORANGE, - - A. M. RANSOM, M. D., *South Orange.*  
 The report notices the very low death rate.

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WEST ORANGE, - T. MEREDITH MAXWELL, M. D., *Orange.*

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GLOUCESTER COUNTY.

CLAYTON TP., - - - - T. S. TURNER, *Clayton.*

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FRANKLIN TP., - - - - J. C. RICHMAN, *Malaga.*

The report notices the necessity of guarding against the illegal practice of unskilled or unprincipled practitioners.

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GREENWICH TP., - - - - JOHN STETSON, *Paulsboro.*

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GLASSBORO, - - - - JOHN E. PIERCE, *Glassboro.*

The report refers to the successful action of the Board in correcting a slaughter house nuisance. Some cases of pleuro pneumonia occurred in this township. The intelligence of Local Boards, as to it, can be a great aid in its suppression.

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MANTUA, - - - - B. A. CORSON, *Mantua.*

Four cases of small-pox occurred in the township, but all recovered. Prompt attention prevented the spread of the disease.

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WEST DEPTFORD TP., - JAMES T. BUDD, *Woodbury.*

154 REPORT OF THE BOARD OF HEALTH.

WOODBURY CITY, - - R. S. CLYMER, *Woodbury.*

A plan and survey of the whole city is about completed and a system of drainage and sewerage is to be adopted.

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WOOLWICH TP., - - SAMUEL AVIS, *Swedesboro.*

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HUDSON COUNTY.

This county, on account of its dense population, has a County Board. We are indebted to it for obtaining local reports and for securing a filling out of schedules. We this year only give the names of the corresponding officers.

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HUDSON COUNTY, *Clerk of Board, E. J. ROONEY, Jersey City.*

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BAYONNE, - - - H. MORTIMER BRUSH, M. D.

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HARRISON.

A committee of Council is the Health Board.

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HOBOKEN.

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JERSEY CITY.

Board of Police Commission is Health Board.

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KEARNY, - - S. W. CLASON, Chairman, *Arlington.*

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NORTH BERGEN, - - A. ENGELBRECHT, *Homestead.*

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TOWN OF UNION, - FRED C. HANSEN, Clerk, *Town of Union.*

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UNION TP., - - - - Wm. H. SCHMIDT.

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WEST HOBOKEN, Wm. G. SMITH, Health Insp'r, *West Hoboken.*

WEEHAWKEN TP., - - F. W. SHEERWOOD, *Hoboken.*

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## HUNTERDON COUNTY.

EAST AMWELL, - - B. C. YOUNG, M. D., *Ringoes.*

The report notices prevalent health, except some malarial disease, which is not usual.

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FRANKLIN, - - CHAS. M. TRIMMER, *Quakertown.*

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HIGH BRIDGE, - - JAMES H. WALKER, *High Bridge.*

Since its organization the Board has carefully looked after the health conditions of the township.

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HOLLAND, - - DR. J. T. RIBBLE, *Milford.*

The report notices the malarial fevers of an unusually severe type have been generally prevalent along the Delaware, the whole length of the river border. Our reports show that this has been true along nearly the whole course of this river—more we believe, than in any previous year. We believe it not very difficult to find what causes have been in operation to impede its waters, to effect adjacent drainage and to accumulate vegetable matter preparatory to dry hot seasons and unusual alternations of water covering.

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KINGWOOD, - - WM. R. READING, M. D., *Baptisttown.*

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LAMBERTVILLE, - - - - GEO. H. LARISON, M. D.

The Report deplores the neglect of vaccination and presents the need of more authority for health boards.

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LEBANON TP., - - - - W. V. PRALL, *Changewater.*

In one of our towns there have been several cases of malarial and typhoid fever this summer. The supposition is that the

cause of it was that the cisterns on which railroad laborers and others depend do not get cleaned as they should be.

RARITAN TP.,	-	-	-	-	DAVID DUNHAM, <i>Flemington.</i>
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READINGTON,	-	-	-	-	JOHN V. BERKAW, <i>Stanton.</i>
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TEWKSBURY,	-	-	-	-	M. L. MCCREA, <i>New Germantown.</i>
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TOWN OF CLINTON,	-	-	-	-	S. VAN SYCKLE, <i>Clinton.</i>
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UNION TP.,	-	-	-	-	W. STOCKTON, <i>Pattenburgh.</i>
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WEST AMWELL,	-	-	-	-	JOHN T. DRAKE, <i>Lambertville.</i>
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MERCER COUNTY.

CHAMBERSBURG,	-	-	-	-	EDW. B. SKELLINGER, <i>Clerk.</i>
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The majority of property-owners have a pit dug in the yard adjacent to their houses, over which (pit) a water-closet or out-house is placed. Pipes leading from the house carry all the refuse water from this source into the pit, and it often happens that the plumbing is so defective, or of such a cheap character, that the stench arising from the contents of the pit will find its way through the pipe back, and contaminate every cubic foot of atmosphere breathed by the inmates of such house. Malarial fevers are quite common this fall, as well as during the past summer, and as a practitioner of medicine it has fallen to my lot to see several cases of the most malignant type, the exciting cause of which I attributed, (in a large degree,) to defective drainage.

The sanitary expenses of this borough are wonderfully small, the appropriation (\$30) this year being the largest sum ever devoted to that branch of public service.

EAST WINDSOR, - - - A. A. WRIGHT, *Hightstown.*

The population outside of Hightstown is 1000.

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HIGHTSTOWN BOROUGH IN EAST WINDSOR TP., - - -  
W. W. SWETT, *Hightstown.*

Malarial fevers have prevailed to an extraordinary extent, the locality having been for many years entirely free from anything of the sort.

The pond lying to the east of the north portion of the borough is generally run quite low during the summer season, and is well supplied with the Yellow Pond Lily and much decayed vegetable matter. The sewage from the Peddie Institute added to this ought at least to deter people from using ice from this pond.

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EWING TP., - - - W. M. H. COOLEY, *Trenton.*

At a subsequent meeting of the Board a petition was handed us to abate a nuisance known as Keeler's Mill Pond, said mill pond said to be the direct cause of a great deal of malaria. Twenty-three (23) families out of twenty-five (25) have suffered more or less all summer, all these families living on or near to this pond. The Board have taken the matter in hand, and have tried two or three means to have it removed, but have not yet succeeded. The fact of this disease being so prevalent all over the country has worked very much against us.

This township has also an effective sanitary association which is a good model for other towns and townships.

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HAMILTON TP., - - - JOSEPH H. WEST, *Hamilton Square.*

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HOPEWELL TP., - - - JOHN FLEMING, *Pennington.*

About the only epidemic that has prevailed since the Board has organized, has been malaria, which has been very bad, especially in the western part of the township along the Delaware.

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LAWRENCE, - - - JOHN P. SCUDDER, *Lawrenceville.*

PRINCETON BOROUGH, - Wm. A. DURYEE, *Princeton.*

Our Board was chosen in early summer. It was scattered during our vacation period. A portion of the members, after a few weeks, declined to serve, and it is only within a few days (October 25,) that all the above members consented to serve. Still some good has been accomplished. Locations that need care are known; wells have been examined; some nuisances abated, and otherwise the Board now hopes to begin to do good work. The borough is districted, and committees appointed. It may be expected that we would include the college in this report, but so much has already been written—much true and much false—and the circumstances of the college sickness are so fully known to the officers of the State Board, that nothing further is said at present.

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TRENTON, - J. D. WOOLVERTON, M. D., *President of Board.*

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WASHINGTON TP., - JOSEPH HUTCHINSON, *Robbinsville.*

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WEST WINDSOR, - JOSEPH H. GROVER, *Princeton Junction.*

There has been more malaria than usual. In this, and in very many of reports, the epizootic among horses is noticed. It is of interest, as showing how wide spread such an epidemic may be, and how independent of local influence in the fact of its existence. Also, as we compare it in severity with that of 1872-3, and compare climatic conditions, there is reason to believe that its mildness had much to do with weather conditions. There are some allusions to the fact that a mild influenza was at the same time prevalent among human kind.

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MIDDLESEX COUNTY.

CRANBURY, - - - ABIJAH APPLGATE, *Cranbury.*

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EAST BRUNSWICK, - - RICHARD SERVISS, *South River.*

MONROE, - - - CHAS. D. APPLGATE, *Cranberry Station.*

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NORTH BRUNSWICK, - JOHN W. BODINE, *Franklin Park.*

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PISCATAWAY, - - - - NATHAN VARS, *Dunellen.*

The past year has been marked by an unusual amount of sickness. The extreme warmth of the winter of 1878-9, has had a marked effect upon the conditions of health of our township, and the inhabitants have been, as a consequence, exposed to a greater degree of sickness. Diseases caused by miasmatic influences have been more frequent than for many years. Intermittent and remittent fevers have been quite prevalent during the summer and fall, and a number of cases of typhoid fever, (which are rare indeed here,) have been observed.

In consequence of this miasmatic influence, other diseases seem to have partaken, to a certain extent, of the periodical character of intermittents, and the severe characteristics seem still to prevail.

These influences have been more general than local, although some local sources of disease have existed. I might mention, as such cause, our proximity to the mill pond at Bound Brook, which has had a very perceptible effect upon the health of our citizens residing in that immediate vicinity.

RARITAN, - - - - THEO. A. WOOD, *Metuchen.*

Public health has been generally good, except some malarial disease. The rate of mortality is less than for any year since the organization of the township. The Board of Health has done much to further the drainage of a brook through the village.

SAYERVILLE, - - - - E. E. HILLMAN, *Sayerville.*

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SOUTH AMBOY, - - - A. APPLGATE, *South Amboy.*

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SOUTH BRUNSWICK, - - C. M. SLACK, M. D., *Dayton*

A typho-malarial fever accompanied by aphthores sore mouth prevailed somewhat in the fall.

160 REPORT OF THE BOARD OF HEALTH.

WOODBIDGE, - - - A. A. EDGAR, *Woodbridge.*

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MONMOUTH COUNTY.

EATONTOWN, - - - ABRAM T. METZER, *Eatontown.*

Malarial diseases have been unusually prevalent, assuming mostly an intermittent form. The only complaint of nuisance made to the Board was promptly attended to.

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FREEHOLD TP., - - - CHAS. F. RICHARDSON, *Freehold.*

Refuse and excreta are removed in a primitive way. Privies are located near the houses, and are cleansed when the owners or tenants please, except when complaint has been made to us, and we have ordered cleansing. Several complaints have been received which were investigated and remedied. \* \* A plan of sinks and odorless excavation should be adopted and enforced here. A careful meteorological summary accompanies the report.

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HOWELL TP., - - - J. LUTZ, *Farmingdale.*

The township has always been remarkably free from malarial diseases.

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MANALAPAN, - - - JOHN VAN DOREN, *Manalapan.*

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MATAWAN, - - - - - BENJ. GRIGGS, *Matawan.*

Malarial fevers have prevailed this year to an extent before unknown in this township.

MILLSTONE TP., - - - PETER FORMAN, *Manalapan.*

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NEPTUNE TP., - - - *Report from Ocean Grove,*  
DR. HENRY MITCHELL, *Ocean Grove.*

To DR. E. M. HUNT, *Secretary State Board Health:*

In compliance with the requirement of Sec. 4, of "An act concerning the protection of the public health, and the record

of vital statistics relating thereto," approved March 11th, 1880, the Board of Health for the Borough of Asbury Park respectfully report:

The district over which this Board has supervision is located in Monmouth county, Neptune township. In form the territory of the borough is nearly a square. It is bordered on the north by Deal Lake, a tide-water inlet, about one hundred and fifty yards average width; on the west by the road bed of the Long Branch branch of the Central Railroad of New Jersey; on the south by Wesley Lake, and on the east by the Atlantic ocean. The ocean front is about one mile in length; the distance from the railroad to the sea is about three-fourths of a mile.

Ten years ago this district was literally a wilderness, being then covered by a dense growth of pine and oak, with an undergrowth of bushes through which a human being could scarcely pass unless aided by an ax.

At present the whole borough is laid out in streets, building-lots, parks, etc., and the permanent population, as shown by the recent census, is now sixteen hundred and forty (1640,) while the summer population, during the past season, reached fifteen thousand (15,000) during a period of three months.

The soil is sandy, with an underlying stratum of clay, about seven to fifteen feet beneath the surface. The clay bed is from three to seven feet in thickness, and is underlaid by a stratum of gravel. Below the gravel is another layer of clay, and the well pipes are driven through this second stratum.

The water taken from these wells has, thus far, been generally good, but several instances have come to our notice where wells have been contaminated, and a movement is now being made by the authorities to secure the introduction of water from a distant point. There appears good reason to expect that an abundant supply of pure water will be furnished to the people of the borough within the coming eight or nine months.

In contour the borough is nearly level, but there is sufficient unevenness of the surface to afford good drainage. There is a fall of four inches to one hundred feet from the railroad to the sea, and from the southern boundary to Deal Lake there is a fall of eight feet. Sewers have been laid (with ten inch tile) through First, Second, Third and Fourth avenues, and in Kingsly and Hick

streets, draining and taking sewage from about one-fourth or one-third of the most populous portion of the borough. A force of men is now at work extending the sewer system.

The streets are wide. All of the avenues leading to the sea are 100 feet wide, increasing to 200 feet toward the shore.

The parks in the borough are numerous, though but two of them are of large size, as the accompanying map will show.

The buildings are, for the most part, light frame structures, with ample piazzas, intended for summer occupation only, though within the last two years a better built and more permanent class of dwellings has been erected.

There is no difficulty in making good cellars in almost all parts of the town, and considerable care is manifested on the part of owners to promote health by cementing cellar bottoms, and also in ventilating incline spaces over unexcavated ground under dwellings.

The usual size of building lots is 50x150 feet, affording opportunity for free circulation of air.

Kerosene oil is chiefly used for obtaining artificial light, though the public buildings are generally lighted by gas, manufactured on the premises from gasoline.

Garbage and other house-refuse is collected daily by the borough carts, and deposited outside the corporation limits. This service was performed very satisfactorily during the past summer, few complaints of neglect having been received.

Privies are made in accordance with a borough ordinance which requires them to be made of brick—bottom and sides—and to be cemented on the inside and made water-tight. They are excavated by the odorless excavator.

There are no slaughter-houses nor any hog-pens within the borough.

The public school building is a large and fine edifice, erected three years ago at a cost of ten thousand dollars, exclusive of the ground. It has accommodation for five hundred pupils. The present attendance is about three hundred.

The only prison in the borough is the police station. It is kept scrupulously clean, and is suitable for the purpose for which it is used.

A new steam fire engine was recently purchased. This ap-

paratus, together with several carbonic acid fire extinguishers, seems to afford sufficient protection against fire.

There is no cemetery nor burial place within the borough.

The public health has been good during the past year. No epidemic, nor any prevailing disease has existed. Not a single case of typhoid fever has occurred here, to our knowledge, during the past year.

So far as we can learn, this locality is exempt from malarial influence. No form of malarial disease has ever been prevalent here, and we believe no case of intermittent fever has originated here. Intermittents and malarial neuralgias which are brought here yield readily to treatment. The Health Board has an Inspector.

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SHREWSBURY TP., - - - W. A. SICKLER, *Red Bank*.

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RED BANK, (in the township), - - - H. J. CHILD, *Red Bank*.

Refuse is removed from vaults by a steam pump with tight barrels. The primary departments of schools are overcrowded. The Board, since its organization, has had sixteen complaints and served twenty-six notices. Through the request of the Board, some of the gutters have been flagged.

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UPPER FREEHOLD TP., - - - WM. ROBBINS, *Allentown*.

Allentown has special drainage in one street and first-class school provisions.

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MANASQUAN, - - - A. A. HIGGINS.

We have held several meetings but very few matters have been presented to us, excepting abatement of nuisances, in which few cases, the people have generally acquiesced in the suggestions of the Board. In this vicinity (on the ocean) there has been but one case of drowning, and in that no opportunity was afforded of applying means of resuscitation, as suggested by the State Board. There is an epidemic of diphtheria prevailing near Sea Plain, in this township, and at Ocean Beach, on south side of Stark River. Cannot account for it, except it be the

general prevalence of the disease at this season. Those attacked near Sea Plain live on the edge of a bog, which has been drained, and the water drunk by them is principally surface water. There have been no other epidemics in this township during the year.

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MORRIS COUNTY.

BOONTON, - - - C. H. SIMONS, M. D.

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TOWN OF BOONTON, - J. G. RYERSON, M. D., *Boonton.*

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CHATHAM TP., - - - MOSES M. OSBORN, *Madison.*

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CHESTER TP., - - - W. A. GREEN, M. D., *Chester.*

No epidemics have visited us during the past year, though in the spring months we had a goodly number of cases of diphtherite or diphtheria—for I regard them as one and the same, differing only in severity. We had also quite a number of cases of scarlatina of the mildest possible type, and in only three instances did anginose symptoms develop themselves to alarming extent. In one case we had nephritis as a complication, followed by anasarca. During the summer, we had comparatively few cases of cholera infantum. What few there were, with but a single exception, terminated in recovery; this was in an infant six months old. Ordinary diarrhoeas were frequently met with and offered but little resistance to the ordinary methods of treatment. No well pronounced cases of dysentery occurred until the latter part of August, and this was of the variety known as bilious or malarial. It followed the course of Black river, near the swamp, all the way from Ironton to Hackleburne. All the cases recovered, and but little difficulty was experienced in bringing about convalescence. Fever of a malarial character has prevailed to no small degree; and in almost every disease that comes under our observation, we can discover a disposition to a paroxysmal exacerbation at some one time in the

twenty-four hours; this is generally controlled by a few doses of bark or some one of its alkaloids. This condition of affairs has grown more and more apparent for the last three or four years, prior to which time we scarce ever had occasion to administer bark as an 'anti-periodic. When it first began to develop itself, I attributed it in part to the unworked mines, (for at that time the mines were abandoned, owing to the general panic) and partly to the malarial wave, that seemed to be passing over a great portion of the country; perhaps both played an important part. When the mines were re-opened, last spring, the trouble seemed to augment, probably owing to the filth that was taken therefrom. Almost all cases of fever follow the several water-courses, or near them; on the hills we have a more varied class of diseases to contend with, mostly inflammatory in type. A great source of trouble is experienced in the Hackleburne district, in controlling certain diseases, particularly those of the bowels. This is accounted for by the location and surroundings: some dozen or fifteen houses, closely built together, occupied by miners, whose families are anything but neat in person or cleanly as regards the premises; all kitchen slops and waste, and very often chamber slops, too, are thrown in front of the door; the privies behind and above the houses, the water made foul by drainage, and the air impure by the water in the river and the uncared for cow-pens and pig-stys, all go toward rendering the locality one of the most unhealthy in the township. Much has been said and threats made about the place, but to no purpose, and the only thing left to do is to exercise the authority which is invested in this Board.

JEFFERSON,	-	-	-	SILAS & ROWLAND, <i>Milton.</i>
MENDHAM,	-	-	-	JOHN R. PITNEY, <i>Mendham.</i>
MONTVILLE,	-	-	-	JOHN BLOWERS, <i>Montville.</i>
MORRIS,	-	-	-	COLLINS WIER, <i>Morristown.</i>
MORRISTOWN,	-	-	-	CHARLES H. GREEN, <i>Morristown.</i>

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MT. OLIVE, - - - - ENOS G. BUDD.

The reports notice the excellent natural water-supply and the healthy character of the locality.

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PASSAIC, - - - OSCAR LINDSLEY, *Green Village*

The township includes the Great Swamp, consisting of about seven thousand acres. The health of the township has been good the past year.

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PEQUANNACK, - - - E. W. MARTIN, *Pompton Plains*.

The habit, when numbering the school district, of inquiring if the children are vaccinated, is a good one.

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RANDOLPH TP.,

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DOVER TP., - - - - WM. H. LAMBERT, *Dover*.

The town is on the Rockaway river and well supplied with water. The poor are few and are taken care of by the township.

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ROCKAWAY, - - - - E. B. MOTT, *Rockaway*.

Malarial fevers are prevalent along the Rockaway river in summer, probably caused by the diversion of its water from its natural channel for canal or other purposes.

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ROXBURY, - - - - J. T. LAWRENCE, *McCainesville*.

There has been considerable sickness from malarial fever. The Morris Canal has, of late, been quite thoroughly dredged, and the muck was thrown upon its banks and most of it has remained there. One case of nuisance was abated by the Board.

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WASHINGTON TP. - - - B. LARUE, *Waughrightville*.

## OCEAN COUNTY.

BERKLEY TP., - - - - C. F. BONNELL, *Bayville*.

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JACKSON, - - - - THOMAS P. BISHOP, *Cassville*.

The assessor reports the district as always exempt from fevers.

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LACY TP., - - - THOS. C. VANARSDALE, *Cedar Creek*.

No ponds or stagnant water are to be found in any part of the township. There are no malarial fevers and deaths seldom occur.

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PLUMSTEAD, - - - A. S. BROWN, *New Egypt*.

The description of the township, especially of New Egypt, is that of a healthy section. The pines extend upon the south, and these, and the excellent water-supply, seem to promote the good health of the locality. The water from the cedar swamps seems to be purer than the usual surface water.

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## PASSAIC COUNTY.

ACQUACKANONK TP., - - - NICHOLAS FREDERICK, *Passaic*.

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MANCHESTER TP., - - - MR. DE GRAY, *Hawthorn*.

Chills and fever and remittent fever have been prevalent this year.

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PASSAIC, - - - - JAMES A. NORTON, *Passaic*.

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PATERSON, - - - CHAS. F. W. MYERS, M. D., *Paterson*.

In addition to report are sent valuable specimens of various blanks used.

POMPTON, - - - CORNELIUS TOWNSEND, *Wanaque*.

Burial grounds are mostly connected with churches. The question may be properly raised whether churches that are closely crowded upon by graves or not occupied during the week, do not become the receptacles of grave-yard air, and so risk the health of those who assemble on the Sabbath. Since it has become more common to have basements, or to have furnaces in small cellars under the building, there is more risk of an inflow of air laden with organic matter.

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WAYNE TP., - - - DAVID BENSON, *Paterson*.

There has been a good deal of malarial fever for the last two years. The effect of various feeds on cattle as producing disease is noticed. Corn meal, from which the sugar has been extracted, has somewhat taken the place of brewery grains. Aborting among cows is not now so common; this is an evil much complained of by farmers; it is an important inquiry whether diseased rye or other grains do not cause it.

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WEST MILFORD, - - - A. S. TERHUNE, *West Milford*.

We quote from a letter appended by one of the physicians of the township.

During the past spring and summer there has been some dysentery, cholera morbus, &c., among the adults, and cholera infantum among children, but not in a fatal form. But the great affliction, or *curse*, if properly named, in West Milford and its environs, is malaria or chills and fever, intermittent fever, &c. It seems to be growing each year, increasing in area and assuming different types and shapes. There has been a number of cases of typhoid fever of a malarial type during the past two or three months, and some of them about sick enough to die, still I have heard of but one fatal case. What causes this malaria I am not entirely able to say, to my satisfaction, and I am quite sure I can't explain it to the satisfaction of all; I do not think it is caused by the badness of the people in West Milford. It is now prevalent to an alarming extent. Quinine cinchonidia, or some other antiperiodic, is a regular dessert for breakfast, dinner and

supper. Malaria around here enters into nearly every disease or complaint I have to deal with, even to child-bed, and I can't get through any of them without the use of quinine. I have been in this place over thirteen years, and for the first five years hardly a case of chills and fever was known any where around, but about eight years ago, when the Greenwood Lake and Montclair Railroad was commenced, intermittent fever, in its various forms, began; I ascribed it to the excessive throwing up of fresh earth, with its millions of little roots, &c., of vegetable matter rotting and decomposing, and throwing off a poisonous gas or fragrance of some kind. But eight years have past, and still the chills and fever, or malaria, is on the increase, and in parts of the community where the natural drainage is good, no swamps or marshes, and genuine mountain air, seemingly healthy and invigorating. The water in Greenwood Lake is very low, at present, owing to the fact that the Morris Canal Company has it under control, to a great extent, and can draw of the water to suit their convenience. A great quantity of vegetable matter is left to decompose, and the result is just what you can expect, a loathsome, disgustings mell all along the border of the pond, an odious gas of some kind or other, perhaps, or a malarial breeder. This, of course, is not at all times of the year, but it is so now, and seems to be the case whenever the Canal Company chooses to raise the water below the average water-mark. If nature had been let alone here, and not been tampered with by art, my impression is that malaria would hardly have been known around Greenwood Lake. The lake has been made larger by nearly two miles in length, land overflowed, a company made richer by it, and a neighborhood made sick. Cannot an act of legislation be made to keep the Canal Company within health limits? Will the State Board of Health of New Jersey take some action about it, find out if I am telling the truth, and if so, try, and not stop trying, till a remedy is found? Greenwood Lake is a pleasant, picturesque lake, surrounded by mountains, and is really a healthy place; air cool and bracing, and is destined, in time, to become quite a popular summer resort, if "not injured by man's device." I will say something also about public nuisances in this part of the country, and that will be about school-houses, privies and cemeteries, or country grave-yards. The public school privies are not well looked after by the trustees,

&c., and are allowed to become filled to the top of the ground with the excretions; no disinfectants, such as dry earth, coal dust, out of coal pit bottoms, are used, and the consequence is that a foul stench is emitted, disgusting and loathsome in every way. I believe that a privy, as a general thing, should be kept just as clean and sweet, to the eye and nose, as the teeth should be kept clean to preserve a good breath. I believe these bad kept privies of our country schools have a demoralizing effect on the children. Would it not be well for the Board of Health to tell the County Superintendents to speak to the teachers about this thing, when they are calling round among the schools under their charge? It wouldn't hurt our teachers, up this way, one bit, to have their County Superintendents ask if charcoal was made around here.

Another great nuisance in some parts of the country is the grave-yard, or burying-ground; such a one we have in the village of West Milford, in the shape of a grave-yard; this grave-yard is in the centre of the village, and on the elevated side of the street. The church is in the grave-yard. Private dwelling houses are situated on the lower side, or other side of the street. Each house has a well of water for family use, cooking and drinking purposes. What I mean is this, the water runs from the grave-yard in these wells, without doubt. I have heard one old sexton of this church tell me a number of times, that when graves were dug in certain parts of the yard, the wells of water would become roiled and muddled during the process of digging the graves. The children of the Sunday School drink out of these wells, and the children of the public school in the place patronize them, as the school has no well of its own, and if it had, the school-house is situated at the lower end of the grave-yard. This grave-yard is a confirmed nuisance; it is an old yard and the community still bury in it; the land is wet and soggy in the yard. There are a number of good locations within a quarter to a half mile from the village for a cemetery or grave-yard—soil dry and pleasant. I urge strongly on the State Board of Health, that the matter be looked into, and, if I am correct, that an act in the Legislature be passed preventing any more burials taking place in this grave-yard.

## SALEM COUNTY.

LOWER ALLOWAY'S CREEK, W. B. RIDGWAY, *Hancock's Bridge.*

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LOWER PENN'S NECK, - - - W. M. NEWELL, *Pennsville.*

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QUINTON, - - - A. G. MCPHERSON, *Quinton.*

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SALEM CITY, - - - J. D. FERRELL, *Salem.*

Its Board of Health was late in organization, but is now fully organized.

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UPPER PENN'S NECK, - - - GEO. W. HEWITT, *Pennsgrove.*

Three other townships have Boards of Health, but have made no special report. The health of the county seems to have been remarkably good.

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## SOMERSET COUNTY.

BEDMINSTER, - - - W. M. P. SUTPHEN, *Bedminster.*

A fever of remitting, intermitting and typhoid types has prevailed in the southern central portion of the township for a period of three months. The clearing of timber from a tract of land embracing about seventy acres has been in progress about four years; a portion of the timber was manufactured into charcoal, while much more was permitted to decay on the ground. During the coaling, the neighborhood was clear of fever; after that ceased, fever commenced in the vicinity, and upon the high lands adjacent. The land was low, in spots marshy from blind springs, and the soil a clay subsoil. During the latter part of the month of September, in 1880, the village of Pluckamin suffered from fever to a degree approaching an epidemic. Due notice having been given, the Board visited the village officially, on the fifth day of October. The sewerage, cellar drainage, condition of wells, cisterns, cesspools and privies were examined,

taking one day's research. Cases were found that demanded prompt action. Property owners were at once notified, requiring sewerage, cleansing of wells, cellars, privies, &c. In every instance, the Board are pleased to say, that their demands were complied with, and a general cleaning of the town was the result. Up to the date of this report no deaths have occurred in that vicinity from fever, and its force appears exhausted, as but few new cases in that vicinity are reported.

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BRANCHBURG T<sub>P.</sub>, - - A. J. AUTER, *North Branch.*

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BRIDGEWATER T<sub>P.</sub>, - - W. M. J. POTTER, *Somerville.*

Chills and fever, or malarial fever, has prevailed in Bound Brook, so that scarcely a person in the village or vicinity has escaped. The Board of Health was called there in July last, to examine the condition of the mill-pond adjacent, and other places, to ascertain the cause of the unusual sickness. The Board met several times at the request of the citizens, and heard testimony in regard to the matter, and finally declared the mill-pond and dam a fruitful source of the disease seriously affecting the health and endangering the lives of the inhabitants of that vicinity, adjudged it a nuisance, and ordered the owners to abate and remove the said nuisance between the first and tenth of November; and that in case of failure to do so, the Board would proceed to remove the same, and charge the expense thereof on the lands. The parties had been previously indicted by the grand jury, and the case was tried in the courts before this time expired, the owners enjoined, and the court ordered them to abate the nuisance. They immediately removed the same by taking it all out to the foundation, and are preparing to drain the pond by making a channel through the central part with lateral drains on either side.

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FRANKLIN T<sub>P.</sub>, - - D. J. VOORHEES, *East Millstone.*

Malarial fevers prevailed to some extent. The Board took measures to secure full returns of vital statistics.

HILLSBOROUGH, - - - DR. C. R. P. FISHER, *Neshanic*.

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MONTGOMERY, - - - WM. OPPIE, *Hartinger*.

Some cases of malarial fever are reported.

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NORTH PLAINFIELD, - - - ISAAC BROKARV, *Plainfield*.

It is claimed that the death rate is increased by the temporary residence of invalids.

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WARREN T<sup>P</sup>., - - - GEO. TERRELL, *Warrenville*.

SUSSEX COUNTY.

ANDOVER, - - - G. C. COOK, *Andover*.

The great neglect of vaccination is noticed.

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BYRON, - - - C. K. DAVIDSON, M. D., *Starhope*.

Malarial affections prevail in the southern portions of the township.

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FRANKFORD, - - - EDWARD ROE, ASSESSOR, *Branchville*.

Land drainage is common and the water-supply good. Among animal diseases, foot-rot is noted as prevalent.

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HARDYSTON, - - - JESSE DENNIS, *Franklin Furnace*.

Malarial diseases were very prevalent during the summer and fall. Water is supplied from the Wallkill and Pequannock rivers and their branches, which are sluggish. Some of the tenement houses of operatives are in bad condition.

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NEWTON, - - - GEO. HENDEN, *Newton*.

Meteorological Tables are carefully kept at the Newton Library by Dr. Ryerson under the direction of the State Board, and will serve to indicate the climate of this portion of the State.

SANDYSTON, - - - WARREN VAN SICKLE, *Layton.*

Scarlatina as an endemic existed to quite an extent last winter and in the early spring. During the summer and early fall, intermittent fevers were quite prevalent, caused, no doubt, by the extreme dry weather exposing decomposing vegetable matter.

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SPARTA, - - - E. R. POTTER, M. D., *Ogdensburg.*

STILLWATER, - - - C. O. MOORE, M. D., *Stillwater.*

Malarial fevers, of the intermittent type, have been prevalent with quite a number of cases (mostly sporadic) of typhoid and typho-malarial fever.

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VERNON TP., - - - CARLOS ALLEN, M. D., *Vernon.*

The Black Creek runs through the valley having extensive drained lands on either side. From these lands or from some other cause, unknown, there has been much malarial disease in the township of late years.

Drainage of wet lands (in other parts) has been effected to a great extent by owners, for agricultural purposes, which checked intermittents in the locality very much. A disease known as "Black Leg" has been reported among calves but is not contagious.

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WANTAGE, - - - W. S. VONDERHOFF, *Deckertown.*

Malarial fever and ague have been common in the low lands along the Wallkill and to some extent throughout the township, induced, in my opinion, by long continued dry weather. In ordinary seasons it is unknown.

Abortion, or premature delivery of calves, causes great loss to our dairies.

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UNION COUNTY.

CLARK TP. - - - W. H. COLES, *Rahway.*

Printed before as a sample of a brief summary.

ELIZABETH, - - - - PETER BONNETT, *Elizabeth*.

The city has a Health Inspector.

C. The water supply is abundant, and is drawn from the Elizabeth River, about a mile and a half from the populous part of the city. The Water Company's pipes are extended over a large part of the city. In other sections, good water is obtained from wells. Some complaint is made during the summer season of smell and discoloration in the city water. This is probably due to vegetable matter in the reservoir, and is a common annoyance in many places.

D. The sewer system is extensive and, in most parts of the city, in advance of the needs of the inhabitants. The only real defect is the use of the Elizabeth River as a drainage outlet, which in consequence becomes very foul and offensive and cannot, in that condition, fail to be detrimental to health.

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FANNWOOD, - - - - DR. F. W. WESCOTT, M. D., *Scotch Plains*.

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LINDEN, - - - - C. J. BROWN, M. D., *Linden*.

Reference is made to the pollution and stench from Peach brook, which is substantiated by many persons, and seems to require the action of the Board.

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NEW PROVIDENCE, - - - - JOHN WOOD, *New Providence*.

The Board reports some special investigations in the township.

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PLAINFIELD, - - - - H. H. LOWRIE, M. D.

The excavations known as the Gravel pits, which have been supposed to be the cause of disease for some years, have at last been filled and rendered perfectly healthy. Another source of complaint is a mill-pond, bounding the city on the west, which we hope to have remedied.

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RAHWAY, - - - - LEWIS S. HYER, *Rahway*.

The assessors take record of all not vaccinated. Some of the

physicians are dilatory in sending in returns of births. The introduction of water on the high pressure system does away with the necessity for fire engines.

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SPRINGFIELD, - NICHOLAS C. JOBS, M. D., *Springfield*.

The diseases that prevail during the summer and winter are alike complicated with malarial poison so much that many yield alone to quinine, as, for instance, a bronchitis gets well under the influence of the bark better than when expectorants are relied upon. There have been only a few cases of scarlatina, and those of a mild type; a few of diphtheria; a lesser number of dysentery than in former years, while of the malarial forms, there have been frequent types of bilious or remittent, typho-malarial and congestive fevers. The pulmonary diseases, especially the forms of phthisis, are greatly aggravated and hastened in their course by the periodic and high fevers which the patients have, and which do not scarcely yield at all to any of the anti-febrile remedies. Those that ordinarily relieve the night-sweats do not have any effect unless combined with quinine. The public school is in good condition as regards the heating and ventilation. Were it not for "malaria," the people would be healthy, happy and prosperous.

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SUMMIT, - - - - - GEORGE W. NICHOLAS, *Summit*.

Malarial fevers of the intermittent form are slightly prevalent on the low lands. Hope to check the disease by enforcing sanitary regulations.

Evils have been arrested and the community has been awakened to the importance of guarding against disease by cleanliness both of person and dwellings.

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UNION TP., - - - - - JOHN LEONARD, *Union*.

Malarial fevers have been prevalent in many parts of the township.

The credit given in this report to the State Board for stamping out pleuro-pneumonia, depended much upon the efficient co-operation of the local Board of Health and of owners of cattle.

The extreme lowness of all streams during the summer is

noted. An effort has been made to convert a portion of the "Turf Meadows" near Connecticut Farms into a lake, but only a little progress has yet been made.

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WESTFIELD, - - - - JOHN M. C. MARSH.

The efficient action of the Board was important in checking small-pox in one locality.

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WARREN COUNTY.

ALLAMUCHY, - - - - WM. SEALES, *Hackettstown.*

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FRANKLIN, - - P. S. CLEVELING, M. D., *Broadway.*

General health good, but fowl and hog cholera have occasioned considerable loss of stock.

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FRELINGHUYSEN TP., - T. RORBACH, M. D., *Johnsonbury.*

There has been unusual exemption from intermittent, remittent and other fevers.

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GREENWICH, - - - S. W. WEIDER, *Reiglesville.*

The general health has been good. The losses from hog cholera are from five hundred to one thousand dollars.

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HARDWICK, - - - J. S. VOSS, *Marlboro.*

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HARMONY, - - - I. K. VANNATTA, *Harmony.*

There are seven school-houses in the township, only one of which is a good one. Two are in cemeteries, and it is worthy of inquiry, whether such a locality is good. Cholera has largely prevailed among swine. It has been noticeable that farmers who lived on the hills were exempt.

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KNOWLTON, - - - LEWIS C. WELLER, *Columbia.*

LOPATCONG, - - - J. YIESLEY, *Phillipsburg.*

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PHILLIPSBURG, - - - J. P. SWEENY, *Phillipsburg.*

The Board of Health has found some difficulty in its work, but has pushed forward without fear or favor.

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TOWN OF WASHINGTON, - WM. BAIRD, M. D., *Washington.*

Possibly one, if not the most important sanitary subject in our town, is the question of sewerage. Our town is particularly free from typhoid diseases and so called zymotic affections, whether this is due to the general use of cistern-water I am unable to say, but with good sewerage there is no reason why this town should not remain with a very small death rate. We are badly situated for getting a water-supply through pipes, and so cisterns will no doubt be used for a long time, or until the town increases materially in wealth and size. This fact, taken with its present size, makes the town well adapted to the earth closet system, and I believe if our townspeople were instructed through the State Board, or by pamphlets, as to the importance of this system, that dry earth and removals at regular intervals would take the place of foul vaults and cleansing every 4 or 5 years. The health of our town is not materially effected by these things as yet, but it is our duty to keep it in its present healthy state.

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WASHINGTON TP., - - - WM. C. CAMPBELL, *Washington.*

The reports include many more items of local and industrial interest, and as placed on file, will afford important reference as to most of the localities in the State. The faithfulness of observations and the general ability shown in these returns vindicate the present construction of our Health Boards. While there are some township officers who are not fully awake to the importance of this oversight of health, it is because they have not yet had time to become intelligent as to existing needs. Each year will increase local attention, except in those rare instances where there is opposition to all progress.

## SUGGESTIONS TO HEALTH BOARDS.

In addition to other directions, to be found in this and other yearly reports of the State Board, it may be added:—

I. Let each Township Committee at its usual meetings, when the assessor is present, sit also as a Health Board and enter the fact in the township health book, together with any item of business.

II. Whenever new officers are elected, there should at the first meeting be an entry in the health book of the names of the Health Board as thus made.

III. Where there is no township physician as a member of the Board, some of the Boards have invited some adjoining physician to act as their adviser.

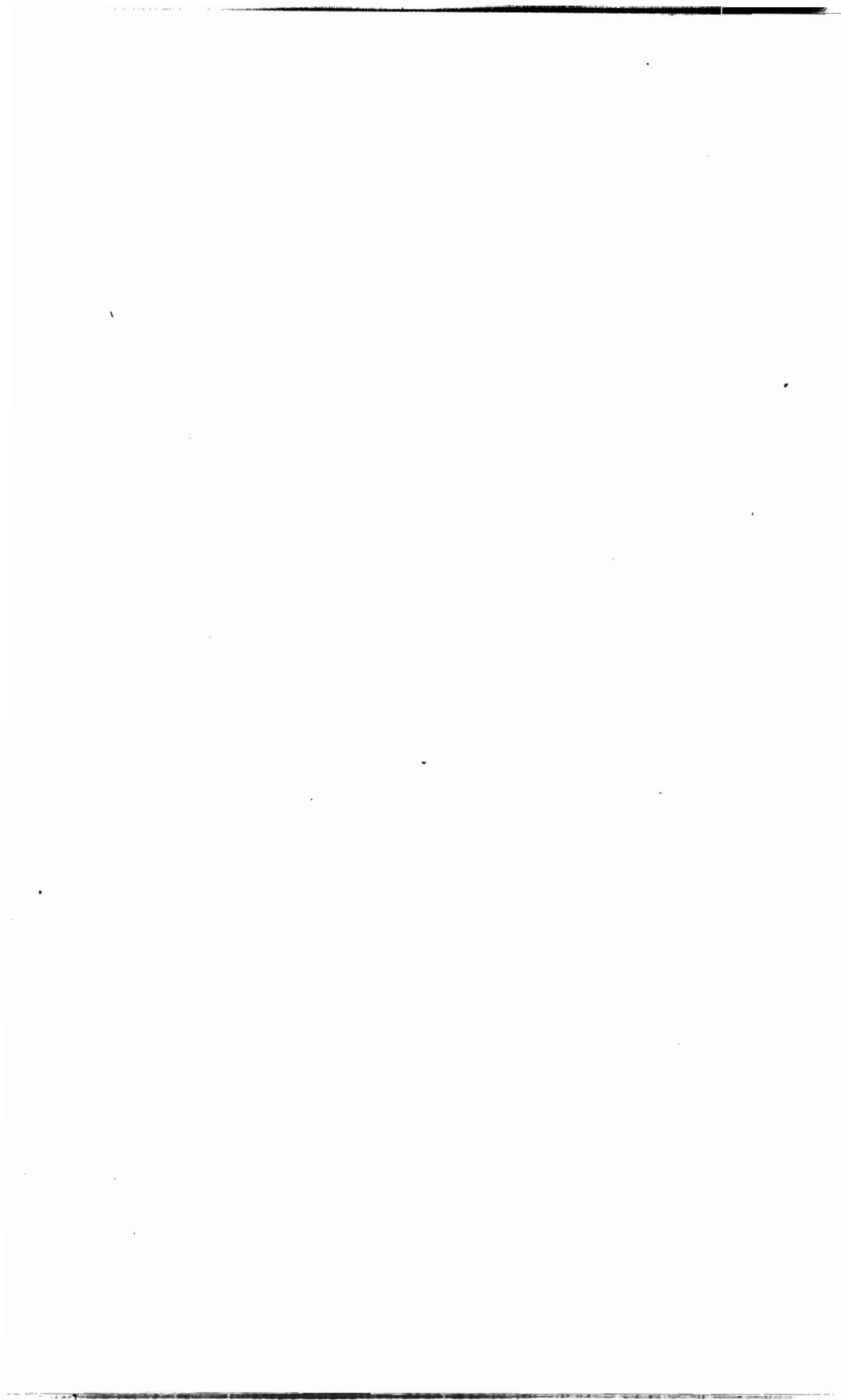
IV. Carefully examine all laws relating to the construction of local Boards and their duties. Correctness and promptness of action are most important. The failure of a law is oftener in delay or mistakes in its administration, or in technical errors than in the defects of the law.

V. The reports of the State Board of Health as sent are not the property of individuals but of the Board. The keeper of the town health book should keep control over them and see that when loaned to others they are returned to him, and passed over into the hands of the succeeding officer.

VI. We ask the same promptness in future annual reports as in these, and that the few who have failed to organize, or to make full report, will fully arrange at the first meeting of the Township Committee, and notify us.

VII. As the returns of marriages, births and deaths, so much indicate the progress and health of communities, and are essential in the study of local conditions, all Boards should insist upon prompt returns, and report to the Secretary of State any omissions. It is, too, the legal right of every citizen to have such a record. Any neglecting returns are liable to suit at law.

VIII. All communications should be addressed "State Board of Health," or "Bureau of State Vital Statistics," State House, Trenton.



## TYPHUS FEVER.

### BRIEF MEMORANDUM OF TYPHUS FEVER AS NOW PREVAILING IN CAMDEN COUNTY ALMS-HOUSE.

About the middle of January, after the Report of the Secretary had gone to press, a request was received by the Secretary of the Board from a Freeholder Committee of Camden county and from the physicians of the Alms-house, that the Board would give attention to a fever prevailing at that institution which had already caused sixteen deaths, but the character of which was not yet fully certified. Our first visit was made January 17th, and a preliminary report the day after. We abstract from that report as follows:

Between November 24 and the date of my visit, there had been about fifty cases of fever, with symptoms very distinct from remittent, and not having the usual symptoms of typhoid fever. We sought the history of the first ten or twelve cases that had occurred. The first patient was living, and was able to give an intelligent account of himself immediately previous to his attack. He had been working during the summer at Ellisburg. About the fourth or fifth of November, he went to Philadelphia, where he remained about a week, with very indifferent self-care. He lodged in two mens' lodging houses, which he describes as of the lowest kind; the crowded rooms were occupied by about twenty others, and a few days after his return home, he became ill, and was brought in a semi-unconscious condition to the alms-house, November 24th, and placed in a small room about 12x12 with three other persons in it. On December 6th, one of his room-mates was taken sick with the same fever, and the other two soon after. In the next room on the left, occupied by two persons, both were taken sick. Cases soon followed in the two rooms on the opposite side, across an eight feet hall. The first ten or twelve cases were just in this section. In the two rooms adjacent, and the three rooms opposite very few escaped. Three of the patients, one of the nurses and some others were able to give numerous facts as to the progress of the disease. The disease had never showed itself in the women's department of the same building. Taking all these facts and some others, as well as the charac-

ter of the fever into consideration, it seems very probable that the occasion of the sickness was the introduction of a contagious disease in the person of the first patient. It was, however, important to examine into other possible sources, or to see whether a fever that had been thus introduced was rendered unusually severe by bad household or local condition. The details as to the examination of water-supply, sewer system, and all sanitary construction, will be given hereafter.

The great defect that at once expresses itself is that of over-crowding. In November and December, the new part not having been in full occupancy, and the number of inmates being greatly increased, there was also an increase of crowding. We found seventy men in two adjacent rooms, 20x80 and 20x70, respectively. The closeness of beds in dormitories and rooms is still worse. Those who are sick are now crowded into entirely too small spaces, and the nurse force is wholly insufficient. While the physicians are doing everything in their power, it is to be feared that the high rate of mortality will not be avoided, and occurrences of new cases prevented until a system is adopted just the same as is in operation in our best hospitals. There is danger that the disease may spread into the adjacent district, unless the greatest precautions are taken, or that the whole institution may become so infected, as to repeat the experience of some others which have continued to have new outbreaks from the old virus, through successive seasons. While more details will be given in the full report when made to the State Board of Health, it seems proper that in view of the present emergency this preliminary statement should be made.

Respectfully,

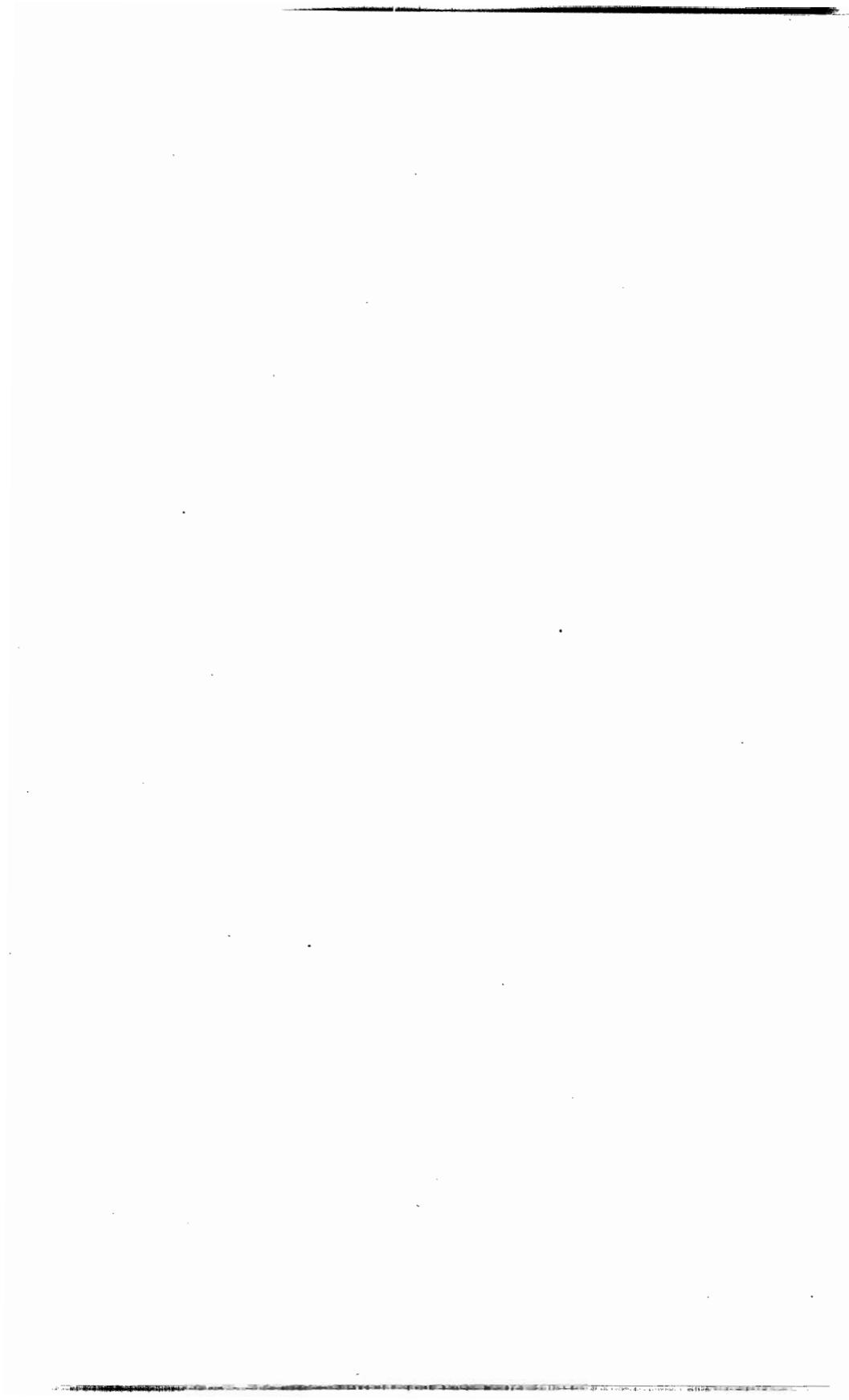
EZRA M. HUNT,

Secretary of State Board of Health.

Continued correspondence urged the rapid adoption of a hospital and separative system. On account of imperfect discipline and doubts as to exercise of authority, some delay occurred. At my next visit I was accompanied by Prof. C. F. Brackett, President of the Board, and Dr. F. Gauntt, member of the Board from Burlington County. We all earnestly insisted that the fever was of so serious a character as to be regarded as a pest which might easily be extended through the adjoining district. The Freeholders were advised to give to the physicians full power of stewardship, and to perfect a system of quarantine by which all well patients after fourteen days could be removed. The rate of mortality had decreased after a little relief of the over-crowding and the use of disinfectants. To this date there have been about seventy cases and twenty-five deaths.

Post-mortems advised by the Board and conducted by Prof. Tyson, of Philadelphia, as also other examinations of specimens by Prof. Pepper, leave no doubt that the disease is typhus fever. *Our report next year* will contain fuller details of cases as also of a thorough examination into local conditions.

It seems a coincidence that remittent fever at Bound Brook, typhoid at Princeton, and typhus in Camden county, should have in one year furnished such wonderful fields for typical study, while small-pox as a contagious disease which can be prevented has also had too much sway. The occasion for a close investigation of preventible diseases seems thus greatly impressed upon us, while other still more common zymotic diseases invite our constant attention and care. These whole series of cases have fully impressed upon us the importance of preventing such outbreaks and the need of prompt sanitary methods in their abatement.



## SUBSOIL DRAINAGE.

THE SANITARY REQUIREMENTS OF SUBSOIL DRAINAGE OF THE SITES  
OF TOWNS AND CITIES.

BY ASHBEL WELCH, C. E.

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All we have to say rests on the proposition that *wet soil is unfavorable to health*. As this will hardly be disputed, we shall not attempt to prove it, but merely enumerate some of the injurious effects of wet soil.

In hot weather the moisture from it facilitates the development of disease germs or specific poisons, whatever disease germs or specific poisons may be, and also their transport from place to place. That moisture facilitates the evolution of deleterious gases. Even where there is nothing to decompose, it causes an injurious excess of vapor. In cold weather the evaporation from damp soil uses up some of the needed heat, making the ground, in some cases, ten degrees colder than it is found to be after being drained.

Dampness also makes the human body more sensitive both to heat and cold. In the dry climate of Minnesota many degrees below zero are quite bearable; on the other hand, we all have felt a temperature of eighty degrees harder to bear on a damp day, than one of ninety degrees is on a dry day. Breathing an atmosphere of vapor by skin and lungs, instead of all air, or nearly all air, has a depressing effect, tending to produce disease, or predispose to it. One reason why mountain air is so invigorating is that at night the atmosphere of vapor is tenuous in comparison with the air, and so we breathe more air and less vapor. The depressing effect of hot weather, and the invigorating effect of cold weather, are probably due more to the greater or less amount of vapor than to the direct effects of heat or cold.

Under some conditions, a wet soil helps to produce one great

class of diseases, such as malarious, and to spread and intensify the zymotic; under other conditions, it produces another great class, such as rheumatism and coughs and consumption.

Doubtless the recent wide extension of the practice of excessive watering of streets in hot weather, is one cause of the increased sickliness of many places, and especially of the spread of malaria to places where it never prevailed before. This comes not only from the moisture, but from the fumes of the street filth, which the moisture assists to solve. The evil is intensified by the excessive foliage in some places, especially close around dwellings. Some persons, perhaps many, on reaching a watered street on a hot day, are unmistakably sensible of its depressing effect. Dust is bad, but dampness and malaria are worse.

The driest countries in the world, such as Egypt and Algeria are the healthiest, except when the heat is excessive; and these far healthier than damp countries equally hot.

Offices in basements, and dwellings of the poor in cellars, even at Liverpool, are notoriously unhealthy. Cellar kitchens are saved from unhealthiness by their open fires.

As there is everywhere an atmosphere of at least very tenuous vapor, some amount of it is doubtless necessary to health and comfort. It is therefore conceivable that a place may be too dry. But it is not likely that a place will ever be found or made too dry in this country.

It may be said that the air in a hot stove room becomes so dry as to produce headache; and that in hot weather the moist air around a playing fountain is refreshing. The headache comes from other causes. The coolness produced by the evaporation of spouting water is refreshing to most persons, in spite of the increased moisture; but to some the depression from the moisture more than counterbalances the coolness.

In 1862 Dr. Henry L. Bowditch, of Boston, read a paper on the connection between moisture and consumption, before the Medical Society of Massachusetts, showing the comparison, after several years of observation and inquiry, of one hundred and eighty-three townships in that State, and also of many single localities and dwellings. He found that in the one hundred and twenty-eight localities where moisture prevailed, consumption prevailed in one hundred and thirteen, and was rare in fifteen and that in the sixty-two townships where dryness pre-

vailed, consumption prevailed in twelve, and rare in fifty. That is, it prevailed in eighty-eight per cent. of the wet localities, and in less than twenty per cent. of the dry.

Much the same result was afterwards independently arrived at by Dr. Buchanan in 1866. After a wide and cautious induction from examination of localities in the three southeastern counties of England, he sums up as follows: "Wetness of soil is a cause of phthisis to the population living upon it." His facts would justify a much stronger statement.

The Registrar General of Scotland, in his seventh annual report made about a dozen years ago, speaking of Dr. Bowditch's conclusions, says in confirmation, that in five of the largest towns in Scotland consumption is most rare where the soil is driest, and little more than half as frequent in the very driest as in the very wettest.

As we should expect from what has been said it has been found that impervious and retentive soils (undrained) are more unhealthy than porous soils; that flat ground and that in which there are undrained hollows are more unhealthy than sloping ground of the same materials; and that glacial drift, being less pervious, and having more isolated hollows, is likely to be more unhealthy than diluvial gravel or sand.

It does not necessarily follow from what we have said that the proximity of streams or ponds, if the water is pure, is specially injurious to health. The evaporation from wet soil is continually forming and keeping up an atmosphere of vapor of considerable density immediately around us, that from neighboring waters being diffused, becomes more tenuous before it reaches us. The vapor from subsoil water brings up impurities from the ground into our very presence, while that from pure water does not. Evaporation from the ground chills it under our very feet; that from streams cools only the water and the air at some distance. But more than all, when the ground is dry the air circulates in it, and neutralizes its impurities.

So, in the somewhat analogous care of houses, damp from recent construction, it is well known that they are unhealthy and depressing, predisposing to diseases of the lungs, rheumatism and epidemics.

Probably no one will question the fact that a site, naturally wet, is made more healthy by being well drained. But the extent



From the foregoing table it appears that the whole number of deaths from other causes than epidemic cholera, before the sanitary improvements, in the 24 towns averaged 240 per annum for every 10,000 inhabitants. The number of deaths from consumption averaged 33 per 10,000, and from typhoid fever 13. This leaves 194 deaths per annum per 10,000 from all other causes than cholera, consumption and typhoid fever. Or out of every 1,000 deaths from other causes than cholera, 137 were from consumption, 54 from typhoid fever, and 809 from other causes:

	Total.	Cons.	T. ph.	Other.
Before improvements.....	1,000	137	54	809
Decrease when "much drying".....	163	46	30	87
"some drying".....	71	30	19	22
"little or no drying".....	30	16	14	14
Decrease per cent. when "much drying".....	16.3	33½	55	10½
"some drying".....	7.1	22½	34½	23
"little or no drying".....	3	13	30½	13½
Decrease due to "much drying".....	133	46	14	73
Decrease independent of drying.....	30	16	14	14
Decrease per cent. due to "much drying".....	13½	33½	24½	9
Decrease per cent. independent of drying.....	3	13	30½	13½

It would seem fair to infer that the decrease in the general death rate due to "much drying" where that took place, averaged 13½ per cent.; to "some drying," where only that took place, 4 per cent.. and to all other causes together, 3 per cent.; that the decrease of the consumption death rate due to "much drying" averaged 33½ per cent.; to "some drying" 22 per cent.; and to all other causes together nothing: that the decrease in the typhoid fever death rate, due to "much drying" averaged 24½ per cent.; to "some drying" 3½ per cent.; and to other causes 30½ per cent; and that the decrease in the death rate from all other causes than cholera, consumption and typhoid fever due to "much drying" averaged 9 per cent., to "some drying" 1 per cent. and to all other causes 1¾ per cent.

Without claiming for these inferred proportions, exact numerical accuracy, or putting them to any extreme, we are fairly entitled to conclude that drying the soil had more influence in decreasing the general death rate than all other causes together. Tabulating and classifying according to any other kind of improvement, we fail to find anything approaching to the same uniformity or magnitude of result.

The decrease in the death rate from typhoid fever, apparently

due to "much drying," was only 45 per cent. of the whole, that from diarrhœa still less; while the whole decrease of consumption was due to it.

The tables show, as they ought to, that the diseases known to arise from other and special causes, are not so much affected by wetness of soil, though aggravated by it; and that consumption is produced mainly by it, as was already known. That is, the inferences from the tables, are, on those points, corroborated by existing knowledge, and therefore likely to be correct in other respects.

The deaths from cholera, during three epidemics, all occurring before the improvements were made, averaged 50 per cent. more in those towns where there was afterwards "much drying" and which were therefore, probably, wettest, than in those where there was only "some drying"; and 100 per cent. more than in those where there was afterwards "little drying" and therefore, probably, in some cases certainly, dry already. Looking at individual cases, however, we do not find the connection between cholera and wetness of soil so uniform as between the majority of diseases, especially consumption, and wetness of soil.

With very few exceptions, the decrease in the death rate in the particular cases, as well as the general average, was greater where there was "much drying" than in those cases where there was only "some drying"; and in those where there was "some drying" greater than those in which there was little or none. This approach to uniformity among so many cases excludes all suspicion of accidental coincidence.

The good done by the sanitary operations in those four and twenty English towns was, therefore, mainly, the drying effected. It is very possible that the sewers as carriers of sewerage, in some cases did more harm than good, the excess of harm being more than compensated by the good they did as drains.

And yet, in most cases, this drying of the subsoil was not the thing particularly aimed at. The sewers were to carry off sewage and storm-water, and where there was any standing water, but the subsoil drainage was merely accidental or incidental. If the good effected so largely by accident has been so great, we may hope it will be much greater when the means are adapted to that special end.

We shall now consider those means.

*Sewers and drains are built for three purposes*: to carry off sewage; to carry off storm and hydrant water; and to drain the subsoil. We shall confine our remarks almost entirely to drains for the last of these purposes.

Sewerage, if water-borne at all, may be carried off by separate pipes, or by the storm-water sewers, according to the circumstances of the place. But we advocate a separate system of drainage, where the soil is wet, to carry off the subsoil water, for the following reasons.

In most soils, especially in wet and retentive soils, it is necessary, in order to get them well dried, to have the drains much nearer together than the sewers or the sewage pipes need to be, or can be.

Sewers need not, and should not, be many feet below the surface, except when they cut through a rising undulation of the ground. Drains, on the contrary, should be fifteen feet or more below the surface, so as to dry the soil to at least that depth, and to keep the deepest cellars dry. The deeper they are, the farther each way they will drain and therefore the farther apart they may be.

Drains can commonly run by the shortest and steepest lines to the nearest outlet. The almost constant flow being moderate in quantity is easily taken care of almost anywhere. On the contrary, sewers to carry storm-water must run on more regular grades, along lines of streets, and to some point, sometimes quite distant, whence a large quantity of water can run off without doing harm. If they carry sewage they should also reach a point perhaps still more distant, where it can do no harm.

A sewer, or pipe carrying sewage, must be tight, or else the deleterious matters or gases will escape into, and contaminate the soil, or the water in it. The soil, should not, therefore, be drained *into* them. It may be drained under, or alongside of such sewers or pipes; but it rarely happens that they are deep enough, or frequent enough, or run in the best direction. A sewer, even if it carried only clean rain-water, should not be used to drain the soil; for if it is not tight the water will run out of the sewer into the ground after a rain, by the same openings by which the subsoil water runs into the sewer at other times. This would keep the height of the subsoil water fluctuating, which is injurious to health. Drains unconnected with the

sewers keep the subsoil water at a uniform level. Water from cellars may be safely drained into subsoil drains, but not into sewers.

Before considering the position and construction of drains, let us first see where the water to be removed comes from, and how it comes. It may fall in rain or snow on the site; or it may be discharged there from water-works, sometimes to an amount that may equal, or exceed the rain-water. Or the water may come from somewhere else, by overland flow, or by percolation under ground. The mode and extent of drainage requirements are affected by the permeability of the soil, the position and inclination of the water, the slope of the surface, and the proximity and character of higher ground, and a proper place for discharge. One cardinal principle of drainage is to intercept the water as early, and as near its source as possible. As much as possible of the rain and waste hydrant water should be carried off at once over the surface or through sewers, and not allowed to sink into the ground, unless careful observation should show that an occasional rain-water subsoil washing does more good by carrying off impurities than harm, by varying the water-level, and in other ways. Overflow water from adjacent territory should be intercepted by channels, sewers or dykes, on the frontier of the site, so as not to come upon, and soak into the soil. Overflow of streams passing through the site may be guarded against by dykes, or what is better, enlarging their channel, or giving the channel a better section. A channel twenty-five feet wide and sixteen feet deep, will discharge one-third more than one of the sectional area of four times the width, and one-quarter of the depth. The width remaining constant, the capacity of the channel may be increased one hundred per cent. by adding to the depth only sixty per cent. In some cases, this deepening has not been done, from the erroneous supposition that it was of no use to make the bottom of a channel deeper than the basin into which it discharges.

The percolation of water underground from neighboring territory should be intercepted before reaching the site, if possible. That is commonly cheaper and more thorough. Often the water can be cut and carried off by a single drain, while if it is diffused over the site it would require many. Outside of the town the way is clear to drain to the best advantage; in the town

streets run wrong for draining, and foundations, houses, gas and water-pipes are in the way, and grades may not suit. The sooner the water is drained off the less it gets into the soil and the less harm it does.

Where such neighboring territory can be controlled, much may be gained by underdraining it all over. In most cases there should be a thorough and deep drain along the frontier of the town site to cut off the underground flow. A vertical stratum of open gravel should extend from the surface of the ground down to the drain, so that the water on reaching it shall immediately drop down through it to the drain. In some cases a course of sheet piling or thin cement wall may be necessary to prevent the water from crossing over the drain and going further laterally.

When the underground flow is too deep to be cut off, the drains should be as near as possible to the places where it rises, and as deep as possible so that it shall not spread, or rise high enough to do harm.

Drains should be fifteen feet below the surface if possible. They may be small round or rectangular unmortered culverts of stone or brick, pipes of terra-cotta or cement, tiles, &c. In any case they must be open at the joints or elsewhere to receive the water, be surrounded by open gravel or something equivalent, to exclude earth or silt, and a vertical stratum of gravel, even if only a few inches thick, should extend from the drain to the surface of the ground. Without this latter precaution drains may cease to take off the water at all from the soil some feet above them, after the filling over them becomes consolidated.

In many cases after sewerage, the death rate has at first decreased, and then, after a while, increased nearly to what it was before. That is, the accidental effect of the sewer was to drain the soil so long as the filling around it remained open and porous, but when the filling settled and became nearly or quite water-tight, the drainage along the outside of the sewer ceased, the soil became wet again, and the death rate increased.

Cellars and foundations of dwellings should be kept dry, for if the cellar is damp the house will be damp. Some of the means besides the general drying of the locality, are cement or asphaltum floor and cemented cellar walls, or, at least, external cement

or asphaltum plastering upon them. A cement or asphaltum layer upon or under the surface of the ground, all around the house, to prevent the surface-water from running down to the foundation; and subsoil drains all around the foundations, and when necessary under the floor. Where possible, water should not be drained out of the cellars but kept out, not dried but kept from getting wet.

There should be no communication between cellars and sewers or sewage pipes. The poison given from them contaminates even ice. Separate drains are sometimes made on or alongside of sewers or pipes. It would be better to make them several feet below, and fill with gravel between.

It is quite possible that the uses for which sewers were intended, may, in some cases, have been productive of more harm than good, while their accidental effects were so great as turn the scale the other way, in favor of good. Streams of filth running for miles and miles through the sewers all over a city, pouring their poisonous gases through the openings into the streets, through the "modern conveniences" into the bed rooms, and through the kitchen sinks into the larders, may be worse than the evils they are intended to remove; but the accidental good they have done in those cases by draining the subsoil, at least while the filling around them remained porous, seems to have more than compensated for the harm. Now if this has anywhere been the case, it would have been a great deal better, as well as cheaper, to put subsoil drains there instead of sewers for sewage. Probably the improvement in many a sewered town is not due to sewerage, but to drainage; however this may be, there is no doubt about the great benefit of subsoil drainage, unless the ground is dry already.

## METEOROLOGICAL TABLES.

*Minimum, Maximum and Mean Temperature, at Newark, N. J.,*

*by Wm. A. Whitehead, for Years 1844 to 1880, inclusive.*

YEARS.	MIN. TEMP.		MAX. TEMP.		MEAN TEMP. Each Five Years.
1844.....	January 12,	3½ degrees.	July 14,	92½ degrees.	51.21 degrees.
1845.....	February 10,	3½ degrees.	July 14,	98½ degrees.	51.37 degrees.
1846.....	February 27,	1½ degrees.	July 10,	94 degrees.	51.66 degrees.
1847.....	February 24,	0½ degrees.	July 19,	93½ degrees.	49.83 degrees.
1848.....	January 11,	2¼ degrees.	June 16,	94½ degrees.	51.25 degrees.—51.06 degrees.
1849.....	January 11,	2¼ degrees.	July 13,	92½ degrees.	50.89 degrees.
1850.....	March 4,	9¾ degrees.	July 25,	93½ degrees.	52.86 degrees.
1851.....	December 27,	7¾ degrees.	June 20,	93¾ degrees.	51.76 degrees.
1852.....	January 20,	2½ degrees.	June 16,	95½ degrees.	50.57 degrees.
1853.....	January 28,	6¾ degrees.	June 21,	97 degrees.	52.75 degrees.—51.77 degrees.
1854.....	December 20,	2 degrees.	August 23,	99 degrees.	51.35 degrees.
1855.....	February 7,	8 degrees.	June 29,	96½ degrees.	50.68 degrees.
1856.....	January 9,	7¾ degrees.	July 27,	97 degrees.	48.85 degrees.
1857.....	January 24,	12 degrees.	August 14,	89 degrees.	49.95 degrees.
1858.....	February 24,	6½ degrees.	July 11,	91½ degrees.	50.52 degrees.—50.29 degrees.
1859.....	January 11,	12½ degrees.	July 13,	91½ degrees.	50.11 degrees.
1860.....	February 2,	4 degrees.	June 29,	90 degrees.	50.00 degrees.
1861.....	February 8,	7½ degrees.	July 9,	91½ degrees.	50.79 degrees.
1862.....	December 21,	5 degrees.	August 9,	90½ degrees.	50.68 degrees.
1863.....	February 5,	3 degrees.	August 3,	90¾ degrees.	50.30 degrees.—50.37 degrees.
1864.....	February 18,	2 degrees.	June 26,	94½ degrees.	51.04 degrees.
1865.....	February 12,	1 degree.	July 7,	91½ degrees.	51.76 degrees.
1866.....	January 8,	12¾ degrees.	July 17,	98½ degrees.	50.65 degrees.
1867.....	January 20,	¾ degree.	July 4,	88 degrees.	49.67 degrees.
1868.....	February 4th,	4½ degrees.	July 5,	92 degrees.	48.62 degrees.—50.35 degrees.
1869.....	March 1,	6 degrees.	July 16,	91¾ degrees.	50.40 degrees.
1870.....	December 30,	5¾ degrees.	June 28,	92½ degrees.	52.67 degrees.
1871.....	December 21,	1½ degrees.	May 30,	87¾ degrees.	50.46 degrees.
1872.....	December 25,	2 degrees.	July 2,	94 degrees.	50.44 degrees.
1873.....	January 12,	12 degrees.	July 3,	91½ degrees.	49.34 degrees.—50.66 degrees.
1874.....	February 2,	3½ degrees.	June 29,	91 degrees.	50.41 degrees.
1875.....	January 19,	3 degrees.	June 25,	92 degrees.	48.20 degrees.
1876.....	December 10,	4 degrees.	July 9,	98 degrees.	51.23 degrees.
1877.....	January 6,	7½ degrees.	July 26,	99 degrees.	53.21 degrees.
1878.....	February 4,	8 degrees.	July 3,	98½ degrees.	53.63 degrees.—51.34 degrees.
1879.....	January 3,	2 degrees.	July 16,	99½ degrees.	51.75 degrees.
1880.....	December 30,	6½ degrees.	May 25,	96 degrees.	52.92 degrees.
Mean of the 37 years.....					50.92 degrees.

From the foregoing table, the following facts are ascertained :

1st. That the lowest temperature has been experienced in February, thirteen times occurring, on nine of them between the 2d and 10th; in January, fourteen times, occurring on nine of them between the 3d and 12th; in December, eight times, occurring only once before the 20th, and in March twice, on the 1st and 4th.

2d. That the warmest weather is most likely to occur in July, having been experienced in that month twenty-one times, on

thirteen of them prior to the 15th; the next in number was June, ten times; then August, four times, and May twice, on 25th and 30th.

3d. That the extremes of temperature during the thirty-seven years was  $112\frac{1}{2}$  degrees; from  $12\frac{3}{4}$  degrees below zero in January, 1866, and  $99\frac{3}{4}$  degrees above in 1849.

4th. That the mean temperature of the years for the whole period was  $50.92^{\circ}$ ; the coldest year being 1875, having a mean temperature of  $48.20^{\circ}$ , the warmest 1878, having a mean temperature of  $53.63^{\circ}$ .

5th. That such is the natural tendency to equalization in the course of years, that while the several years have differed nearly five and a half degrees ( $5.43^{\circ}$ ), yet between any series of five years, the greatest difference has been less than a degree and a half ( $1.42$ ).

*Highest and Lowest and Mean Temperature of the Several Months.*

MONTHS.	HIGHEST TEMP.	LOWEST TEMP.	MEAN OF ALL.
January.....	1876—65 degrees.	1866— $12\frac{3}{4}$ degrees.	37 years, 29.11 degrees.
February.....	1874— $68\frac{1}{2}$ degrees.	1855—8 degrees.	37 years, 33.17 degrees.
March.....	1851— $77\frac{1}{4}$ degrees.	1868—2 degrees.	37 years, 37.79 degrees.
April.....	1846— $85\frac{1}{2}$ degrees.	1857—17 degrees.	37 years, 48.71 degrees.
May.....	1880—96 degrees.	1861—31 degrees.	38 years, 59.19 degrees.
June.....	1853—97 degrees.	1843— $38\frac{1}{4}$ degrees.	38 years, 68.50 degrees.
July.....	1849— $99\frac{3}{4}$ degrees.	1845— $46\frac{1}{4}$ degrees.	38 years, 73.81 degrees.
August.....	1854—99 degrees.	1854— $46\frac{3}{4}$ degrees.	38 years, 71.55 degrees.
September.....	1854— $93\frac{3}{4}$ degrees.	1848— $34\frac{1}{2}$ degrees.	38 years, 64.11 degrees.
October.....	1861—83 degrees.	1845— $22\frac{1}{4}$ degrees.	38 years, 52.99 degrees.
November.....	1847— $73\frac{3}{4}$ degrees.	1875—8 degrees.	38 years, 42.38 degrees.
December.....	1848— $68\frac{1}{2}$ degrees.	1852— $7\frac{1}{2}$ degrees.	38 years, 32.01 degrees.
Mean.....			51.11 degrees

*Temperature of the Seasons.*

SEASONS.	WARMEST.	COOLEST.	MEAN.
Spring.....	1880—52.34 degrees.	1875—45.13 degrees.	37 years, 48.56 degrees.
Summer.....	1877—75.34 degrees.	1859—68.12 degrees.	38 years, 71.40 degrees.
Autumn.....	1850—56.32 degrees.	1875—50.77 degrees.	38 years, 53.16 degrees.
Winter.....	1879-80—35.91 degrees.	1867-8—24.89 degrees.	37 years, 30.59 degrees.
Mean.....			50.93 degrees.

The proportionate amount of fair weather during the several years, and the number of days on which rain fell in mensurable quantities, and snow irrespective of quantity in each year:

YEARS.	FAIR.	Mean	RAIN.	Mean	SNOW.	Mean
	Equal to Days.	of each 5 years.	In Days.	of each 5 years.	In Days.	of each 5 years.
1844.....	222		101		23	
1845.....	238		88		24	
1846.....	209		98		23	
1847.....	219		91		31	
1848.....	233	224	91	94	23	25
1849.....	214		95		22	
1850.....	224		97		28	
1851.....	232		91		18	
1852.....	233		90		28	
1853.....	236	227	98	94	21	23
1854.....	230		79		34	
1855.....	220		94		22	
1856.....	253		79		23	
1857.....	219		101		32	
1858.....	235	231	98	90	19	26
1859.....	220		90		28	
1860.....	227		79		28	
1861.....	236		86		34	
1862.....	218		99		29	
1863.....	213	223	113	93	27	29
1864.....	239		82		28	
1865.....	228		85		26	
1866.....	228		97		24	
1867.....	213		101		37	
1868.....	204	222	101	93	36	30
1869.....	228		112		38	
1870.....	230		88		27	
1871.....	227		98		27	
1872.....	243		86		31	
1873.....	232	232	97	96	35	32
1874.....	239		92		28	
1875.....	219		102		44	
1876.....	216		96		31	
1877.....	228		98		13	
1878.....	219	224	110	100	18	27
1879.....	204		112		44	
1880.....	218		116		28	
Means.....	226		97		29	

From the foregoing table it is seen that the amount of fair weather in any one year is, on an average, equal to 226 days. That the average number on which rain falls in quantities susceptible of measurement is 97. That snow is observed on an average 29 days in each year, and that on taking the average of each five years it will be found that the quantities assimilate in a remarkable degree.

Table of Rain-fall at Newark for Thirty-eight Years.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Average of each 5 years.
1843.....					0 850	1.590	2 285	22.485	3.610	5.905	3.920	4.145	.....	.....
1844.....	4.985	1.640	4.785	0.390	3.550	2.560	5.820	2.080	2.970	5.515	2.040	3.875	.....	40.210
1845.....	3.370	4.210	3.765	1.275	2.155	3.400	2.175	4.800	2.455	2.255	2.875	3.735	.....	36.470
1846.....	5.125	4.160	3.415	3.265	8.745	2.175	4.730	4.105	0.550	2.815	8.745	3.745	.....	51.575
1847.....	4.655	6.075	4.145	0.850	3.155	6.230	3.305	2.890	11.300	3.460	2.840	5.910	.....	54.835
1848.....	1.825	1.815	2.395	1.335	5.985	6.065	2.065	0.955	2.195	4.965	2.720	4.520	.....	36.790
1849.....	0.640	2.690	4.355	0.910	4.235	1.090	2.365	8.085	1.600	6.920	2.180	4.470	.....	40.050
1850.....	5.010	3.055	4.175	3.030	7.435	3.535	7.420	4.725	4.405	1.725	1.520	5.110	.....	51.145
1851.....	2.010	4.500	3.967	6.090	3.930	1.105	6.435	1.520	0.625	3.660	4.610	1.930	.....	40.382
1852.....	2.920	2.205	4.805	5.215	2.675	1.720	2.535	4.165	1.740	2.170	5.845	7.545	.....	43.540
1853.....	3.090	5.220	3.145	3.015	4.675	3.655	3.250	11.225	5.030	5.080	3.670	1.285	.....	52.340
1854.....	1.790	5.020	0.980	11.365	4.170	2.100	3.580	1.125	3.960	2.440	4.310	2.635	.....	43.475
1855.....	4.030	3.466	1.875	2.470	2.365	4.525	4.470	4.160	2.250	5.260	2.890	6.500	.....	44.261
1856.....	3.370	1.250	2.000	2.570	4.315	3.120	1.410	5.700	2.665	1.400	2.790	3.485	.....	34.075
1857.....	3.830	1.500	1.990	7.155	6.030	5.345	5.080	4.015	3.810	3.955	0.870	5.785	.....	49.365
1858.....	3.465	2.485	1.010	3.852	4.995	4.650	2.995	4.210	1.410	3.010	4.785	4.260	.....	41.077
1859.....	6.055	3.800	6.885	5.305	2.250	3.945	4.025	6.265	6.985	2.550	3.785	5.200	.....	57.050
1860.....	2.320	2.710	1.225	2.510	5.000	1.815	2.720	6.235	5.650	2.835	6.715	3.420	.....	43.155
1861.....	4.465	1.885	4.915	4.920	5.190	2.600	1.120	3.970	3.260	2.865	6.425	1.990	.....	43.605
1862.....	5.415	3.695	3.995	3.215	3.045	6.605	3.020	3.005	2.125	4.265	4.455	1.850	.....	44.690
1863.....	4.270	4.250	5.250	5.835	4.490	1.045	5.955	4.975	1.300	3.445	2.610	4.575	.....	48.000
1864.....	1.730	0.825	3.145	3.670	5.280	1.855	2.675	3.210	4.680	2.675	3.950	4.760	.....	38.455
1865.....	4.090	4.570	4.890	3.340	5.730	3.485	6.735	3.935	3.210	4.685	3.300	4.385	.....	52.355
1866.....	1.740	5.070	1.820	2.820	4.400	2.505	1.840	5.345	5.470	3.970	2.090	2.910	.....	39.980
1867.....	1.610	5.640	4.395	2.575	6.550	9.745	3.755	10.615	1.235	4.620	1.945	2.045	.....	54.730
1868.....	3.275	1.620	2.170	5.255	6.925	5.895	8.535	4.755	8.955	1.250	4.375	3.845	.....	56.855
1869.....	3.420	5.055	4.670	1.150	4.670	5.845	3.690	1.555	2.540	6.820	3.085	5.435	.....	48.475
1870.....	4.725	4.265	4.555	7.000	1.995	3.125	6.965	3.095	2.795	4.750	2.460	2.185	.....	47.915
1871.....	3.035	3.045	4.990	3.685	3.950	7.105	4.140	5.310	1.990	6.026	3.990	2.175	.....	49.441
1872.....	1.845	1.775	3.880	3.745	3.075	4.270	8.940	6.625	3.240	3.110	4.175	3.785	.....	48.465
1873.....	5.820	3.885	2.760	5.835	3.755	1.715	6.615	7.765	3.550	3.740	4.670	2.470	.....	52.580
1874.....	5.670	3.168	2.135	8.715	2.755	3.380	4.230	2.785	9.050	2.435	2.860	2.810	.....	50.193
1875.....	3.310	2.400	3.820	3.135	1.595	2.335	5.985	10.215	1.930	2.870	4.360	2.610	.....	44.565
1876.....	1.200	5.355	10.000	3.305	3.045	1.585	3.060	2.450	7.505	1.260	4.040	2.515	.....	45.320
1877.....	3.060	1.650	6.075	3.125	1.010	4.170	5.980	7.730	1.470	7.735	6.915	0.920	.....	49.840
1878.....	6.525	4.960	3.635	1.730	4.205	2.445	4.330	8.060	2.535	2.830	4.570	7.469	.....	53.294
1879.....	2.890	2.530	3.745	4.960	2.175	3.038	5.050	9.120	3.950	0.320	1.940	5.330	.....	44.648
1880.....	2.590	2.830	4.900	3.305	0.760	1.185	7.460	4.680	2.480	2.100	2.365	2.685	.....	37.340
Means.....	37 years	37 years	37 years	37 years	38 years	38 years	38 years	38 years	37 years	.....				
Greatest.....	6.525	6.075	10.000	11.365	8.745	9.745	8.940	22.485	11.300	7.735	8.745	7.545	57.050	.....
Least.....	0.640	0.825	0.980	0.390	0.760	1.045	1.120	0.955	0.550	0.320	0.870	0.920	34.075	.....

\*Very remarkable—perhaps unprecedented.

Seasons.

	Spring Months.	Summer Months.	Autumn Months.	Winter Months.
Greatest quantity in any one year.....	1854, 16.515	1843, 26.360	1847, 17.600	1852-3, 15.855
Least quantity in any one year.....	1855, 6.710	1854, 6.805	1879, 6.050	1871-2, 5.795
Mean quantity.....	37 yrs, 11.709	38 yrs, 13.353	38 yrs, 10.939	37 yrs, 10.676

From the foregoing table it will be seen that the yearly average of water deposited in rain and melted snow is 46.216 inches, the extremes being 57.050 inches as in 1859, and 34.075 inches as in 1856. It is also seen that while two years in conjunction may differ in quantity 18.055 inches, as in 1847 and

1848, yet the greatest difference in the average of any five years was only 4.849 inches as in 1854-58 and 1859-63. One practical result derived from this table is, that in every square foot of surface in Newark, there falls on an average twenty-eight and eight-tenths gallons of water in the course of a year.

*Depth of Snow in each Winter.*

	Feet.	Inches.		Feet.	Inches.		Feet.	Inches.
1843-4.....	2	7	1856-7.....	4	4	1869-70.....	1	6
1844-5.....	3	3	1857-8.....	2	4	1870-1.....	3	1
1845-6.....	4	4	1858-9.....	3	11	1871-2.....	1	4
1846-7.....	4	...	1859-60.....	4	3	1872-3.....	5	3
1847-8.....	1	10	1860-1.....	4	...	1873-4.....	3	...
1848-9.....	3	9	1861-2.....	4	4	1874-5.....	3	7
1849-50.....	2	7	1862-3.....	4	2	1875-6.....	1	...
1850-1.....	2	1	1863-4.....	1	10	1876-7.....	2	11
1851-2.....	5	3	1864-5.....	4	...	1877-8.....	1	2
1852-3.....	2	1	1865-6.....	2	11	1878-9.....	2	11
1853-4.....	5	11	1866-7.....	5	2	1879-80.....	7	...
1854-5.....	3	9	1867-8.....	6	3			
1855-6.....	5	5	1868-9.....	1	10			
Greatest Fall 1867-8.....							6 ft.	3 in.
Least Fall 1875-6.....							1 ft.	... in.
Mean .....							3 ft.	6 in.

METEOROLOGICAL SUMMARY AT PATERSON FOR THE YEAR 1880,  
 BY J. S. HILTON, C. E., CITY SURVEYOR.

The total rain-fall for the year is largely in excess of the mean yearly fall recorded for a period covering nearly half a century. "Draper's" table of rain-falls, running back to 1834, gives 46.75 inches as the mean yearly fall for that series of years. Last year's fall amounts to 57.77 inches, an excess of 11.02 inches over the mean fall of 46 years. Of this total amount, 3.69 inches is due to melted snow, from an aggregate snow-fall of 44.75 inches in depth during the year.

Taking the amount of rain belonging to each season of the year, and comparing it with the mean fall for such seasons, we are enabled to compile the following table:

SEASONS.	Rain-fall for 1880.	Mean Fall.
Winter.....	13.79 inches.	10.47 inches.
Spring.....	8.06 "	12.44 "
Summer.....	22.34 "	12.45 "
Autumn.....	13.58 "	11.38 "

Here we find all the seasons in excess this year except spring, which fell short 4.38 inches, or about 33 per cent. of the mean. It is apparently rather an anomalous condition of things, to find a year with an aggregate rain-fall largely in excess of the mean fall of half a century, bringing with it a drought so widespread and severe as that of 1880. But in looking over the record an explanation is easily found. Taking the months of May and June, which show the heaviest mean rain-falls, with the exception of August, we find the year 1880 recording for them both but 3.75 inches against a mean fall of 8.60 inches, a deficiency of 4.78 inches, or nearly 60 per cent. This is the record for Paterson. At Newark and New York, the deficiency is still greater, the former place recording a falling off of 6.77 inches and the latter of 6.52 inches for the same months. We find further, that during May, 1880, there was but one day, and in June only three days, on which rain, otherwise than a mere sprinkling, fell.

This gives a period of 61 days, with only four days on which rain of any account fell. To this most unusual scarcity of rain, at the very period in which nature usually provides most bountifully for the saturation of the water-sheds and replenishing of the water-courses, was added a very high temperature for both months, and the prevalence of drying winds from the southwest, west and northwest. In these facts we can readily find sufficient causes for the severe drought, from which we are even yet not free, notwithstanding the large aggregate amount of rain for the year. During the year the greatest amount of snow fell in the months of March and December, it being 14 inches in each month. The least snow was in January, 3 inches. The heaviest monthly rain fell in July, amounting to 12.06; the least in May, 0.85 inches. The longest period without rain was 22 days, from the 31st of April to 21st of May (inclusive.) During the year rain fell in measurable quantities on 115 days. During 1879

rain fell on 114 days. The mean temperature for the year was 55°, 5° above the average. The temperature of the winter months was 37°, nearly 7° above the average. The spring months were 6° above the average, and the summer and autumn months, 6° and 1° respectively above the average. This record shows an unusually high temperature for the past year. The river was unusually low during the whole year. The highest water recorded for the year was on the 14th of February, it being then 3 feet 10 inches above extreme low water. On the 15th of March it was only 1½ feet above extreme low water level, and on April 28th it was barely 10 inches above extreme low water at the Arch street bridge. In April, 1879, it was 5 feet 10 inches above low water at the same point. From May to the end of the year the highest level reached was only 1 foot 8 inches above extreme low water,—and the rise was only temporary, the water rapidly falling after each rise, and from May to the end of the year it approximated but a few inches above extreme low water, the rains having little effect on it. The remarkably heavy rain of July, amounting to 12.06 inches, raised it but one foot above extreme low water. There is no record to show that the Passaic river has ever been at so low a stage of water continuously as during the year 1880. Since May there has been no time during any month when the average level has been more than one foot above extreme low water, below the Falls, and that only for a few days.

In fact, the drought, in duration, may be stated as one lasting eight months, and a drought of that extent may be safely recorded as having never been equalled, at least within the memory of the "oldest inhabitant." During 1878 and 1879, the low water in the river lasted only twenty-five days in the former, and forty-four days in the latter year. Against these periods, a drought of two hundred and forty days for 1880 is remarkable, and the drought of 1880 bids fairly now to extend into 1881. The rain fall of December, 1880, is far below the record for the last two years, and is 1.50 inches below the mean fall for the month. The stage of the river at present is but a few inches above extreme low water.

In 1878, the river in December was ten feet above low water, and in 1879 it was nearly three feet above. Never since the incorporation of the Passaic Water Company has its capacity

been so tried as during this year. Since May, their turbine has been used only a few days, and the steam pumps have been working continually night and day. During October, the water in the river and reservoirs was so low that, by agreement, the manufacturing establishments along the race-ways stopped work for one day (the 12th) to allow the river to fill up, and give the Passaic Water Company a chance to fill up their reservoirs. Thousands of dollars have been lost to these establishments during the year, in the enforced short time and stoppages, caused by the scarcity of water.

City Surveyor's Office, City Hall, January 5, 1881.

Table of Temperature and Rainfall at Freehold, N. J., from July 1st, 1879 to July 1st, 1880.

MONTHS.	Minimum Temperature.		Maximum Temperature.		Monthly Mean Temperature.	Rain or snow fell on days.	Total Rain-fall or melted snow.	Mean do. of five years.	Mean relative humidity.	Prevailing winds.	Thunder and lightning on days.
	Date.	Degree.	Date.	Degree.							
	Inches.	Inches.	Per c't.								
July.....	1 and 6	56.	16	97.	73.76	10	5.45	4.91	78.3	W.	10
August.....	10	51.	3	92.5	70.853	10	9.58	6.59	83.4	W.	5
September.....	26	37.	1	85.	61.44	8	1.86	2.92	80.2	W.	6
October.....	26	24.5	3	83.	58.49	9	0.68	2.85	79.6	W.	2
November.....	21	15.5	12	72.	41.498	7	1.71	4.40	74.2	W.	1
December.....	27	8.	4	60.	36.71	12	6.77	3.82	80.3	N.W.	.....
1880.											
January.....	14	11.	28	58.5	38.183	11	2.06	3.03	81.4	W.	1
February.....	2	9.	27	67.	34.757	11	2.69	2.67	76.1	W.	.....
March.....	25	16.	5	69.	36.863	16	5.71	5.95	74.2	N.W.	.....
April.....	12	23.	15	82.	49.707	12	2.91	2.90	67.5	N.W.	7
May.....	1	32.	27	94.5	67.15	6	0.82	2.32	69.2	W.	5
June.....	3	49.	24	94.2	71.966	7	1.58	2.99	71.6	W.	8
Totals.....		332.0		954.7	641.377	119	41.82		916.0	W.	45
Means.....		29.3		79.5	53.448	9.9	3.48		78.3	W.	3.7

Observations taken by Frank Osborn, Middletown, N. J., from July 1st, 1879 to July 1st, 1880, inclusive—Maximum and Minimum Temperature.

DAY OF MONTH.	1879.											
	July.		August.		September.		October.		November.		December.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.....	86	61	85	68	87	62	79	56	54	27	42	18
2.....	85	59	89	69	88	63	92	61	50	27	45	21
3.....	87	57	92	71	85	65	81	60	54	32	60	32
4.....	92	69	92	72	72	67	90	54	41	22	62	38
5.....	93	62	84	66	84	62	81	52	47	19	73	32
6.....	69	56	87	68	81	59	81	55	50	18	45	36
7.....	73	55	88	71	78	60	71	58	55	31	58	45
8.....	77	56	74	69	83	65	75	57	58	32	60	40
9.....	82	66	81	61	79	54	76	57	59	35	62	36
10.....	86	66	68	53	75	51	87	63	74	58	47	36
11.....	89	67	77	53	75	51	75	62	76	43	60	45
12.....	88	67	80	60	73	55	66	59	53	43	63	36
13.....	77	62	84	60	75	53	75	60	78	51	50	22
14.....	81	61	84	61	73	51	79	49	72	49	40	24
15.....	87	68	85	64	72	52	78	49	65	50	46	35
16.....	96	69	72	64	74	49	83	58	75	50	52	25
17.....	96	69	74	64	73	49	89	62	66	38	38	25
18.....	84	59	78	66	78	50	82	61	68	38	59	18
19.....	78	58	69	63	76	54	81	65	48	30	44	18
20.....	77	58	81	62	71	52	71	39	48	32	35	28
21.....	76	57	81	60	72	54	67	39	36	13	36	22
22.....	79	60	82	60	62	56	66	45	32	13	38	15
23.....	91	65	89	66	59	50	67	56	39	14	40	30
24.....	87	67	80	62	73	49	75	40	54	24	42	30
25.....	78	66	75	61	77	45	53	27	52	24	45	31
26.....	73	65	68	60	68	42	48	27	53	23	37	8
27.....	73	65	66	57	68	42	59	36	56	31	33	6
28.....	86	70	71	55	68	48	55	37	52	32	30	9
29.....	83	69	78	57	72	50	69	42	61	49	45	29
30.....	84	69	84	59	69	54	64	45	55	23	48	35
31.....	79	69	85	59	.....	.....	54	27	.....	.....	57	19

DAY OF MONTH.	1880.											
	January.		February.		March.		April.		May.		June.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.....	33	19	50	24	70	36	62	29	63	31	78	60
2.....	35	22	40	7	54	25	69	38	66	33	90	49
3.....	49	26	32	31	52	25	60	39	72	52	60	48
4.....	48	30	37	22	54	35	70	51	82	54	71	52
5.....	56	32	38	10	71	48	66	50	85	52	73	56
6.....	58	36	32	12	70	39	70	41	75	52	77	58
7.....	51	38	46	24	58	34	59	32	85	51	83	64
8.....	50	31	44	12	42	33	48	23	65	47	88	63
9.....	50	31	41	15	53	24	49	27	72	51	68	55
10.....	51	32	40	8	32	24	56	31	93	53	76	53
11.....	62	31	34	12	47	22	69	35	92	62	77	58
12.....	55	38	42	35	27	20	49	22	86	56	81	61
13.....	55	32	50	41	36	24	47	22	79	49	94	69
14.....	35	12	68	49	35	27	62	36	65	46	88	66
15.....	49	12	56	31	*	*	83	52	59	39	78	62
16.....	50	28	35	27	40	30	86	53	70	45	67	57
17.....	55	25	40	27	37	30	60	44	80	62	73	56
18.....	46	26	58	27	47	20	60	36	88	60	79	59
19.....	50	33	62	31	46	26	71	38	70	52	82	60
20.....	55	34	45	16	41	30	60	45	60	56	89	65
21.....	56	30	45	16	51	27	65	40	85	55	88	65
22.....	52	30	*	*	50	27	71	40	87	60	89	65
23.....	54	32	*	*	51	27	74	32	80	62	85	61
24.....	50	28	51	20	60	32	57	39	80	64	87	65
25.....	50	27	48	21	41	13	45	38	89	65	97	73
26.....	42	30	49	31	44	18	50	42	99	68	94	71
27.....	55	30	59	42	52	24	65	49	97	71	93	70
28.....	57	40	*	*	48	35	65	40	98	67	90	71
29.....	69	30	75	42	38	28	69	42	92	58	93	70
30.....	50	22	.....	.....	41	28	62	44	75	58	93	72
31.....	52	41	.....	.....	*	*	.....	.....	76	62	.....	.....

\*No observations taken.

204 REPORT OF THE BOARD OF HEALTH.

Maximum, Minimum and Mean Temperatures. Station, Barnegat, New Jersey.

1878.												
DAY OF MONTH.	July.		August.		September.		October.		November.		December.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.....	82	61	74	64	82	73	69	56	47	37	48	36
2.....	82	66	85	65	84	72	75	59	56	35	57	45
3.....	83	67	84	67	78	70	70	59	49	38	49	37
4.....	88	67	82	67	74	70	71	57	50	31	53	40
5.....	82	66	82	69	76	66	64	53	42	28	41	29
6.....	77	64	79	65	73	66	64	51	56	31	43	30
7.....	80	66	82	65	73	66	63	46	40	34	41	27
8.....	81	69	86	67	68	64	66	52	43	31	38	25
9.....	75	64	80	68	71	66	73	59	42	29	51	37
10.....	73	62	81	67	73	68	67	55	53	35	55	41
11.....	74	64	78	68	74	68	60	55	57	35	45	33
12.....	70	64	77	67	76	68	58	51	62	43	40	30
13.....	71	64	78	65	77	67	67	47	58	37	39	27
14.....	75	62	76	68	73	58	68	46	46	33	42	30
15.....	84	63	76	70	72	56	70	57	45	30	45	33
16.....	72	66	80	69	69	60	72	58	53	44	34	26
17.....	79	65	77	70	71	55	70	62	54	50	33	22
18.....	94	68	83	71	80	59	70	46	54	43	37	26
19.....	89	68	78	69	75	63	56	44	52	43	31	21
20.....	70	72	79	66	82	67	62	39	49	41	32	21
21.....	84	72	77	65	83	69	67	43	55	40	49	23
22.....	79	66	72	65	70	56	64	45	54	46	47	30
23.....	82	63	70	65	65	56	66	56	47	38	31	19
24.....	78	64	73	60	74	63	61	47	56	35	29	15
25.....	88	66	78	65	72	63	57	43	57	43	22	13
26.....	78	65	72	60	77	60	61	44	54	37	21	12
27.....	84	65	77	59	61	49	63	54	57	37	28	20
28.....	77	65	63	60	54	49	58	41	57	38	31	18
29.....	80	63	74	63	67	54	52	38	48	35	30	13
30.....	72	62	78	64	68	62	63	45	48	30	35	21
31.....	67	62	77	64	.....	.....	52	40	.....	.....	34	19
Range.....	33°		27°		35°		37°		34°		45°	
Monthly Mean.....	71°.	62.2	71°.	61.1	67°.	66.6	57°.	57.2	43°.	43.8	32°.	32.9

1879.												
DAY OF MONTH.	January.		February.		March.		April.		May.		June.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.....	36	23	33	20	34	24	55	33	61	43	75	57
2.....	37	8	26	16	36	26	49	34	59	39	73	55
3.....	13	1	36	25	36	28	50	28	62	39	66	57
4.....	21	6	38	23	41	32	39	24	54	46	72	56
5.....	21	11	37	21	50	36	38	25	61	48	76	58
6.....	28	11	35	28	41	32	47	23	67	49	78	58
7.....	31	14	37	27	43	30	53	37	57	45	65	48
8.....	41	22	32	23	33	26	44	32	57	45	74	52
9.....	41	27	42	18	42	31	60	32	56	46	74	51
10.....	28	19	33	19	51	36	49	42	57	48	73	60
11.....	33	17	43	32	65	39	43	37	56	47	79	57
12.....	35	26	47	34	48	32	49	31	59	48	70	57
13.....	37	27	35	25	47	31	57	32	66	52	72	59
14.....	38	28	26	16	51	39	49	41	68	54	71	56
15.....	29	22	22	8	47	31	48	40	68	53	74	55
16.....	35	20	33	10	42	30	51	42	68	54	84	56
17.....	33	18	33	29	54	32	43	39	67	56	73	56
18.....	38	27	34	26	33	26	42	38	72	56	66	52
19.....	30	22	29	24	38	23	41	36	65	56	67	55
20.....	22	12	32	25	51	21	59	34	70	57	67	57
21.....	35	9	25	16	57	38	56	33	67	57	76	55
22.....	42	29	32	10	44	34	59	43	63	53	70	58
23.....	44	28	37	25	44	33	69	45	59	50	75	58
24.....	38	22	34	23	41	28	55	42	67	41	75	60
25.....	52	32	36	26	48	33	53	45	71	53	68	59
26.....	34	17	46	32	38	26	64	43	65	54	74	61
27.....	37	18	36	20	48	36	48	41	65	48	84	59
28.....	61	25	26	14	49	38	57	48	66	58	78	56
29.....	42	29	.....	.....	42	36	54	49	72	55	74	55
30.....	36	21	.....	.....	55	38	65	47	72	58	72	60
31.....	41	24	.....	.....	41	33	.....	.....	70	58	.....	.....
Range.....	62°		39°		44°		46°		33°		36°	
Monthly Mean.....	28°.	28.2	29°.	29.1	38°.	38.7	44°.	44.2	57°.	57.6	64°.	64.9

METEOROLOGICAL SUMMARY FOR 1880.

*Station, Bayard Avenue, Princeton, N. J. Latitude 40° 21' N.;  
Longitude, 2° 20' E. Height of Barometer Cistern  
above Sea Level, 225 Feet.*

OBSERVER, PROF. C. G. ROCKWOOD, JR.

	BAROMETER. (Reduced to 32 degrees.)			THERMOMETER.				Mean Humi- dity.	Prevailing Wind.	Rain, (inches)		Snow.	Days when precipitation equalled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Rain.*			Snow.				
January.....	30.424	29.307	29.940	60.5	2.5	37.71	‡	N. E.	2.82	4.0		8	9	
February.....	30.359	28.848	29.856	67.5	8.3	35.40	69.0	N. W.	2.43	6.5		10	7	
March.....	30.225	29.146	29.813	71.5	16.4	36.73	68.9	N. W.	5.20	9.5		16	13	
April.....	30.104	29.319	29.767	79.5	24.7	49.97	62.6	N. W.	4.12	.....		11	7	
May.....	30.052	29.499	29.812	97.3	32.7	66.98	62.3	S. W.	0.62	.....		4	6	
June.....	30.032	29.358	29.746	97.3	48.2	71.82	63.3	S. W.	1.41	.....		8	3	
July.....	29.923	29.431	29.739	93.0	55.0	72.81	72.4	W.	11.13	.....		12	7	
August.....	30.183	29.467	29.814	89.3	50.9	70.74	77.5	S. E.	3.21	.....		7	10	
September.....	30.116	29.436	29.802	91.0	43.9	65.27	71.6	S. W.	2.25	.....		8	7	
October.....	30.171	29.232	29.865	80.0	29.3	52.22	71.0	N. W & S. W.	2.56	trace		10	7	
November.....	30.489	29.301	29.996	68.3	11.3	37.87	73.24	N. W.	2.66	3.0		8	11	
December.....	30.224	29.342	29.782	46.7	11.0	26.09	74.5	W.	3.57	17.75		10	11	
For the Year.....	30.489	28.848	29.829	97.3	11.0	51.97	.....	.....	41.98	40.7		112	98	

\*Including melted snow.

‡Hygrometer not mounted.

Summary of Weather Observations at Vineland, N. J., for 1880.

MONTHS.	TEMPERATURE.			MOISTURE.			BAROMETER.				FROST.			WINDS.								
	Max.	Min.	Mean.	Hygrom.	Rainy days.	Rain in inches.	Max.	Min.	Mean.	Range.	Any frost.	All frost.	Thunder days.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	
January.....	61	10	41.28	71	12	2.820	30.450	29.525	30.041	.925	12	.....	.....	10	8	2	15	1	26	2	29	
February.....	69	12	39.68	60	7	2.260	30.392	29.014	29.923	1.378	17	3	.....	.....	3	.....	14	7	29	9	25	
March.....	74	20	40.91	69	13	6.350	30.306	29.144	29.864	1.162	12	.....	1	7	17	2	5	4	16	8	34	
April.....	82	22	53.06	65	10	2.610	30.164	29.414	29.808	.750	5	.....	.....	1	5	1	13	9	24	2	35	
May.....	95	34	69.26	63	5	2.00	30.668	29.608	29.871	.480	.....	.....	.....	1	5	.....	20	12	22	6	24	
June.....	97	52	74.77	69	5	3.650	30.112	29.527	29.842	.585	.....	.....	7	12	12	.....	10	7	27	13	14	
July.....	98	56	76.45	73 $\frac{1}{2}$	8	8.636	30.024	29.560	29.838	.464	.....	.....	7	9	6	.....	12	3	37	1	25	
August.....	90	50	73.03	77	8	6.635	30.230	29.592	29.909	.638	.....	.....	7	4	20	1	12	5	41	1	9	
September.....	92	44	66.83	80	5	2.941	30.160	29.590	29.899	.570	.....	.....	.....	4	11	2	12	5	29	8	19	
October.....	92	28	63.84	74	7	1.140	30.589	29.384	29.996	1.205	6	.....	.....	9	16	4	5	10	24	7	18	
November.....	67	9	38.22	63	9	4.440	30.594	29.500	30.076	1.094	21	7	.....	6	10	.....	13	4	22	16	19	
December.....	50	10	26.23	56	10	7.525	30.330	29.534	29.910	.796	27	16	1	8	10	1	3	3	18	13	37	
Means.....	.....	.....	55.23	.....	99	50.397	.....	.....	29.915	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yearly range of barometer.....	.....	.....	.....	.....	.....	.....	108°	.....	.....	1.580	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yearly range of temperature.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	26	26	75	121	14	134	70	315	83	288	

GENERAL FACTS.

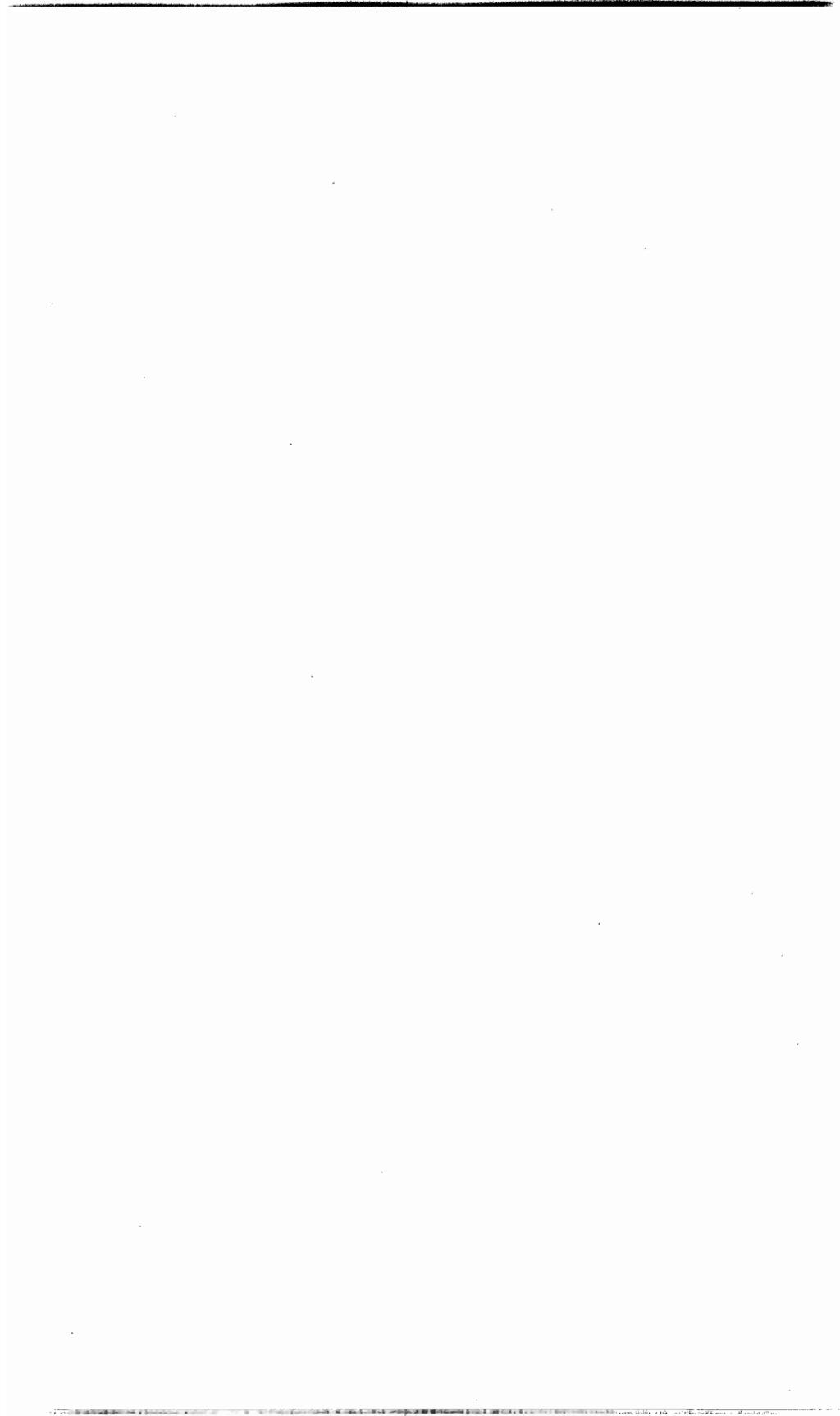
Under the caption "Frost," where it says "any frost," i. e. frost any part of the day, this foots up 100 frosty days for the year; while under "all frost," it means the frost was continuous through the day, and under this there were 26 days in the year.

The average number of "any frost," for 15 years, is 92 days in a year, and of "all frost," for same time, is 27 days; highest number "any frost" is 113, lowest 75, in 1878; highest "all frost," 45, in 1868; lowest "all frost," 16, in 1869 and 1870.

SNOW IN GENERAL HERE.	Any frost.	All frost.	WINDS FOR FIFTEEN YEARS.										Number of obser- vations.
			N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.			
1866..... 23½ inches	92	22	26	81	10	106	4	546	33	289	1,095		
1867..... 49¼ "	91	38	25	174	31	170	15	370	36	274	1,095		
1868..... 40 "	113	45	20	191	28	152	9	381	24	293	1,098		
1869..... 13¼ "	101	16	3	129	23	87	10	493	28	322	1,095		
1870..... 15 "	76	16	24	158	23	158	19	378	67	278	1,095		
1871..... 36¾ "	78	30	14	157	14	160	22	347	85	296	1,095		
1872..... 49½ "	113	35	21	116	16	145	22	416	125	237	1,098		
1873..... 15½ "	92	19	16	182	39	155	26	329	120	238	1,095		
1874..... 17 "	92	19	28	184	21	115	38	378	96	235	1,095		
1875..... 50¾ "	101	39	29	186	19	109	27	401	76	248	1,095		
1876..... 25¾ "	91	30	45	138	19	106	53	413	77	249	1,098		
1877..... 36¼ "	79	18	57	178	20	86	77	343	59	275	1,095		
1878..... 7¾ "	75	24	63	152	25	140	59	310	53	293	1,095		
1879..... 11 "	92	21	78	101	23	93	80	369	75	276	1,095		
1880..... 54¼ "	100	26	75	121	14	134	65	315	83	288	1,098		
Total..... 4419-20 "	.....	.....	524	2,246	325	1,916	526	5,789	1,037	4,081	16,444		
Average (nearly) 30 "	92 2-5	26 8-15	35	150	22	128	35	386	69	272	.....		

Wind Before, During and After Rain in 1880.

Wind.	Before.	During.	After.
N.	5	0	5
N. E.	7	25	6
E.	1	6	0
S. E.	10	23	4
S.	9	15	6
S. W.	28	26	16
W.	0	2	8
N. W.	7	13	20



## OUR MILK SUPPLY.

WILLIAM K. NEWTON, M. D., STATE MILK INSPECTOR.

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Milk is the type of food ; it is the model alimentary substance. Containing, as it does, the essential varieties of nourishment, it is sufficient for the maintenance of life, and, unaided by other foods, is able to keep the system in a healthful state. It constitutes, almost exclusively, the diet of children at that time of life, when they are the least able to withstand any interference with the purity of their food. In short, it is one of the most important articles of food that enter into daily use. It is absolutely necessary, then, that an article so universally used, and one playing so important a role in every-day life, should be easily obtained in a pure state, unadulterated, and free from the germs of disease. There is, however, no one article of food that is so frequently adulterated or sold in an impure state, as the one now under consideration.

What is to be done, then, to check this trade in impure and diseased milk ? The people look to the State for stringent laws against adulteration, and to our health officers for the rigid and impartial enforcement of such laws. Our citizens are deeply interested in the subject ; aside from the great loss of money entailed by the sale of watered milk, the health and lives of their children are at stake.

If we look at our vital statistics, it will be noticed that the death-rate during the first five years of life is enormous ; the chances of surviving beyond the fifth year are small indeed. In infancy, when the tenure of life is the slightest, when the death-rate is the highest, and the amount of sickness the greatest, then will we find the disastrous results that follow the use of skimmed and watered milk. It is our duty to remove in every way, even

the slightest cause of ill-health or death. The lives of these children are of value to the nation.

It is estimated that a life is worth one thousand dollars to the State and every death, consequently, is so much loss; if we look at the subject in this light, leaving out of consideration the wreck and sorrow in the household, the subject is of vast importance and one demanding the most careful thought. "The child is the promise of all the hereafter. The whole future of the world is wrapped in him. Unless he fulfill this promise and grow to manhood, the family ceases, the State perishes, the human race comes to an end. The family has the intensest interest of affection in his preservation, and all the pride and power of the nation rests on his life." (*Jarvis.*)

The increase in infant mortality is largely caused by artificial feeding and the use of milk devoid of nourishment. The danger is a real one; sickness and death are caused by feeding the children on skimmed and adulterated milk. The sooner the subject is grappled with and the remedy applied the better will it be for our infant population.

Let stringent laws be passed prohibiting the sale of adulterated and impure food and let these laws be enforced. Let our health authorities be impressed with the great responsibility resting on them. Good work will be done when this nefarious traffic in impure milk is broken up and when the dealers in it—who are not inaptly called our modern Herods, the slayers of infants—are brought to justice. This branch of preventive medicine is a vital one, and demands our serious attention.

We may state, in the beginning, that this article is not an exhaustive one. It is written in the interest of public health and aims to teach the people a little about our milk supply, the adulterations used and the dangers that may arise from the use of impure or diseased milk. As far as possible technicality has been avoided, as we do not seek to teach experts; chemical processes have been omitted, as all attempts at entering into competition with special treatises on the subject would do little good. We have refrained, when we could, from burdening the text with foot-notes and references, but have added a somewhat exhaustive bibliography at the end of the paper, which may be consulted by any one wishing further information on the subject.

For convenience, we have divided the subject with various sec-

tions, and will consider it under the following headings: A, the source of our milk supply; B, adulteration; C, detection of adulteration; D, effects of impure milk on the health; E, diseased milk may cause disease in man; F, feeding influences the healthfulness of milk; G, milk as an article of contagion; H, laws bearing on our subject; I, the inspection of milk; J, bibliography.

A.—THE SOURCE OF OUR MILK SUPPLY.

One who has not investigated the subject will be astonished at the immense amount of capital invested in the dairy interest in our State. There are in New Jersey about one hundred and sixty thousand milch cows, representing, in value, five million six hundred and eighty thousand dollars; if to this is added the capital invested in the milk business in its various branches, not far from seven million dollars will be found to be locked up in the different branches of the trade. The daily production of milk is about two hundred and forty thousand gallons; a large quantity of this is shipped to New York City; the Midland Railroad carries, on the average, four hundred and twenty cans a day to New York; the Central Railroad, three hundred and twenty-five cans; the Delaware, Lackawanna and Western Railroad, three hundred and eighty cans. By far the largest amount produced is used in our own State, in the butter and cheese factories and as food.

New Jersey contains but few large cities; there are but seven cities with a population greater than twenty-five thousand. Small towns preponderate. Hence the greater quantity of milk used as food is obtained in the towns in which it is used, very little being transported from the source to the place where it is consumed. Newark, Jersey City and Hoboken are the only large towns that receive much milk by the railroads. Inspection, then, is not easy, and the supply being in the hands of many small dealers is not well under control. The greatest source of impure milk is that produced by cows shut up in the stables in the cities; these animals are poorly housed and fed, and milk thus made cannot be of good quality; this last remark is peculiarly applicable to the cities of Newark, Jersey City, Hoboken and Paterson. Our farmers are, as a rule, honest, and endeavor to supply a pure article; the greatest trouble is with the dealers

in the towns and cities, who are not themselves dairymen, but who buy from producers, and who adulterate to a greater or less degree. Only local inspection can reach them. Many of the cheese factories send skimmed milk to our towns and cities, and the use of this article cannot but be followed by a long train of disease among the children.

#### B.—ADULTERATION.

The list of substances said to be used for the purpose of adulterating milk, is a long one. Every authority writing on the subject of milk adulteration has, in preparing the work, copied from various books the names of materials at any time used, hence they make now a formidable catalogue. Practically speaking, adulteration, in this country, is limited to the use of water, sodium carbonate or bicarbonate, potassium nitrate, turmeric, annatto, caramel, salt, borax, and possibly magnesium carbonate and glycerine. Fortunately, the adulteration practiced is limited and the substances used are easy of detection.

The substance must needs be such that its introduction into the milk will not be detected by the naked eye, and must neither be precipitate nor float on the surface. At the same time the material added must not coagulate on boiling, nor give taste, odor or color to the milk by which its presence may be easily discerned.

We have, notwithstanding the fact that many of these materials are never or but seldom used in this country, thought it best to mention the substances said to be used, in order to make the subject more complete. The substances thus said to be used in the adulteration of milk are:

Water,	Starch,
Sodium carbonate and	Arrowroot,
Bicarbonate,	Gum Arabic,
Borax,	Dextrine,
Magnesium carbonate,	Gum Tragacanth,
Potassium carbonate,	Chalk,
Sugar,	Gelatin,
Caramel,	Glycerine,
Potassium nitrate,	Emulsion of almonds and
Turmeric,	Hempseed,
Annatto,	Brains,
Flour,	Hempseed.

We will now take each in turn, and state for what purpose it is added.

Water is by far the most common adulterant. It was estimated by Professor C. F. Chandler, that "the average milk sold in New York City, consisted of three-fourths milk, and one-fourth added water. The 120,000,000 quarts of milk sent annually to New York receive an addition of 40,000,000 quarts of water, which sold at ten cents per quart, brings four million dollars per annum, or twelve thousand dollars per day. This fraud, besides being expensive, exerts a most unfavorable influence on the health of young children especially." It is difficult to trace the adulteration with water to its source; milk passes through so many hands before reaching the consumer, that it may have received two or three dilutions before being served on his table. In our tours of inspection in various parts of the State, we found that the farmers, as a rule, were honest in their endeavors to send pure milk to market, but there are many dishonest men among that class. A farmer, for instance, may have a contract to supply a dealer with five cans of milk daily; from some cause the supply falls short ten quarts, and if the producer be dishonest, the deficiency is made up with water. Now the ten quarts in five cans may appear to be a small quantity, and will be difficult of detection; but when this milk reaches the middle-man, and his supply is not sufficient to meet the demand, he dilutes it to bring it up to his quantity, and by the time the consumer gets it, three or four dilutions may have been practiced. The most adulterating is not done by the farmer; the exaggerated examples are to be found in our cities, among the smaller dealers. It is to be hoped that if adulteration is done with water, that it is free from the germs of disease.

*Sodium, carbonate and bicarbonate.* These substances are added to disguise an excess of acidity, and in some cases, to increase the specific gravity.

*Borax* is added for the same purpose, and also to retard the separation of cream, and to preserve the milk.

*Magnesium and potassium carbonates* are added to correct acidity and to cover a blue tinge.

*Sugar and caramel* are used to give color and to develop the flavor of impoverished milk.

*Salt* is used as a flavoring agent and to increase the specific gravity of skimmed and watered milk.

*Potassium nitrate* has been discovered in milk from Orange County, N. Y. It is added to increase the specific gravity and to act as a preservative.

*Turmeric and annatto* are used to cover a blue color.

*Flour, starch, arrowroot, gum-arabic, gum-tragacanth, dextrine, emulsion of almonds and hempseed* are said to be added to increase the consistency of milk, but the fraud is so transparent that it is hardly probable that any of these substances can be added successfully.

*Chalk.* This substance is popularly supposed to be a favorite adulterant. It is hardly probable that it is used; the certainty of its detection is against its use. It is asserted that chalk is used to make milk that has been watered white and to correct acidity.

*Gelatine* has been added to give consistency.

*Glycerine* is used to increase specific gravity, to give consistency and taste.

*Brains.* Every book on food-adulteration mentions the fact that calf-brains have been used to thicken milk. This may have been done at some time, but it is difficult to trace this statement to the originator, and it is hardly probable that any person, however depraved, would use this substance as an adulterant.

#### C.—DETECTION OF ADULTERATION.

Having mentioned the various adulterants and the purposes for which they are used, we will now consider the methods employed for their detection.

*Water.* There are three methods for determining the amount of water added to milk: 1, by determining the specific gravity, 2, by chemical analysis, 3, by estimating the percentage of cream. Unless a standard of purity is fixed on beforehand it will be impossible to estimate the quantity of added water. Whether a chemical analysis is made or a hydrometer used it does not alter the case; a standard must be agreed on.

In New York City, the hydrometer is used as an instrument for determining the amount of dilution with water. In Massachusetts, Rhode Island and Maine a chemical examination is required by law when suit is brought against an offender.

1. SPECIFIC GRAVITY METHOD.—For determining the specific gravity, a hydrometer is ordinarily used, but in cases requiring great accuracy the gravity is arrived at by weighing a known quantity of the milk. The latter plan being employed by chemists. The hydrometer used in testing milk, is called, in this country, a *lactometer*. All tests are made at 60° Fahrenheit.

Much has been written, within the past few years, for and against this instrument; but had the instrument and its use been clearly and honestly defined, there had been no necessity for any discussion. The lactometer is nothing but a hydrometer, and it can do no more than register the specific gravity of milk. It can, within certain bounds, tell the amount of water added, and can, with a certain degree of accuracy, detect skimmed milk.

If we take pure milk, and allow the lactometer to float in it, the instrument will sink to a certain mark in the stem. If we now add water to the milk, the specific gravity is lowered, and consequently, the lactometer will sink lower in the fluid. If we skim the milk, the instrument will float higher in consequence of the increased specific gravity. The lactometer favors the milkman rather than the consumer; the only error it can make would be in a case where the milk had been *adulterated* with cream; then the specific gravity would be lowered and the instrument would register a point equal to watered milk. It is well to bear in mind that the lactometer, to be of any service, must be used by a person who is a competent judge of milk and is thoroughly acquainted with the pure article; such a person would easily distinguish between watered milk and milk rich in cream. A person conversant with milk can tell, with any instrument, whether a milk is rich or poor, and a man is not competent to act as inspector who cannot make these distinctions.

Now, if we use the lactometer as the instrument for the detection of added water, what specific gravity shall be taken as that of pure milk? The New York Board of Health has taken the lowest average for pure milk, and fixed the standard at the specific gravity of 1.029 at 60° F. We do not propose to lengthen this article unnecessarily by quoting authorities to prove the accuracy of this standard. Suffice it to say, that hundreds of samples of milk, known to be pure, have been examined by the New York authorities, and in no case, where the milk

was from a healthy cow, did the specific gravity fall below that figure. And, in this State, in our capacity of State Milk Inspector, we have inspected hundreds of samples of milk, known to be absolutely pure, and in no instance did we find a single sample to have a specific gravity as low as 1.029. We can state, then, that the New York standard is many degrees too low, and admits of watering from five to ten per cent. If any one wishes to consult authorities, the list of authors appended to this article may be used.

In lawsuits, in New York City, the lactometer has many times been criticised, but as a rule, it has come off victorious as a competent instrument with which to take the specific gravity of milk. Prof. C. F. Chandler, President of the New York Board of Health, has testified in these cases, that the instrument is able to register the specific gravity of milk. Prof. Morton, of Stevens' Institute, said that 1.029 was a correct standard, and that a lactometer of that standard would give the specific gravity. Prof. Barker, of the University of Pennsylvania, testified that the lactometer was a good test for the specific gravity of milk; chemical analysis was the best way to test the *purity of milk*. The evidence all tends to prove the statement, that the lactometer will give correctly the specific gravity of milk; more than this it will not do.

As the lactometer of the New York Board of Health is used extensively in this State, it will be well to describe its construction. The scale of a hydrometer long enough to use in testing milk would be inconveniently long and the figures confusing. To obviate this, Dr. Chandler has made a scale for his instrument which is easy to read, and which gives an idea of the percentage of adulteration with water. A hydrometer stem is taken, and at a point equal to the specific gravity 1.029—which is the standard for pure milk—is marked 100, at the top of the stem, at a point equal to 1.000 (or pure water) the lactometer is marked 0, the intervening space being divided into 100 divisions; below one hundred, 30 degrees are marked off equidistant apart. "The point to which the lactometer sinks in the milk under examination, indicates the percentage of milk in 100 parts. Thus, if the instrument sinks to 80, the milk is 80 per cent. pure, and contains 20 per cent. added water." But this

assumes the original milk to have a specific gravity of only 1.029, which is lower than good milk.

The lactometer errs, therefore, in not showing the dilution of good milk down to our low standard, and consequently in reporting on a portion of dilution. If the lactometer is used in this State to detect adulteration and watering, the standard of purity should be fixed at a higher point than 1.029, or 100 of the New York instrument; for as previously stated the figure allows too wide a margin for watering. We hold to the opinion that in cases of suit, a chemical analysis should supplement the use of the lactometer; for if the specific gravity be raised by the addition of any substance like salt, caramel, etc., that instrument will not detect it. For rapid inspection the lactometer is of great service, and in a short time the inspector can examine many cans, easily selecting the pure from the impure, and in case of suspected adulteration a chemical analysis may follow.

2. *Chemical analysis.* As in the case of estimating the degree of watering by the lactometer, an arbitrary standard of purity must be fixed on before any conclusion can be arrived at by a chemical analysis.

The law of Massachusetts fixes a chemical standard of purity. It reads: "In all cases of prosecution, if the milk shall be shown upon analysis to contain more than 87 per cent. of watery fluids, or to contain less than 13 per cent. of milk solids, it shall be deemed, for the purpose of this act, to be adulterated." Massachusetts, then, has fixed a standard of purity. There is no question to be debated in case of suit as to the inspector being an expert, for he turns the sample over to the State analyst and the latter decides on the character of the milk. This method makes the question an easy one to decide in case of suit, and the discussion as to the accuracy of the lactometer, or any other instrument is avoided. This arbitrary standard has been determined on from analysis made by Sharples, Babcock and other chemists. There is here, however, a wide margin allowed for milk of a poor character, and this margin is in favor of the milkman. We give the result of an analysis of pure milk from ordinary cows for the purpose of showing that 13 per cent. of total solids is a fair standard by which to judge the milkman:

ANALYST.	NUMBER OF COWS.	TOTAL SOLIDS.
Sharpless.....	22	14.49.
Babcock.....	8	14.55.
Vaughn.....	58	14.08.
Newton.....	24	14.26.

If the State of New Jersey demands that a chemical examination be made to determine the degree of adulteration, a course which we favor, it would be well to adopt the standard of Massachusetts; this will allow dairymen to sell milk that will represent a fair degree of purity, and, at the same time, be equitable for both sides.

We do not wish to take the space requisite to discuss, at length, the various chemical manipulations used in milk analysis. The special works on the subject must be consulted. We will describe, however, the method we employ to determine the amount of water and milk solids: The sample to be analyzed is thoroughly mixed; 5 *Grams* of the milk are accurately weighed out in a tarred platinum dish, this is placed on the water bath and allowed to evaporate for three hours; the dish is carefully dried and weighed; the loss in weight will equal the amount of water, and the weight is that of the total solids. This method is more accurate than where the milk is measured with a pipette.

3. *By estimating the per cent. of cream.* This method is very inaccurate; the separation of cream is influenced by the temperature and various other factors. The cream glass used is a graduated tube, the gradations being from 0 to 20, as a rule; the milk is placed on the glass and allowed to stand at a temperature of 55° F., or 60° F., for twenty-four hours, when the per cent. is read off.

A very rapid and easy method—at the same time accurate—for getting at the amount of fat, and hence the degree of dilution with water, is the lactobutyrometric process. The process is much used by Prof. G. C. Caldwell, and is described by him in the "First Annual Report of the Cornell University Experiment Station."

We have employed the method by using a burette instead of the ordinary apparatus, and have found the process accurate and very satisfactory. The results correspond very closely with those obtained by chemical analysis. We insert a description of the instrument, and the process by Prof. Caldwell, as it is of

great intent to dairymen, not to mention chemists. The process is peculiarly useful in butter and cheese factories.

“A simple, and at least tolerably accurate method of testing milk, which shall not only give some idea of its quality, but shall also detect adulteration or skimming without fail, is acknowledged by all to be one of the great desiderata, especially in butter and cheese factories. \* \* \* \* A method of examination of milk, by which such information may be gained, that requires no expensive apparatus, and is easy and quick in execution, is found in Marchand's lactobutyrometrical process, as more recently modified by two German chemists, Schmidt and Tollens; in their hands, its indications came nearly always within 0.2 per cent. of the truth, and usually much nearer than that. In the case of thirty-nine determinations of fat in milk of all degrees of richness, made by the chemists just named, in no instance was the difference between the result obtained by this method, and by the most accurate chemical method, greater than 0.2 per cent., and in all but fourteen tests it did not exceed 0.1 per cent.

In twelve cases the two methods of analysis gave almost the same results.

#### DIRECTIONS FOR THE USE OF THE INSTRUMENT.

“Into the lactobutyrometer, a glass tube closed at one end and provided with a graduated scale near the open end, put, first, exactly ten cubic centimeters of the milk; this is done by filling the pipette marked *milk* with the milk to be examined, up to a short distance above the mark on its neck, by suction at the upper end while the point is dipped in the milk, then removing the pipette from the mouth and quickly closing the open end with the ball of the fore finger before enough milk runs out to bring the level below the mark; then remove the point of the pipette from the milk, wipe it off, and holding the instrument with the other hand so that the mark on its neck is on the same level with the eye, slowly and slightly raise one side of the finger closing the opening till the liquid begins to drop out at the lower end; when the level of the liquid just reaches the mark, close the opening again, hold the point of the pipette in the mouth of the lactobutyrometer and remove the finger from the upper opening; when all the milk has run out, allow about a

minute for the pipette to drain while held in the same vertical position, and finally blow out the last drop that remains adhering to the narrow opening below; during this operation it is best that the lactobutyrometer should be supported in an upright position so that it will not be necessary to hold it, and both hands will be free to manage the pipette; and care should be taken not to touch the sides of the tube with the point of the pipette, lest some of the milk which should go into the tube may remain adhering to its mouth.

Ten cubic centimeters of milk being thus transferred to the tube, next put into it exactly ten cubic centimeters of ether, with the aid of the pipette marked *ether*, then close the mouth of the tube with the cork that accompanies it, and, grasping the lower end of the tube in one hand and the upper end in the other with a finger over the cork to keep it in place, give the contents of the tube a vigorous shaking, carefully lifting the cork two or three times to allow vent for the ether vapor that accumulates in the tube. When the liquid presents the appearance of a uniform creamy consistency, without any visible clots, remove the cork and add, by means of the pipette marked *alcohol*, exactly ten cubic centimeters of this liquid, close the tube again and, at the same time, pour some of the alcohol, to the depth of about half an inch, into the saucer at the base of the brass cylinder, which also accompanies the apparatus, and which has previously been three-fourths filled with water, and set fire to this alcohol; while the water is thus being heated, give the contents of the tube another vigorous shaking in the same manner as before, with the same precaution in regard to opening the tube two or three times, till all the coarse clots formed when the alcohol was added are broken up, and the contents of the tube present a uniformly fine granular appearance. When the temperature of the water in the brass cylinder reaches 40 to 42 degrees Centigrade (104 to 108 degrees Fahrenheit,) blow out the flame of the burning alcohol, and put the lactobutyrometer in this warm water. The solution of fat immediately begins to collect at the top of the liquid; when, after five or, at most, ten minutes, no more fat globules appear to rise, and the layer of the solution does not increase in thickness, the lactobutyrometer is put in the glass cylinder which has already been nearly filled with water at a temperature of 20 degrees Centigrade, or 68 degrees Fahrenheit;

the fatty layer will become turbid and generally increase slightly in thickness, and finally, in a few minutes, it becomes clear and is then ready for measurement.

The number of the degrees is then read off on the scale on the tube, at which the lowest part of the meniscus or hollowed surface of the liquid stands, and also the degree at which the lower level of the fatty solution stands, where it meets the liquid below it, and from which it is distinguished by a sharply marked line; subtract the second number from the first; search for the number expressing this remainder in the column headed *ether fat solution* in the following table, and against that figure in the column headed *per cent. of fat* the corresponding per cent. of fat in the milk will be found."

(The table will be found in the report referred to.) A full description of the process may be found in the report.\*

We now pass on to the consideration of other adulterants.

2. *Sodium carbonate and bicarbonate.* An excess of alkalinity would lead us to suspect the addition of these substances. Evaporate the milk to dryness, incinerate the contents of the dish and to the ash add an acid. If carbonates be present effervescence, due to the liberation of carbonic acid gas, will ensue.

3. *Borax.* Evaporate to dryness, incinerate and test for boracic acid in the ash.

4. *Magnesium and potassium carbonates.* Test for carbonates in the ash.

5. *Sugar, caramel.* As the process for determining these substances is somewhat lengthy we refer to special treatises on analysis. (See the *Analyst*, March, 1880, p. 37.)

6.—*Salt.* Evaporate the milk to dryness, incinerate the contents of the dish. Taste the ash, an excess of sodium chloride is easily discovered. Test for excess of chloride with a standard solution of nitrate of silver.

7.—*Potassium nitrate.* Test for nitrates in the ash.

8.—*Turmeric and annatto.* Coagulate the casein with alcohol or an acid, filter and add caustic potassa to the whey. If turmeric is present the yellow color becomes brownish. If annatto be present a red color is given.

\*The instrument is made by Childs & Jones, Utica, New York.

9.—*Flour, etc.* Flour, starch and arrowroot give the characteristic blue color when tincture of iodine is added to the milk after boiling. The microscope will detect the starch granules if the milk has not been boiled.

10.—*Gum-tragacanth, gum-arabic and dextrine* are detected by alcohol which, when added to the whey, causes a precipitate of flakes to fall.

11.—*Chalk.* Let the milk stand in test-tube. If any considerable quantity of chalk is present it will precipitate. A drop of acid added to the precipitate will cause effervescence.

12.—*Gelatine.* This will coagulate on boiling and settle to the bottom of the test-tube.

13.—*Glycerine.* (see Blyth, p. 49).

14.—*Brains.* Detected by the microscope.

#### D.—EFFECTS OF IMPURE MILK ON THE HEALTH.

It is our purpose in this section to consider the effects resulting from the use of skimmed and adulterated milk. Milk from diseased cows as a cause of disease in man will be dwelt on in another section.

Skimmed milk is milk deprived of its most nutritious ingredient—the fat. Hence, to expect such an article of food to be as nourishing as rich milk, would be folly; nor would one hope to have a child thrive on milk that had been diluted with water, or otherwise adulterated. We have seen that skimming and watering are almost the sole methods of tampering with milk, and that other forms of sophistication are rarely met with in this country. If we leave diseased milk out of consideration, for the present, we will have to look to impure milk, as above described, as the great factor of mal-nutrition. Feeding a child on milk bereft of its most nourishing ingredient will result in starvation.

In order to have an infant thrive well on cow's milk, the composition must be as nearly like human milk as possible, and any disturbance of the normal relations of the various ingredients must be avoided, or derangement of the child's health will almost certainly follow. The fat, the casein, the sugar and the salts, must be given in natural proportions, or harm will result. Skimmed milk is deficient in fat while it contains an excess of casein. A diminution in the quantity of cream will be followed

by wasting; an excess of casein will cause gastric and other troubles; while too little of the salts may cause serious changes in the bony framework. Cream is the most digestible form of fat. "It will often be found in practice, that the addition of a little more cream to the baby's food will correct any mild indigestion, due to an excess of casein." (*Wiggin.*)

The principal and most fatal diseases of infancy are those characterized by wasting, that is the system loses its fat. Adipose tissue will not accumulate in the system if health is impaired, or if fat is not supplied from without, in the food. Wasting is a sign of defective nutrition. Now, if we try to nourish a child on skimmed or watered milk, fat in insufficient quantities is supplied, wasting results, death may follow; or, in other words, the child is starved.

"Of all the deaths that occur in the great cities of North America, from a quarter to a third take place under one year of age, and from two-fifths to one-half under five; out of one hundred live-born children, about twenty-five die before the end of the first year of life, and from forty to fifty before reaching the close of the fifth year." (*Curtis & Jarvis.*)

Milk being the principal article of diet in infancy, we naturally turn to that period of life to find the effects of impure milk; and it is just at that period of life that we note the highest mortality. Thousands of children perish annually from starvation, due to feeding on skimmed and watered milk. "The skimming and watering of milk—the darkest feature of which is the increase in the rate of infant mortality thereby caused—should be stigmatized as a grave crime; and the offender, when brought to light, should be subjected to some severer penalty than a paltry fine. Once let it be understood that the perpetrator shall be subjected to some ignominious punishment, proportionate to the offence, and, what is now considered as a trivial misdemeanor, will henceforth take rank among the impermissible as well as forbidden offences." (*Nichols.*)

That infant *morbidity* and mortality are increased and caused by the use of impure milk, is no idle fancy; that poor milk is a factor, is proved almost daily in the practice of physicians having much to do with children's diseases. Where is the physician who has not seen cases of slow starvation of infants, resulting from the use of this inferior milk? The merest tyro in medicine accepts these facts as proved beyond doubt.

It is not long ago that three children died of starvation in the practice of Dr. Da Costa, of Philadelphia. The cause of death was found in the milk which analysis proved to be skimmed and then watered one and one-half times\*.

Authorities and instances might be cited at great length to prove the truth of these statements, but our space will admit only of the bare mention of facts as given.

Is it not time, then, that the sale of this impure food was stopped? The sale will go on, despite legislative enactments, till checked by energetic health officers in our towns and cities, and to them the public look for relief.

#### E. MILK FROM DISEASED COWS MAY CAUSE DISEASE IN MAN.

It is conclusively settled that many of the diseases of cattle are transmissible through the milk, and it is indeed fortunate that this secretion diminishes or disappears in many of the diseases of animals; notably anthrax.

Tuberculosis, without doubt, may be carried into the human system, by the milk from cows sick with that disease. In a cow which was sold to be killed, Pench recognized the existence of phthisis. Milk from this cow was fed to pigs and rabbits. These animals thus fed, when killed showed tuberculous lesions in the lungs, intestines and elsewhere. The experiments made were quite conclusive and proved, without doubt, that tuberculosis is transmissible from the cow to other animals by means of the milk.

Experiments similar to these, made in Germany, and by Burdon, Sanderson and Wilson Fox in England, also prove that tuberculosis can be carried and will produce disease in healthy animals when the milk or flesh of these animals is used as food. Tuberculosis is a very common disease in cows, especially when they are improperly housed or fed. The stables in our cities should be closely watched, as the danger of transmission is a real one, and proper precautions should be taken to check the sale of milk from cows sick with phthisis.†

\* Amer. Journ. Med. Sci. July, 1880. p 271,

† Vide *Med News and Abstract*, Sep. 1880, p. 533; *Br. Med. Journ.*, July 31, 1880; *N. Y. Med. Journ.*, Vol. III, pp. 241 and 321. "Tuberculosis of milch cows and the contagiousness of Tuberculosis, etc.," A. N. Bell. Am. Med. Ass'n, 1877; *Forc.*, p. 484; Blyth, p. 54 *et seq.*

Milk from cows affected with the foot and mouth disease (*Aphtha Epizootica*) when taken into the system, is the cause of serious ill health. The disease is an exceedingly contagious one prevailing among cattle and other animals. The following train of symptoms follows the ingestion of milk from these animals; loss of appetite, nausea, accelerated pulse, swelling of tonsils and submaxillary glands, an outbreak of vesicles upon the lips and tongue. The lower extremities are covered with a peculiar cutaneous eruption.\*

The results of analysis and microscopic examination of milk, from cows affected with this disease, are given in *The Analyst*, May, 1878, in an article entitled "Diseased Milk," by C. Heisch, F. C. S.

Pleuro-pneumonia is a very common disease among cattle, but the secretion of milk is, as a rule, checked in the early stages. Hence there is little possibility of it being used as a food.

The subject of transmission of diseases from animals by means of the milk is as yet in its infancy, the literature being small. But investigations are being made in Europe and in this country, and all published statements prove that it is extremely dangerous, to human life and health, to use the milk from diseased cows as food.

A source of sickness not mentioned above is found in the milk from cows secreted just after calving, and called colostrum. This produces diarrhœa in children. The microscope will detect colostrum corpuscles in such milk.

Milk contaminated with pus from an inflamed udder, or an abscess of the udder, will cause stomatitis and diarrhœa in infants.

It is hardly necessary to extend this section beyond these few hints; sufficient has been said to warn persons against the use of milk from cows not in perfect health.

#### F.—FEEDING INFLUENCES THE HEALTHFULNESS OF MILK.

That a healthy cow allowed to feed on rich meadow grass, and in the evening carefully housed, cared for and given a diet of meal and hay, will yield a rich, creamy milk, is evident; and that a child fed on this milk will keep in good health, grow fat

\*Blyth, p. 56, *et seq.*; 2nd annual report of Mass. State Board of Health.

and prosper, is equally plain. On the other hand, we know that a sickly cow, fed on distillery swill, improperly housed and cared for, will yield a thin, watery milk; and that a child fed on such milk will lose health, have diarrhoea and waste away. These facts are almost self-evident; so patent are they that it seems hardly necessary to mention them. Yet, they are ignored daily, and people wonder at the mortality among infants in our cities. Let us examine the subject a little more minutely.

The influence of different kinds of food on the yield and quality of milk is an interesting question to the dairymen, from a business point of view. But, to us, as physicians and sanitarians, it is of vast importance as affecting public health. The consideration of the subject, in its commercial aspects, is foreign to the purposes of this paper; readers desiring information on this branch of the topic are referred to the admirable works of Flint and Thomson; to the reports of the agricultural boards of the various States, and especially to the reports of the Secretary of the Massachusetts Board of Agriculture.

It is our intention to look at the subject as a sanitarian, and see what foods do render the milk unhealthful. Great service would be done the State, if the subject was thoroughly investigated, for the attention it deserves has not been given to it. Many of the diseases of infancy are undoubtedly caused or aggravated by milk from cows fed on poor or unwholesome food. The length of this paper would be unnecessarily increased, if we were to devote the space to the subject that it deserves; we must content ourselves, then, by giving a few hints, with the hope that better and more thorough work will be done by another. We have selected for consideration points not touched on in books and not generally known to the public.

*Brewers' grains.* So much has been said in the public papers about this that it deserves our attention. Not much information can be obtained from books, as to the effect of milk from cows fed on brewers' grain, on the health of children, but little has been written on the subject. There is, however, a strong popular impression that the milk thus produced is unhealthful, and that health of infants is compromised or endangered by its use.

During the past spring and summer, we have taken pains to consult with farmers in all parts of the State, as to the effect on the health of cows by using this substance, and have accumu-

lated evidence from about seventy sources. The facts thus adduced will be noted further on.

This substance is obtained from breweries. After the barley is "malted," the malt is crushed, placed in a tub with hot water, and an infusion made. During these processes much of the starch in the barley is converted, by the action of diastase, into sugar and dextrine, and these substances go into solution. This infusion of the soluble parts of the malt is strained off, and the insoluble portions are sold under the name of brewers' grains, or beer grains. Beer grains, when dried, contain about ten per cent. of water, fourteen per cent. of albuminoid, twenty-one per cent. of sugar, thirty-two per cent. of starch, and six per cent. of fats.

Dr. Voelcker, of the Royal Agricultural Society, says: "Brewers' grains are much more nutritious than their appearance seems to warrant. Even in the wet condition in which they are obtained from breweries, they contain a fair proportion of ready-made and flesh-forming matters. Dried brewers' grains make good milk, and are fully as valuable, as a food for cows, as barley meal. It is the custom among our farmers, on account of cheapness, to feed this substance to cows, either alone or mixed with meal, hay, or other fodder. In some parts of the State, large quantities are purchased at one time, and stored on the farm, in pits and barn-cellars. The grains are generally wet, and if not used immediately, or if improperly cared for, they ferment, become sour, and in a short time, rot. When given to cows in a sour or rotten state, they cannot but be injurious, and produce poor milk. The evidence given by farmers proves that fresh beer grains, given in small quantities, mixed with other food, are not unhealthful, and that the milk produced is of good quality. When used to the exclusion of other food, or in a fermented state, the milk produced is thin and watery, with a small per cent. of cream; but the quantity is increased. The grains seem to act as a stimulant to the mammary glands, exciting the secretion of milk. As a rule, it increases the quantity, but impairs the quality. The opinion among the better class of farmers is, that the milking life of the cow is shortened by the use of this food, and that its use should be discountenanced.

As to the effect of milk thus produced on the health of

infants, there is great uncertainty of opinion among physicians, and it is believed that the use of this milk is followed by diarrhœa and wasting. One physician of note asserts that it is a fruitful cause of eczema in children, but as this disease is very common in childhood, even when the infant is fed on breast milk exclusively, this statement cannot be accepted as positive.

*Distillery swill.* Swill milk is rarely heard of now, but not many years ago it was a fruitful cause of disease and death in children. Fearing that the lessons of the past may be forgotten we are constrained to mention it as a possible cause of disease. Distillery swill "if properly fed in limited quantities, in combination with other and more bulky food, may be a valuable article for the dairyman, but if given, as it too often is, without the addition of other kinds of food, it soon affects the health and constitution of the animals fed on it. Where this forms the principle food of milch cows, the milk is of a poor quality; it contains, often, less than one per cent. of butter, and seldom over one and three-tenths or one and one-half per cent. Its effect on the system of young children is, therefore, very destructive, causing diseases of various kinds, and, if long continued, certain death." The adulteration of pure milk from the healthy cow by water, though dishonest and objectionable in the highest degree, is far less iniquitous in its consequences, than the nefarious traffic in "swill milk," or milk produced from cows fed entirely on "still slops," from which they so become diseased, after which the milk contains a subtle poison, which is as difficult of detection, by any known process of chemistry, as the miasma of an atmosphere tainted with yellow fever or cholera. The fact is sufficiently palpable, that no pure and healthy milk can be produced by an unhealthy and diseased animal, and that no animal can long remain healthy that is fed on an unnatural food, and treated in the manner too common around the distilleries of many large cities." (*C. L. Flint, pp. 144, 208, 216.*)

Where swill-milk was sold in New York, a few years ago, "it was found different in alimentary character from that produced by cows that were fed on grass, hay or grain. It was not so well digested in the stomach, nor had it the nutritive power to create flesh and sustain strength. The children lost flesh and failed to gain it. Their skins were pallid, sometimes discolored and corrugated. Their countenances had the appearance of old

age, rather than the bright and lively bloom of childhood. They suffered from diarrhœa and dysentery and great debility, and many died." (*Jarvis.*)

Fortunately, no "swill-milk" is sold in this State at the present time, but it is well for health officers to be on the lookout for it. The sale of it is, in this State, considered a misdemeanor, punishable by a fine of fifty dollars and imprisonment for thirty days. The laws of Massachusetts, New York, Michigan and other States also forbid its sale.

Various plants, when eaten by cows, affect the taste and color of milk. It is well known that turnips and wild carrots impart a very unpleasant taste and odor. The poison oak, (*Rhus Toxicodendron*) when eaten by cows, so affects the milk that it is almost a poison to children. When a child takes this milk, there is extreme weakness, vomiting, a fall of temperature, the tongue is swollen and dry. (*Parkes.*)

The taste of milk is altered by cows feeding on the following plants: wild turnip, charlock, rape, wormwood, ramsons, cypress spurge, hedge hysop, black hellebore, German chamomile, maize. Color is imparted to milk by the following: Yellow bedshaw, madder and species of carex, scirpus, equisetum, ranunculus. Euphorbia gives a reddish color, and the milk is made blue by alkanet, water violet, purple cow wheat, perennial mercury, common knot grass, buckwheat, yellow rattle. (*Calder.*)

#### G.—MILK AS A VEHICLE OF CONTAGION.

That milk will act a carrier of the germs of contagious diseases is proved beyond doubt. Epidemics of typhoid fever and scarlet fever, occurring in England, have had their origin in contaminated milk.

An epidemic of typhoid in the town of Eagley, England, was investigated by the medical inspector of the Local Government Board. It was found that a small brook had been used by the mill operatives so that large quantities of fecal matter were daily emptied into the stream. It was also found that one of the workmen was ill with a disease supposed to be typhoid fever. The water from this brook was used at a dairy and was the only supply in use. There was no positive evidence that the milk was diluted with this water, but it was acknowledged that the milk cans were washed with it. Of fifty-seven families supplied

with milk from this dairy, fifty-five were attacked with typhoid fever. About one hundred and forty-six persons were sick with the disease. The inspector says: "Not one household, to which the milk was traced, did I find free from the disease."

An epidemic in Islington, England, was also traced to milk diluted with contaminated water, as the cause.\*

*Scarlatina.* In an epidemic of scarlet fever in South Kensington, England, it was observed "that one of the first severe cases which initiated an epidemic, occurred in the house of a milkman whose wife milked the cows, the milk being supplied to about twelve families in the city. In six of these, cases of scarlatina occurred in rapid succession at a time when the disease was not epidemic, and without any communication having taken place between those that became affected and the persons who brought the milk. It is very probable that, in this instance, the milk was the carrier of the contagion, as, previous to the distribution to the several consumers, it had stood in a kitchen which before had been used as a hospital for a scarlatina patient."†

English public health reports and medical journals contain many instances like the above. The danger, then, is a real one and the public should be warned in time to avert any such epidemics in this country.

#### H.—LAWS BEARING ON THE SUBJECT OF OUR MILK SUPPLY.

The dangers to public health arising from the use of adulterated, skimmed and diseased milk having been pointed out, it will be well for us, now, to review briefly the character of the various State laws having for their object the regulation of the trade in this article. We can then the more readily point out the imperfect or inefficient parts of these laws.

The first act on our statute books is that of April 7th, 1875, which reads:—"The sale or keeping of adulterated milk is a misdemeanor, punishable by a fine of \$50, and imprisonment for 30 days. To adulterate milk, or to keep cows for the production of marketable milk in an unhealthy condition, or to sell milk as pure milk from which the cream has been taken are also

\*For full accounts of these epidemics, see 8th Annual Report, Mass. State Board of Health; *Practitioner*, Vol. XVII, p. 225; Vol. XI, p. 234; *Med. Times and Gaz.*, Nov., 1870.

†*Practitioner*, Aug., 1876, p. 155; Oct., 1877, p. 307. 9th Annual Report, Mass. State Board of Health.

punishable as above. The addition of *water or any substance* is defined as an adulteration. Milk from cows fed on distillery waste (commonly called "swill") is declared impure and contrary to this act."

This law is a public health measure and aims to secure for the people a supply of pure, healthful milk. If the mere enacting of a law could do good, this act would be all that was necessary. But it has remained on our statute books for more than five years, inoperative and is practically a dead-letter. We doubt if a suit or conviction has been had under it. Many reasons may be found for this law not being enforced.

It fails to reach the great mass of petty offenders in our larger cities. Citizens will not take the time necessary to follow up a suit, nor will they, if fraud is really detected, act as complainants. The fines are too low, if we consider the enormity of the crime, which is looked on only as a misdemeanor. Besides all this, no standard of purity is fixed by law, on which to base degrees of sophistication.

If we were allowed to modify this act so as to make it practical we would suggest the following alterations:—The burden of its enforcement should be placed where it belongs, on the public health officers in the towns and cities, and they should be held responsible for carrying out the requirements of the act. The fines and imprisonment should be made proportionate with the crime committed; we think the public is endangered by the sale of impure milk, and the crime should be punished by a heavy fine and long imprisonment. A standard of purity should be fixed by law, and officers, competent to determine the degree and character of adulteration, should be appointed to make analyses for the health officers in our towns and cities. We have stated in a previous section what that standard should be.

The milk act should be a part of a general law against the sale of adulterated food of any kind.

The other laws, bearing on the subject, are purely trade measures, and have for their object the prevention of dishonest competition in the milk trade, and are not intended to guard the public against unhealthful milk. These laws read as follows:

Act of April 5th, 1878: Every person who shall sell, or who shall offer or expose for sale, any milk from which the cream, or

any part thereof, has been removed, shall distinctly and durably stamp or mark, in letters not less than two inches in length, in a conspicuous place, above the centre, upon the outside of every can, vessel, or package containing such milk, the words "skimmed milk," and such milk shall only be sold or shipped in or retailed out of a can or other vessel so marked.

Violations of this act are punishable by a fine of \$50. The sale or exposure for sale of milk contrary to this act is presumptive evidence. The non-payment of the fine is punishable by imprisonment.

Act of March 12th, 1880,—supplementary to the above act: The State Milk Inspector is appointed and empowered to open any can, vessel or package containing milk, whether sealed or otherwise, or whether in transit or otherwise; and if upon inspection he shall find such can to contain milk which has been adulterated, or from which the cream, or any part thereof, has been removed, the inspector is empowered to pour the contents of the can upon the ground, and bring suit against the person violating the law.

Any citizen may act as complainant under these acts.

It may not be amiss to look at the objects and bearing of these last two acts. Prior to the passing of the act of 1880, which created the office of milk inspector, there were laws, which, if enforced, were sufficient to check the sale of impure or adulterated milk; but the great trouble was found in having them enforced, consequently they were practically inoperative.

The history of these acts is pretty much as follows: The sale of milk was greatly interfered with by unprincipled dealers in different parts of the State, who shipped inferior or watered and skimmed milk, and obtained prices as high as those received by honest men who sent pure milk. To check this fraud, the act of April 5, 1878, was passed. This act, a purely commercial one, had for its sole object the prevention of dishonest and unfair competition. The law, which was copied from that of New York, was on the statute books for years, and not a single suit was brought under it, no person being found to act as complainant; the law being a dead letter for two years, it was thought, by the milk producers, that if some one person was appointed to look after their interest, at the expense of the State, the objects sought for would be obtained.

In accordance with these views, the act of March 12, 1880, which is supplementary to the previous one, was passed, and the office of State Milk Inspector created.

The two last acts protect the public against the sale of skimmed milk to a slight extent only. We have previously remarked that the supply of our cities comes from farms in their vicinity and not a large quantity from distant points, and that the bulk of the milk produced by dairymen is shipped to New York, hence the interests of our people in this case are secondary to those of the people of New York City.

We have, then, laws perfectly competent, if enforced and if modified to a slight extent, to check the sale of impure milk, in this State. It is not for us, in an article like this, to criticize the laws; it remains for others to alter the laws so that they cover the ground.

#### I.—INSPECTION.

We have thought it well to draw up a short scheme for the use of milk inspectors in making systematic examinations. A man to act as an inspector, must be a good judge of milk and, without the aid of any instrument, he should, from the taste, odor, consistence and appearance, tell whether the milk is a specimen of genuine milk or not. If he use the lactometer, this knowledge is especially necessary, for the lactometer is useless except in the hands of an expert. He must be conversant with the workings of the milk business, from the time the milk leaves the the cow to the time it is delivered to the consumer. He should likewise know the "tricks of the trade." It is well to be provided with a lactometer and lactometer glass, a floating thermometer and a number of four ounce bottles in which to put the samples.

*Scheme.*—The taste and odor should be noticed; upon rubbing the milk between the fingers it should give the feeling as if it had "body." Now stir the milk well, and take a sample from the centre of the can and put it in the lactometer glass; take the temperature if necessary; apply the lactometer; watered milk will run between between 80° and 105°; skimmed milk may mark from 110° to 125°. If suspicious, take a sample and label the bottle with all marks on the can and the date. An analysis may be made as follows: *Analysis.*—Take the specific gravity

in a 100 gram bottle; set for cream in a cool place and read off the per cent. in twenty-four hours, and notice any sediment.

Thoroughly mix the sample and weigh out five grams in a tarred platinum dish; evaporate on a water bath for three hours; dry and weigh. Loss in weight equals water; weight, less the weight of dish, equals total solids. Extract fat with ether or benzine; the loss equals the fat. Now ignite and when the dish is cool weigh; weight equals the ash

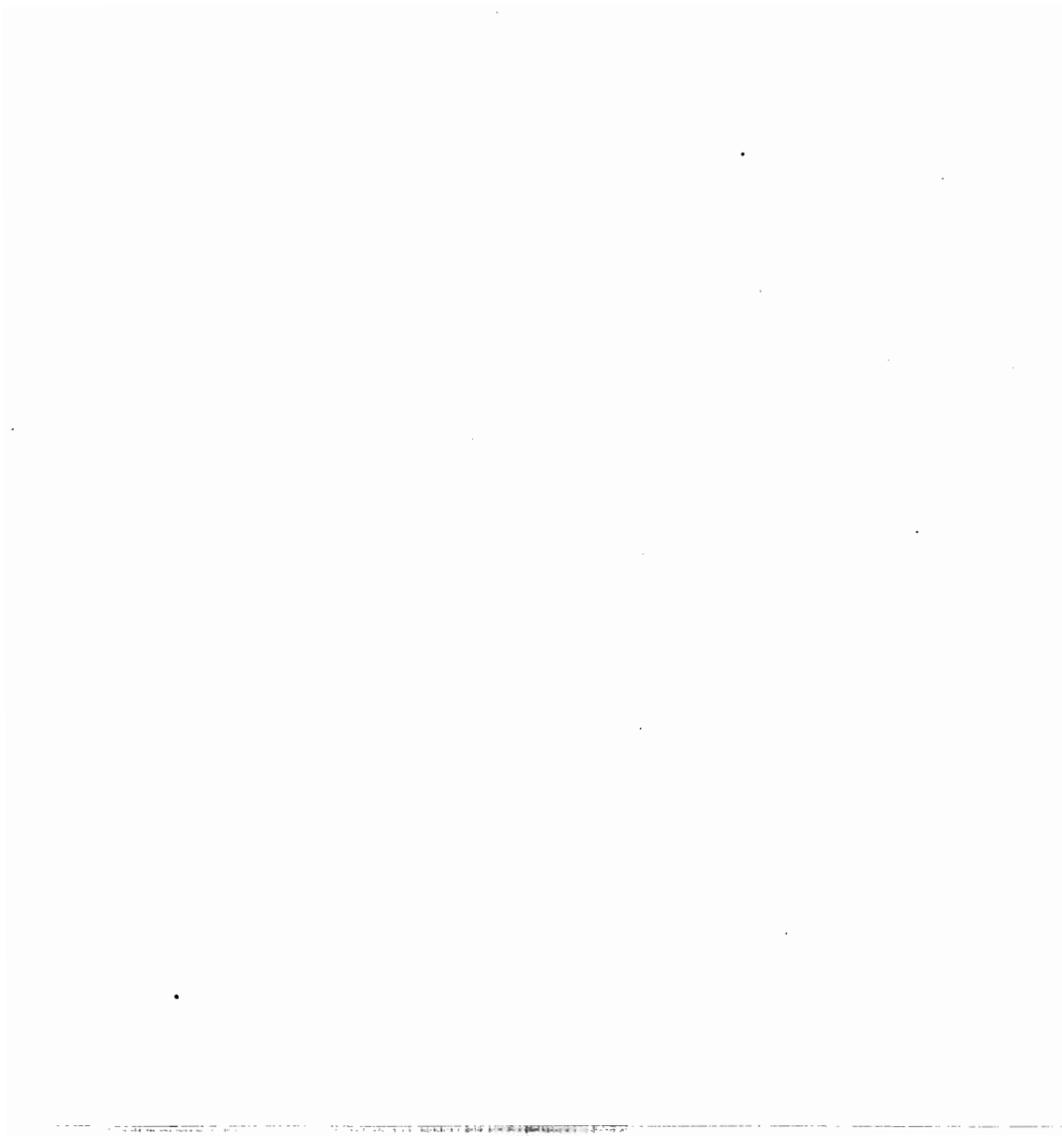
Test for adulterants, sodium, potassium and magnesium carbonates; borax, potassium and magnesium nitrate; sodium chloride; chalk, etc. The casein and sugar may be estimated after the fat is extracted, but this is rarely necessary.

Take a fresh sample and examine under the microscope. Note starch grains, blood corpuscles, pus corpuscles, colostrum corpuscles, Blyth's bodies, etc.

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## CONTAGIOUS PLEURO-PNEUMONIA.

EZRA M. HUNT, M. D.

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It has been the duty of the Secretary of the State Board of Health, for the past year, to have frequent correspondence with those who have to do with the diagnosis of contagious pleuro-pneumonia, and to aid in its investigation in this State. Few diseases of animals are as interesting as this is in its comparative study. It requires the acute analysis applied to the various zymotic diseases and needs to be traced also for the light which it may possibly throw upon epidemics. While a specific disease, it results almost exclusively in a local affection, so that it has to be treated much as a disease of the respiratory organs. Its one great lesion becomes the absorbing thought in the study of the disease, although this must not be to the exclusion of its study as to its constitutional effects. This is made all the more significant by the fact that inoculation in the flesh, as upon the ears or tail, not only will give the specific disease, but divert its concentration from the lung and at the same time secure immunity from attack. It is made benign, not so much by the local mildness, as is sometimes demonstrated by tailless cattle, but because it is thus diverted to another centre for its activity.

Without repeating the history of diseases, or relying entirely upon the text-book authorities, we purpose to seek an answer to the following questions:

Have the laws of its contagiousness or communicability been determined?

Are its lesions so distinct as that its diagnosis from all other forms of lung diseases can be determined from post-mortem appearance alone?

Do the thermometer or symptoms distinguish it from other lung diseases of cattle?

How are we to arrive at its diagnosis as an infectious pleuropneumonia?

What is the period of its incubation?

Can an animal that has fully passed the acute stage and returned to feeding, to milking and to apparent health, communicate the disease?

Question 1st.—Have the laws of its contagiousness or communicability been determined? It is first to be noted that much which is accepted as proof of contagion is not really such. Terms such as epizootic (epidemic) infectious, transmissible, etc., are confounded.

The secretions of a cholera patient or a typhoid fever patient may communicate the disease, but the person not, or neither may communicate and yet the secretions after voidence, standing and change, i. e. after a number of hours more or less may communicate the disease.

Or, as it is claimed in yellow fever, the patient may be harmless, while the things and surrounding (fomites) may communicate the malady.

Or, a disease may be in the atmosphere so that there is what is called an epidemic constitution of the atmosphere.

Or, like cerebro-spinal meningitis, it may prevail, not because one animal catches it from another, but because numbers are subjected to the same unfriendly influence.

Dysentery often prevails as an epidemic or endemic when it is not contagious.

The pathology of puerperal patients, so far as the peritoneum is concerned, is the same as the non-infectious form.

So a great deal of the average testimony as to the contagiousness or communicability of a disease, needs to be sifted and treated, not by the test of prevalence, or of seeming confinement to localities, but by close and exact evidence as to individual communicability.

It is generally believed by authorities that the form of pleuropneumonia of which we write is communicable from animal to animal, and also by the surroundings of infected animals. Although classified and tabulated facts arrived at by such methods of exclusion as exclude other possible sources of prevalence are too scarce as yet. The common sentiment and obser-

vation of veterinarians concludes it to be communicable through contagion.

The lines of its contagion are not very well defined. We have good reason to believe that most contagions are particulate, i. e. not gaseous but consist or reside in minute particles. Most of these are diffused slowly. The yellow fever poison seems to cling near the ground, and scarlet fever poison is not communicable to the same distance as measles.

There is some reason to believe that the ferment of the lung plague is not very diffusive, and that animals two hundred or three hundred feet distant are not in the area of the poison.

Are the lesions so distinct as that its diagnosis from all other forms of disease, or of local affection can be determined from the post-mortem appearance alone?

To an observer of a post-mortem where an animal is killed with pleuro-pneumonia and has one sound lung, the contrast at once convinces of something—one lung is say of two and a half pounds weight, the other of twenty to thirty pounds. There is effusion of a liquid—there is a thickened pleura, both of the part next to the chest wall and of that covering the lungs. There is plastic exudation, both inter-pleural (L) and in the interstices of the connective tissue, which leads to organization and so gives to you all the solidity of fibrinous exudation. It is just this that constitutes the pathology or lesion of the disease. "All the other organs of the body are, as a rule, found to be in a state of health." There is variation in the amount and consistency of the watery or gluey fluid, after the plastic exudation so rapidly organizes as to bind down the pleura and lung so that you need to peel it from the chest wall.

The pneumonia is chiefly interstitial and magnified because of the abundant connective tissue in the cattle. Neymeyer's definition of interstitial pneumonia (vol. i, pp. 162 and 192) as an inflammation, involving the walls of the air vesicles and the inter-lobular connective tissue, "is fully descriptive as to kind." Only the amount is magnified because the bovine animal has so large an amount of connective tissue in the lung, and because the "pneumonic lobules are separate blocks of tissue." By the exudation and by the conversion of the inter-lobular tissue into granulative tissue and connective tissue, the lobules themselves pass to a stage of stuffing or impaction, and so you get necrosis or a strangulated death of the lung substance.

If the animal does not die, but goes on to recover, the dead portion of the lung becomes encapsulated or encysted by "the false membrane over the pleura, and the inter-lobular and peribronchial spaces."

Now in all this, as to the pathology of the lesion, so far as quality or method of change is concerned, we have nothing pathonomic or distinctive of an infectious or contagious malady. As we read or study, side by side, the various changes that take place in pleuro-pneumonia, or chronic interstitial pneumonia, in the adult and in the animal, the terms of description and the records of lesion as to the character of the exudation, its organization, changes and results, it is hard not to come to the conclusion that Leaning does, that if there is a contagious pleuro-pneumonia in animals there is also an analogous infectious pleuro-pneumonia in adults, and between the two, as he finds them in the adult, he makes only such pathological distinctions as these. In one, the pneumonitis is the principal lesion; in the other, the inter-pleural plastic exudation. "He makes the essence of distinction to consist in the more excessive and intense hyperplasia of the blood, its tendency to throw out plastic or fibrous exudation being such that "wherever there is celluloid connective tissue there is plastic exudation."

While the medical profession generally recognize cases of common pneumonia, to which all these facts attach, it is significant that they regard it not as a contagious disease, although, at times, largely prevalent, but as a severe and malignant type of usual pneumonia, which is also generally a pleuro-pneumonia.

While some veterinarians have asserted to us that it is possible from the post-mortem lesions of the lung alone, to pronounce a case one of infectious pleuro-pneumonia, yet on presenting the specimens to five of the most eminent pathologists of New York City, three of whom have examined cattle lesions also, they plainly declared that while from the rapid plastic or pleuritic exudation and its "tremendous" rapidity of solidification, there might be grave suspicion and inference that the disease was specific, yet that the same pathological order of change was common and not distinctive. The very points that had been named to us as differential, were shown not so to be by those who believe in a contagious pleuro-pneumonia.

"Some have supposed the very extensive exudation into the

lung structure and its marbled appearance, are indicative of some specialty in the inflammatory process; this is not, however, the case, for it is found that ordinary pneumonia, caused by cold, induces the same anatomical condition of the pulmonary parenchyma—the peculiar appearance being due to the anatomical fact, that the lungs of horned cattle contain much connective tissue and that the air cells are separated into groups by such connective tissue.”

Prof. Williams, of Edinboro', in his Principles and Practice of Veterinary Medicine, quotes Strangemayer with approval, thus:

‘All this, however, is not intended to and does not discredit the idea of contagion. The same structural or tissue changes occur to an organ from causes totally different. So pneumonia, arising from very different causes, does not have lesions corresponding to the variety of causes. Puerperal fever, although so distinctly communicable, so far as the peritonitis is concerned, has no distinct lesions. Although the pleural adhesion and infusion are marked, yet common pneumonia is generally pleuro-pneumonia.’

Loomis has said that in pneumonia nothing is so frequent as adhesion of the lung to the pleura.

Prof. Janeway states, that in one hundred and twelve cases of post-mortem of pneumonia, only ten were found entirely free. While there is a field for the comparative study of the lesion, it is not chiefly as to its pathological distinctness.

The degree of lesion, the habits of the disease, the natural and physical signs and evidence of the source of contagion, must be sought as diagnostic. Then the effects of imparting the disease to other animals by inoculation from the diseased lung as a crucial test, are worthy of consideration. Where all such facts are weighed, studied and compared, we have the greatest respect for conclusions, but we must claim that from post-mortem appearances *alone*, it is seldom wise to assert a positive diagnosis. And we must also say, that diagnoses have sometimes been made with a facility and celerity appalling to any medical clinician.

Does the thermometer distinguish the contagious pleuro-pneumonia from all other diseases of cattle, and especially those in which the lungs are affected? The thermometer is merely a test

of animal heat, and as such is valuable only as a measure thereof. An excessive degree of temperature attaches to very many diseases and to none more than those of the lung. In the common pneumonia of men, it is not unusual to record a heat varying from  $104^{\circ}$  to  $107^{\circ}$ . If we find in a stable an accurate record for days of the heat, as in our hospitals, or as in the note book of private chemists, and are sure that with care as to thermometers and with all that precision which is so difficult with animals, and so exacting on the time, and nice observation of the attendant, that the record shows a very high temperature, this would aid in giving precision to the diagnosis, but not so as of itself to establish the disease. In a case in Camden county, in which nine animals died, the temperature was as high as  $107^{\circ}$ , but there was no lung lesion whatever, and the disease was not pleuro-pneumonia. How, then, is a diagnosis of the disease to be arrived at?

We have only to answer that it is by the history of the cases, the ability to trace the source of contagion, the natural and physical signs, the spread of the disease and the post-mortem appearances, by a summing up of all the facts in evidence. The rapidity of the fibrinous exudation and interstitial consolidation is an important index. An influenza, like the horse epizootic, may prevail and pneumonia may be epidemic without being contagious when real infectious pleuro-pneumonia is occurrent. There may also be cases of sporadic disease among cattle. The infectious disease is claimed never to occur spontaneously in this county, but always to originate from a previous case. If, therefore, there is no clew to contagion, it needs strong evidence to assure as to the specific nature of the disease. It is easy to arrive at a superficial diagnosis, and positive conclusions are made by men whose evidence would be cast out of any capable medical or veterinary court as incomplete.

#### WHAT IS THE PERIOD OF INCUBATION?

The period of incubation has not yet been accurately determined, but must be admitted to reach from ten to forty days, as a rule. We believe we have evidence of its occurrence three months after the purchase of an infected animal. This is the great difficulty in eradicating the disease. An animal may easily pass in an ordinary inspection, and yet be a conveyancer of

the disease. It is for this reason that we regard the usual inspections, as they have always been conducted, entirely insufficient to guard against the disease. Acute cases only are likely to be discovered, and drovers soon become wise enough not to bring these over by usual routes. While there should be full powers of inspection, this cannot be the sole or chief reliance. So long as pleuro-pneumonia exists in any part of any State, every man who brings any cattle in the State, should be required to define the locality from which they came, and give a certificate of health, and be held accountable for any outbreak in the animal for three months. All newly-purchased stock should be kept apart from the common herd. Any slight cough or other ill condition of health should be carefully watched.

Can an animal that has fully passed the acute stage, and returned to feeding, milking, and to apparent health, communicate the disease?

This is a most important question, since, over and over again, a quarantine has been continued, because of the assertion that recovered cattle are still dangerous. It has been assumed that any animal having once had the disease, may at any time after apparent recovery, become the focus of a contagion, and so infect other cattle. It is assumed that because an animal once affected, may continue to have one lung, showing that there has been disease in it, that, therefore, the "capsule walling up the diseased germs may break down, and the imprisoned germs escape, and so another outbreak occur." We submitted that point to an eminent medico-veterinary authority, who replied: Who saw the germs? Where is the record of one fact that any such case ever did break down and release imprisoned germs? Because a part of a lung becomes necrosed and encysted, that does not prevent recovery. We constantly have similar conditions in human recoveries. Nor does a lesion retain the specific character of the disease causing it. Caseous degeneration, or necrosis, or other changes resulting, are in fact always quite distinct from the original cause thereof. The suggestion that such animals may, at any time, become foci of contagion, is not supported by evidence.

Dr. Yeo, one of the best of recent authorities, says: "The exudates do not tend to become highly organized, but to change to a cicatricial tissue, or degrade into lower forms of matter, i. e.

caseous or calcareous." We have seen, the last summer, cases which had been pronounced pleuro-pneumonia, and had recovered with signs of consolidated or necrosed lung; yet they were kept in close stables, and with numbers of other cattle. After a lung has thus passed into a necrosed or cicatricial state, there is no probability that by any outbreak it can again become the centre of a specific contagion. The reason why we advise the fattening and slaughter of recovering cases, is rather because there is danger of infection during the prolonged recovery, and because milch cattle are not likely to do as well with one lung, or a part thereof, permanently impaired. It would, at least, be worth while that some of these lungs which had been harmless for months or years, should have some of their juice inoculated into other animals, to see whether genuine infectious pleuro-pneumonia could be produced.

What are the laws and restrictions that are justifiable, and on what kind of evidence must the claims for their enactment rest?

We first claim that it is due that the presence, degree and type of infectious pleuro-pneumonia should be established by the most indubitable evidence, before severe restrictive measures are resorted to.

It is no longer enough that this or that authority give their opinions. They must state the grounds and evidence of their opinions so that other experts, too, may sift the facts and draw their conclusions. Or, at least, they must by former subjection to such tests have established their claims to speak *ex cathedra*.

We believe, therefore, first of all, that all states should in the case of this or other suspected contagious disease among animals, have its constituted authorities, with power enough to find out and decide and with diligence enough to give the grounds of their conclusions, in order that there may be reasonable evidence as to suspected contagions.

On satisfactory evidence thus furnished that any contagious disease among animals exists, isolation should be promptly secured, and such authority be granted as the communicability of the disease justifies.

It is important after such methods of test as are due alike to science and art and due to the owners and to their individual rights, that large powers should be given, since upon full authority and its exercise may depend the entire question of spread.

The rule in all contagious diseases is to give large police and sanitary powers and then hold officers accountable for their judicious execution. The man who always exercises power mainly because he has it, or who hesitates to exercise because of the opposition of interested parties, cannot be entrusted with such a law.

Large powers are only meant as discretionary powers, and where exercised beyond a limit which the facts in evidence justify, no class so abuse and misuse power as those who are largely entrusted therewith. The very confidence thus reposed in them is a declaration of a belief that they will act only upon evidence such as will be satisfactory to the common sentiment of experts which, in our country, always has, if not a full popular approval, yet a noble and sustaining constituency of those who are always ready to defer to the expressed statements, evidences and opinions of a majority of careful investigators.

Errors of judgment when they effect rights of property or life are as serious as if they were errors of financial cupidity or other ill-intent. This does not inculcate hesitancy in action, but it does include discernment both in resolve and execution and ability to defend action in a way satisfactory to the common intelligence of judges.

The peremptory slaughter of animals, their forcible detention and inspection in transfer, and the closing up of avenues of trade by summary ordinance are acts to be justified by the facts in evidence. Those that act promptly with good reasons, therefore, are to be commended; those who act upon grounds that will not stand the test of close examination are to be condemned, just in proportion to the magnitude of the trust committed to them. When a disease like pleuro-pneumonia is epidemic in any locality, large powers to prevent spread must be conferred and exercised. The welfare of animals is a large interest in the State.

The hygienic sanitary measures, necessary for their health and the prevention or limitation of contagious diseases among them, is among the clear duties of the State. It concerns not only a pecuniary or humanitarian interest, but bears directly upon the health of the people.

The laws which effect them are very similar to those that effect human health. It is found that the care of the one is quite a measure of the care to be extended to the other. In the matter

of epidemics, (epizootics) or contagions and the various laws of communicability or transmission, these diseases are of intense interest, since by these we may study all contagions.

It is evident to any one who examines a lung of an animal with acute pleuro-pneumonia, that it is so rapid in fibrous exudation and in interstitial consolidation, that the only hope of a case is in very early treatment and a profound impression upon the inflammatory and exudative process. Bleeding and large rapid doses of calomel, and later, counter-irritation after removal of the hair, need exact trial under testing methods. Milk, with lime water and defibrinated blood, may be easily and largely given by drench to meet any reduction from treatment which is less rapid than that from the disease. Cows' blood, stirred well while fresh, so as to remove the strings of serum, leaves a juice of great value for alimentation in such cases. If farmers would use such preventive treatment as we have indicated in circulars, and would have skilled veterinarians examine affected herds, so as to see each case in its start, we are sure its extension could be limited.

In the last few years, biologists and pathologists and the medical profession have been most earnestly studying the laws of contagion and of the production, dissemination and virulence of disease, using comparative pathology and other comparative studies as a most important means of information. For this reason, in England and on the continent, medical men have been prominent as authorities on the disease of animals, and co-operate with educated veterinarians in their attempts to prevent disease. It is due to veterinary science and art that both alike take a very deep interest in these studies. It is due to the medical art that physicians utilize the large opportunities, thus furnished, for the study of the laws of health, of disease, of physiology and pathology, as they affect human kind.

We feel that in the study of the lung disease of cattle, of these blood poisons, and of such a disease as infectious pleuro-pneumonia, there is still a large field for investigation, in which, recently, such men as Dr. T. Spencer Cobbold and Dr. C. S. Roy, Dr. Leaming, etc., have added to the labors of Fleming and Williams and Law.

As pleuro-pneumonia, like most of the contagious diseases of

animals, does not, thus far, admit of much treatment, the chief service that the State can be is as follows :

1st. To diffuse information that shall enable owners to suspect contagion, and so separate the animals before others are infected. Also to acquaint them with methods of disinfection and disposal and of avoiding the carrying of the disease.

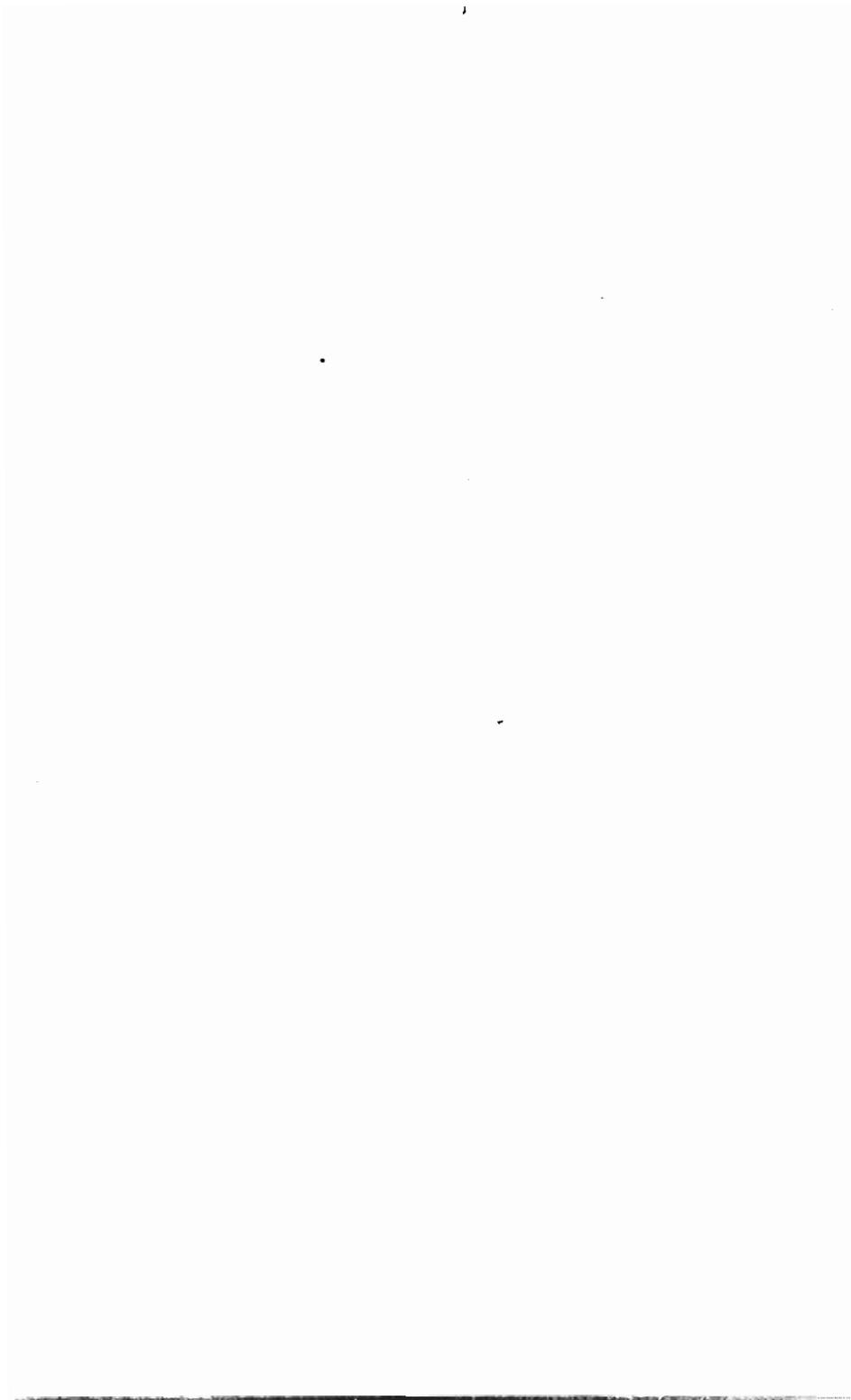
2d. To prevent the irresponsible introduction of cattle from infected districts, by inspection, by regulative laws, and by holding sellers responsible.

3d. To provide means for the disposal of animals that have the disease, so that centres of contagion may not be preserved.

4th. To guard against modes of keeping cattle which tend to cause ill-health and diseased milk supply.

5th. To authorize inoculation under State oversight in herds already affected where it does not readily subside.

The present law, with slight alterations, can be made operative for these purposes, and at moderate expense, unless sudden outbreak or introduction of a contagious disease should require especial expenditure. The details as to its former management and some other suggestions will be found in the record made for the Board of Agriculture, and published in their report for this year as required by the law.



## REPORTS OF VETERINARY INSPECTORS.

REPORT OF WM. B. E. MILLER, D. V. S., DECEMBER 31st, 1880.

The subjoined report will show the number of places visited where diseased animals were reported, the number sick at time of inspection, the nature of the disease, and deaths resulting therefrom as far as known:

March 24. Visited Benjamin J. Lord's farm, Parkville, Gloucester county; found no chronic cases of pleuro-pneumonia. Mr. Lord had lost several, and had one killed by Gen'l. Sterling's order.

March 30. Found one animal sick with bronchitis in a lot of fat steers. Examined at the Camden stock yards. The animal was slaughtered by J. L. Pierson, butcher, of Woodbury, Gloucester county.

April 1. Visited E. A. Bloomfield's farm, Elizabeth, Union county; found one chronic case of pleuro-pneumonia. Had lost some and had others killed by the cattle commission of last year.

Same date. Visited Jacob C. Dodd's, farm Lyons Farms, Essex county; found three chronic and one acute case of pleuro-pneumonia. Had lost some and had some killed by previous commission.

April 2. W. Cohen, Old Small-pox Hospital, Hoboken, Hudson county. One sick, had lost some and had others killed by other commission.

April 2. Mrs. Schuler, Blun street, Union Hill, Hudson county. One chronic case. Had some killed by previous commission.

April 5. Found three sick steers in a lot of forty. Inspected at the Camden stock yards. Were slaughtered for beef. Came from West Philadelphia stock yards.

April 14. Visited Bergen county; found one chronic case—

on one of the farms where cattle had been killed by the previous commission. Informed myself as to other herds which had previously been in quarantine.

April 6. Visited Manasquan, Monmouth county, and examined a cow on the farm of J. H. Morris; found it an acute case of pleuro-pneumonia. Lost one on the 18th and one on the 19th of February; had no other cattle. Also visited the farm of Shem Pierce, of the same place, and found one sick with same disease; had lost one three weeks previous.

April 16. Mr. McMullen, Jersey City, Hudson county; one cow sick of parturient apoplexy; died.

May 12. John Whittick, Hightstown, Mercer county, had two infected with pleuro pneumonia from herd of J. C. Fisher, on adjoining farm, who had several deaths and some killed by the State authorities last year. No deaths in Whittick's as far as known.

May 14. Joel Barkalow, Forked River, Ocean county, lost one cow with pleuro-pneumonia.

June 28. Visited Englishtown, Monmouth county. John H. Laird had one cow sick; had lost one from indigestion.

Same date. William B. Congden lost one from parturient apoplexy.

Same date. George Morris had three sick with indigestion; no deaths as far as known.

June 29. Visited Freehold, Monmouth county. Abijah Applegate lost five cows within a few days of each other; did not think it any contagious disease. None sick at time of visitation.

July 1. Visited Farmingdale, Monmouth county. Many farmers were losing cattle from indigestion, owing to the dry weather. Found no contagious disease.

July 2. Visited Ridgway, Lakeview, White's Bridge and Toms' River, and found that nearly every farmer had lost cattle as the result of the excessive drought.

July 19. Visited Robertville and Matawan, Monmouth county, and found the same state of affairs as at other parts of the country—cattle dying by the dozens from indigestion.

July 20. Visited Mount Holly, Burlington county. J. Ewing had five cows sick with lung trouble; had lost two,

C. H. Deacon had two sick with pleuro-pneumonia; killed one at this visit; had lost some before; has since had many others killed by State Board.

The disease was brought to this farm by the purchase of a cow from Caleb Ridgway, cattle dealer, that came from the stock yards of West Philadelphia.

Mr. Gaskill and Mr. Southwick of Pemberton, both bought from same drove and had their herds infected. Mr. Kelley, of Masonville, also had the contagion brought to his herd from the same source, and had several killed.

July 26. Dr. Ashhurst, of Mount Holly, had one sick cow which was killed. Not pleuro-pneumonia.

July 28. Visited Clayton, Gloucester county, and examined the herd of E. J. Davis and others, found three cases of pneumonia.

September 8. W. R. Hylton, Wrightsville, Camden county, had four sick with pleuro-pneumonia, has lost or had killed thirteen in all, infected by a cow from Philadelphia stock-yards.

September 9. Visited Turkey, Monmouth county. One farmer had lost two cows; found three more sick.

September 13. Visited Rieglesville, Warren county; found hog cholera very prevalent. The mortality very great.

October 1. Visited Mount Holly and examined two horses for glanders.

October 15. Visited Mount Holly and slaughtered two horses belonging to Ashmead Deacon, previously condemned for glanders.

October 11. Visited Sicklerville and Williamstown, Camden county, and found hog cholera very prevalent and fatal. Two cattle had died from phthisis pulmonalis verminalis.

November 1. Visited M. C. Brownings, Ellisburg; found one sick cow; had lost one. Made several subsequent visits to this farm; lost nine cattle in all. Disease "typhoid fever."

November 5. Visited Mullica Hill, Five Points and Ewans' Mills; found two farms infected with pleuro-pneumonia. Edward R. Lacy lost two steers, and had two more sick with it. Mr. Heritage lost one. They purchased these cattle from a drove which came from the Philadelphia stock-yards about three weeks before.

December 7. Visited Salem county; found pleuro-pneumonia on three farms, one death had occurred, and one was slaughtered at the time of visitation, and a post-mortem made of the carcass. These animals all came from one drove recently brought from Philadelphia. No other deaths since, as far as I know.

December 9. Visited E. Tomlinson's, Kirkwood, Camden county. Found one steer sick with pleuro-pneumonia; slaughtered the animal, and made a post-mortem, which showed the lesions of the last stages of the disease. Revisited this place on the 12th, and found another sick, which was slaughtered immediately. These cattle were purchased in West Philadelphia about six weeks before, and came from West Virginia for sale.

Your obedient servant,

WM. B. E. MILLER, D. V. S.

To E. M. Hunt, Secretary State Board of Health.

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BURLINGTON COUNTY, STATE OF NEW JERSEY.

MOUNT HOLLY, January 15, 1881.

*Gentlemen* :—I have the honor to inclose for your information, a report of the disease known as contagious pleuro-pneumonia, in my district during the present year :

It first made its appearance on the farm of Mr. Caleb Wilkins, Fostertown, Burlington county, N. J., June 9th, 1880. He had bought the cow of Mr. Caleb Ridgway, Vincentown, Burlington county, N. J., the preceding March. She died June 11th, 1880. She had been separated from the herd as soon as found ailing, and the rest of his herd did not contract the disease.

I was next called, June 21st, 1880, to inspect a cow suffering from contagious pleuro-pneumonia, on William G. Deacon's farm, near Mount Holly, N. J. She came from the same drove about the same time. Mr. Deacon has lost sixteen head. The same day (June 21, '80,) I condemned a case for the Hon. Job H. Gaskill, on his farm near Ary's Mount, Burlington county, N. J. He also bought two cows from Mr. Ridgway's infected drove last spring. He has lost ten head.

Mr. Joseph Kille, Masonville, Burlington county, N. J., bought a cow of Mr. Ridgway, some time in March, and on the 25th day of June, I condemned her and three others, as suffering from this malady. He has lost seven head.

Mr. H. H. Troth, Rancocas, Burlington county, N. J., called me to inspect his herd on the fourth day of August, 1880. I condemned two cases, and one cow had died prior to my visit, he not knowing it to be the cattle plague. He bought two cows of Mr. Ridgway, from the drove. He lost seven head.

Mr. William E. Gaskill, Juliustown, Burlington county, N. J., called me September 4, 1880. Condemned one cow. We suppose his cows took the disease from Mr. Job H. Gaskill's, as they pastured in adjoining fields before Mr. Gaskill's herd was quarantined. He has lost seven head.

Mr. Joseph Lundy, Rancocas, Burlington county, N. J., pastured his cows in an adjoining field to Mr. H. H. Troth's, in the early part of the summer, and during the month of September, 1880, lost three cases.

Mr. Rowland Stokes, Rancocas, Burlington county, N. J., pastured some young stock on an unfenced meadow near where we had Mr. Troth's cows quarantined. Two of his heifers jumped in and mingled with the diseased ones; and November 26th, I slaughtered one heifer for him, making in all eight herds affected. Slaughtered by order of State Board of Health, forty-four head; died of the disease, seven head. Total loss, fifty-one head from June 9th, to December 7th, 1880. One other cow, not seen by me, on the farm of Daniel Emley, Mount Holly, was slaughtered by order of State Board of Health. Although the disease appeared in a very malignant and contagious form in this county, we seem to have it under control at present; but we must be vigilant, and adopt all precautionary measures to stay its progress. We were fortunate enough to not allow it to spread from farm to farm after we were apprised of its appearance, by our system of quarantine, except, in the one instance of Mr. Stokes' cattle, above mentioned. Mr. Caleb Ridgway, Vincentown, Burlington county, N. J., bought the drove in question, from a man in a Philadelphia stock-yard, not knowing them to be diseased, and sold them to the farmers in our vicinity. Thus this fatal disease spread, causing our farmers to suffer great losses. Regarding the causes, symptoms, different stages, &c., of the disease, it does not seem necessary to occupy any space in my report. After infection, death is the only remedy that will stop its progress.

One of the Township Boards of Health reported two cases of glanders, which were slaughtered by order of the State Board of Health.

Respectfully submitted by your most obedient servant,

C. K. DYER, D. V. S.

REPORT OF J. A. MC'LAUGHLIN, D. V. S.

JERSEY CITY, JANUARY 1ST, 1880.

E. M. HUNT, M. D.,

*Secretary, Board of Health of New Jersey.*

SIR:—According to request I submit the following statement of work done by me since my appointment as cattle inspector.

June 9, 1880. Went to farm of Mr. Teese, distant about three (3) miles from Elizabeth, Union Co., found four (4) cases of pleuro-pneumonia contagiosa. Destroyed two (2); quarantined the remaining two (2).

June 25. Went to Mr. Donovans, Jersey City, Hudson county, found one suspicious case.

July 20. Examined eleven (11) head of Holstein cattle, at the Bremen pier, Hoboken, said cattle imported from Holland and the property of B. B. Lord, of N. Y. All perfectly healthy.

August 11 and August 16. Went to Lower Hackensack, New Barbadoes; cattle the property of Mr. Gross. Found one cow suffering from *simple* pneumonia. After a thorough investigation concluded that contagious pleuro-pneumonia was not on his (Mr. Gross') farm.

September 8th. Went to the farm of Mr. Theo. F. Young, Andover, Sussex county. After a thorough investigation convinced myself that contagious pleuro-pneumonia was not among his herd.

September 16th. Went to the farm of Cooper & Hewitt, Mr. George, agent, Charlotteburg. After a thorough investigation satisfied myself that contagious pleuro-pneumonia was not among his cattle.

October 21st. Went to Preakness Valley to farm, (Old Stag Farm.) Found one sick cow showing other symptoms than those attending contagious pleuro-pneumonia. Found, also, one (1) cow on which I held a post-mortem. Conclusion arrived at: No contagious pleuro-pneumonia.

December 22. I examined two hundred and seventy head of Western cattle about to be exported per steamer "Persian Monarch," (agents Patton, Vickers & Co.) I mention this casually as showing the increasing business with the foreign markets, the result of increasing confidence, and none of these had any apparent disease.

## VARIOUS CIRCULARS.

ISSUED BY THE NEW JERSEY STATE BOARD OF HEALTH, AND  
COPIES OF LAWS ENACTED BY THE LEGISLATURE, BEAR-  
ING ON HEALTH, VITAL STATISTICS AND THE CON-  
TAGIOUS DISEASES OF ANIMALS.

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### PROTECTION TO BATHERS.

JUNE 1, 1880.

Our statistics show that from July 1, 1878, to July 1, 1879, one hundred and ninety-three persons were drowned in this State. Some at the sea-shore, or by the capsizing of boats, some in ponds, many while bathing in rivers or small streams, some in pools or cisterns. Many of these were good swimmers. Not all of these perish from real drowning. Some have heart disease made fatal by nervous shock, others apoplexy or some intense congestion, others syncope from exhaustion. It is not easy to decide on the moment whether the drowning is from any of these causes, and it is better to proceed on the supposition that the case is one in which death *has occurred* from the shutting out of the oxygen of the air. Cases where the hands are clasped and the fingers contracted are the most hopeful. "Those capable of inhaling and retaining a large amount of air in the lungs, and those who retain their presence of mind in the greatest degree, are those who resist the dangers of submersion for the longest time and are the most readily revived, while those who force nearly all the air from their lungs at the first shock can seldom be recovered."

"When a person falls into the water or is exhausted by the act of swimming, he goes beneath the water, then again comes to the surface, aided by the buoyancy of the air in the body and in

the clothing. In coming to the surface, realizing danger, he instinctively assumes the upright position, springs from the surface, and throws up the arms for help, at the same time endeavoring to relieve the desire for breath, by an inspiration, and to express the desire for aid, by calling out. This effort takes in water as well as air, and produces a slight spasmodic cough during which act the body goes beneath the surface the second time. As the consciousness of sinking becomes more acute, there is an agonized expression of the countenance which is indescribable, but which, when once seen, will be ever remembered and recognized—and at the same time frantic efforts are made to grasp everything that can be seen, whether within reach or not, and this desire continues even after having sunk, as oftentimes bodies are found clutching the weeds, grass, or stones, that may be found at the bottom of the water.”

“Sometimes the air is so exhausted from the system that the body does not come to the surface after going down the second time, but generally there is sufficient inflation to bring it once more to the surface, when as soon as the head comes above the water, the urgency to take the breath has become so great that a full inspiration is made without due caution, and a large quantity of water and a small quantity of air are taken into the system. The water penetrating into the bronchial tubes produces a second fit of coughing, expelling what little air may be left, and the body sinks just below the surface or goes to the bottom.”

Five minutes under water is the usual limit after which recovery is improbable in a case of drowning, but as there is not always the same amount of air exclusion, as the time cannot always be accurately stated, as syncope or nervous shock may have modified the lung and air condition, and as there may be slight inhalation of air before it is perceived, no case not known to have been *under water* half an hour should be regarded as hopeless. Persons have been recovered who for an hour have shown no outward sign of life. Places frequented by boys for swimming, and all bathing places and life-saving stations, should have definite provisions for such accidents, and should be required by their patrons each year to state precisely what these appliances are,—and to show that they are in perfect order for instant use and under such direction as to be readily at hand. An accident ought never to occur without a full knowledge beforehand of how most rapidly to secure aid and appliances.

Printed guides in public places near the water serve both as information and warning. Methods and skill depend on speed for success. For details we refer to an article prepared for the New Jersey State Board of Health by T. G. Chattle, M. D., and to be found in our report of 1879.

In a case just occurring, the boat seeking the drowned one should have in it a person whose duty it is at once to take charge of the recovered body and not wait to land before doing anything.

When needing to be removed there should be at hand a stretcher on which to carry the body. Some one on the shore should be securing things needed.

The body should be carried with the face and front downward. One person each side with hands joined across the thighs, and with the others passed under the arm-pits to the head, will give the chest most freedom, and help to empty water, froth or mucus from the chest or stomach.

Discipline or readiness for the accident is the first and best promise of restoration. Order hot bottles, dry clothing, electric battery, hypodermic syringe or other provided apparatus to be brought and thus be ready with whatever the person directing may want.

#### HOW TO TREAT THE DROWNED; HOW TO SAVE A LIFE.

I. Cleanse the mouth and nostrils quickly and loosen collar, necktie and other clothing if you can, so as to get at waist and chest, but do not lose time at this.

Roll the body over upon the right side and so on over upon the face, the face resting on the bent right arm. Thrust your finger in at the angle of the mouth, and if you find the tongue fallen back, press or draw it forward. (The second or third finger of the other hand or a knot in a handkerchief will hold the mouth open while doing this if need be.) Then standing astride the body and clasping your arms around it so that the fingers of your two hands interlace just over the navel, raise the body by a slight jerk three or four times so that all but the head and feet clear the ground. This is to clear the stomach and windpipe, and will not take a half a minute.

II. Then turn the body on the back with the head as low as the body. Draw the tongue forward to one side of mouth and pass a lead pencil or stick as thick as the forefinger, in from the side

and across to the opposite back tooth, so as to keep the mouth a little open. (The stick will generally keep the tongue, or if not, it may be held.)

III. Then open the vest and the outer clothing so as to get nearer to the surface. If at hand, apply ammonia up the nostrils and inject with a hypodermic syringe a dram or teaspoonful of brandy or whisky every few minutes beneath the skin of the upper arm or shoulder, or let another do it while you work on at *artificial* respiration—

THUS: In order to fill the lungs with air, raise both arms slowly upward and backward until the hands are brought together directly over the head. Then, more quickly replace them at the sides.

*To expel the air from the lungs:*

Place one hand upon the navel and the other close above it; then press heavily upon the navel, at the same time with the other hand or fist push strongly inward and upward, taking off the pressure suddenly. Then repeat the arm movement, and so alternate on and on. One or two persons can do it.

Each time as the arms are drawn back dash hot water against the sides. During these movements some one else should wipe the hair with a towel and put on the head a dry woolen cap; take off the shoes and stockings and wrap the feet in warm flannel and apply the galvanic battery to the feet, thus aiding and yet not interrupting the work of the one in charge, who must be recognized as director.

*If still there are no signs of life, vary the arm movement, and instead grasp the body around the chest and with the operator's arms under the patient's arm-pits, raise the body forward gently and quickly to a sitting posture, then lay it down again and press over the navel with the hands as before, and alternate by this method about six or eight times per minute and continue according to indications.*

The galvanic battery is best applied to the side of the neck and chest walls, but at first, time must not be lost from these systematic efforts to induce artificial respiration. Lose no time, yet do not hurry so as to lose regularity, and do not wait for anything you may want.

Warm rubbing, warmth, ginger tea, hot coffee, champagne or wine, beef tea and egg should be ready for use if there is resusci-

tation and ability to swallow. A portable bed should be at hand so that in transfer to a building there may be no exposure but a recovery of animal heat. As some die in secondary shock after apparent revival, this must be guarded against by quiet, warmth, food and rest.

*How to keep the tongue from falling toward the windpipe and so impeding respiration.*

Feel with your finger where the tongue is when you put in the pencil or stick and press it down and forward. If you have no one to hold the tongue you need not hesitate to pass a large pin or a small hook through its end, which does no harm and can be passed on through afterward by taking the line off of it. If the stick is passed in at one angle of the mouth across to the back tooth of the opposite side, and raised a little, that pries open the mouth, and the tongue can be worked or pulled well forward or out at the angle of the mouth and held by a handkerchief over the fingers if need be.

*How to use the hypodermic syringe.*

Remove the nozzle and fill it with brandy or whisky as you would a small syringe. Pinch up the skin and insert horizontally so that it pierces through the skin. Then push the piston down till the barrel of the syringe is emptied of a teaspoonful. A physician may add to the first or second injection the  $\frac{1}{50}$  of a grain of digitaline, or six drops of the tincture or three of the fluid extract of digitalis. A drop of the fluid in the syringe should always be forced out before insertion, so as to have no air forced in.

*How to use the electric battery.*

Have a small Faradic current battery. Mix a little water with a half teaspoonful of the bisulphate of mercury, or, if out of it, use any strong acid, and put it in the metal cup. Then see, by holding the tin handles, one in each hand, that the battery works strongly. Apply one handle closely at the side of the neck and the other at the pit of the stomach. Move the latter handle around and between the ribs of either side and at the ticklish points at each side under the ribs. A battery should be kept at every bathing place. Use it as early as you can. A good hand battery, such as Grenet's, can be had for ten dollars.

## TO HOUSEHOLDERS, CITY AUTHORITIES, BOARDS OF HEALTH, ETC.

I. *Look to the Condition of your House.*—Begin at the cellar or basement. Have nothing there that can decay, or that causes foul odors. If damp, let in air or sunlight, or drain the surroundings if needed. If by cleansing, by whitewash or by repeated airing there is not agreeable air, speedily use some of the disinfectants recommended.

II. *Look to the Kitchen.*—Let all sinks be kept sweet by scrubbing—by hot water poured down each day, or by use of disinfectants if needed. If outside there is an opening to the air, so that the kitchen sink is not the chief air outlet to a cesspool or sewer so much the better. Be careful that all slops or offallings from kitchen or laundry work is soon conveyed away, or disinfected at once, and not made to become a part of any heap or mass of impure matter. Cleanness cannot come out of uncleanness. Such things rapidly vitiate air, and discomfort, sickness or death result. Dirty water of any kind is even worse than dry filth. Secure cleanliness if you would secure health.

III. *Have the Dwelling and Sleeping Rooms well aired each day.* Closed closets, unshaken bed clothing, windows open and curtains down will not secure rooms fit to live in, or sleep in. *Flush* the room with air and let this, with sweeping and dusting, remove the organic particles which otherwise constantly accumulate and cause foulness. Chamber slops and wash-water are very innocent if cared for within six hours, but soon after decompose, and in sickness or very hot weather, sometimes sooner. If there are water-closets or stationary wash-basins in your house, be sure that they are not the foul air inlets to outside cesspools or sewers. Have good traps, good outside ventilation, good caution as to smells and use disinfectants for temporary purposes until you can remedy radical defects. Look to unoccupied rooms and the attic so that all may be dried and well aired, and that you may secure as much coolness and ventilation above you as possible, and not have an unventilated hot air chamber near the roof.

IV. *Know as far as you can that your Water and Ice Supply is Pure.*—Use no water from wells where surface soil is foul or where organic matter can reach, or from cisterns exposed to foul

air, as water will absorb foulness. If the water has any odor while heating in a glass tube, or if it becomes turbid or emits odor on being shaken after being kept a day in a long glass bottle, half full and corked, at once suspect it. If you must use it, have it boiled, and when cool, air it by pouring from one pitcher to another, and use it thus until you can be satisfied as to the purity.—See in full our First Annual Report, pages 83-4.

V. *See that the Food supplied for your Family is in proper condition before cooking, and that it is prepared in a wholesome way.*

VI. *Look to the Out Door part of your Home and that it is kept in Proper Order—that no water or decomposing matters are thrown upon it.*

If there is a cesspool it must not smell where it is disconnected with the house or has access to the air. If it does, it must be disinfected until radical change can be made. If there is an ordinary outdoor privy have free access of air to it, and exclusion of all slop or rain-water from it. If there is odor from it, use odorless disinfectants until it is corrected. If too foul for use cover it over with "calx powder," and have under the seats some receptacle, such as the patent pail, or a half barrel, or tub, which can be frequently removed and alternately replaced by another. A privy built above ground, with water-tight receptacle, by the use of dry earth, powdered wood charcoal, dry sifted ashes and occasional copperas water, is easily kept neat and clean, if cleansed each spring and fall.

Country homes need inspection and circumspection. Their sanitary care is often greatly neglected by nice people.

VII. *Insist that your town, if you live in one, have thorough sanitary inspection.*—Where persons are housed closely to each other there cannot but be evils from which the community has a right to be protected, and yet from which each one cannot protect himself. There will be householders who, from thoughtlessness, ignorance or poverty, do not secure for themselves or for others the needed sanitary conditions. Charity, the public welfare, and the necessary incidents of city life require regulated and definite provision against all those nuisances which imperil the life and health of the populace.

Insist upon systematic prevention, instead of waiting for that

loss which disease always involves, when it is artificial, or when we are compelled to meet an epidemic hurriedly.

If your authorities do not act, move by voluntary associations, which shall exhibit the facts and so compel action.

There is no waste so great as that of preventible disease, which disables not only the sufferers, but puts a tax on labor, capital and life much more direful than a well directed expenditure to prevent it. Epidemics are to be dreaded, but our greatest losses are from a chronic death and sickness rate which has a permanent base of supply in prevalent insanitary conditions, not prevented, not remedied as they should be and can be. Public health is common wealth. Can you not do something to reduce the tax levy which forced diseases impose upon the citizens of your city, township and State? To the degree that sickness and invalidism is unnecessary, it means hard times and ill-content. Every motive of comfort and interest requires that we plan to prevent all those ailments which are within the range and duty of our control.

#### DISINFECTANTS, AND HOW TO USE THEM.

Draughts of air for all floating foulness.

Dry rubbing for all easily detached foulness.

Wiping and water scrubbing for all attached foulness in most cases admit of no effective substitution.

Submersion in boiling water is applicable to the cleansing of all garments, utensils, &c., admitting of such a method; and dry boiling heat or freezing cold will also neutralize infective particles.

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 cross-bar, 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. A pound and a half 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.

*Chloride of Lime.*—A valuable disinfectant, chiefly because it contains from 30 to 35 per cent. of chlorine, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. 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.

*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.

*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.

*The Metallic Disinfectants.*—Sulphate of iron (copperas or green vitriol), two pounds to a gallon of water, to be sprinkled freely in drains, cesspools, privy closets, soiled vessels, or heaps of decaying matter which cannot be removed at once. One half of the strength will do where it is to stand in contact with surfaces or in spittoons, water-closets, house vessels or vaults.

One half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sul-

phate 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.

Soiled garments may be put to soak in a half pound of sulphate of zinc (white vitriol), to three gallons of water. It will not stain or discolor most fabrics. One ounce of chloride of lead dissolved in a pint of hot water, and then a pailful of water added, into which a handful of common salt has been thrown, serves a similar purpose. Also a half ounce of permanganate of potash to a gallon of water.

For washing, soiled garments should be put in boiling water, unless the character of the fabric forbids it. Powdered borax, one quarter of a pound to a gallon of water, is a good cleanser of clothing. Soiled hair, brushes, etc., are cleansed by it. Chloride of zinc, one quarter of a pound to a gallon of water, does not stain or discolor fabrics.

Parkes recommends two ounces of chloride of lime, or one ounce of sulphate of zinc, or one half of a fluid ounce of chloride of zinc, to be added to each gallon of the boiling water in which the garments are thrown. On clothing that cannot be washed, and does not need to be burned, after thorough shaking and airing, the sulphate of zinc or chloride of zinc solution may be sprinkled.

For general disinfection, the following compound is available and valuable, and far better than most of the patented articles offered:

Sulphate of iron (copperas), forty pounds.

Sulphate of lime (gypsum or plaster), fifty pounds.

Sulphate of zinc, (white vitriol), seven pounds.

Powdered charcoal, two pounds.

Mix well, and scatter dry or wet it in small quantities, and make into balls ready for use. Where a liquid is needed, stir in water in the proportion of a pound of the powder or ball to a gallon of water, and sprinkle where needed.

*Carbolic Acid* is valuable as an out-door disinfectant, to be added to the sulphate of iron solution or used separately. Because of its own odor we cannot well test its effect in correcting other smells. We would test specimens or use only Squibbs

Liquid, No. 1, because sure of its strength, to be diluted by adding from fifty to one hundred parts of water, according to the mode of its employment. It is seldom required if the other articles named are properly used. Carbolic acid and chloride of lime must not be used together.

Remember that we do not know that any chemical disinfectants destroy the germs of a disease.

They only neutralize or suspend the action of those artificial disease producers or fertilizers, which the bad administration of cities or householders, or interference with natural laws or neglect of cleanliness has provided. We are to rely on these palliatives or correctives only while we are preparing for radical methods of prevention.

N. B.—The only reason why the death rate of your city or your township is over 15 to the 1000, or why the sickness and invalid rate is a large multiple of this, is because you are the victims of nuisances which admit of abatement.

PRESENT WHOLESALE PRICES OF DISINFECTANTS.

Sulphate of Iron (Copperas, Green Vitriol),  $1\frac{1}{2}$  cents per pound.

Sulphate of Zinc (Vitriol), 6 cents.

Chloride of Lime (in bulk), 2 cents per pound; in packages, 6 cents.

Sulphur Roll,  $2\frac{1}{2}$  cents per pound.

Carbolic Acid (No. 1 Squibbs), 30 cents per pound.

Zinc and Carbolic Acid, disinfectant of N. Y. Board of Health, 40 cents per gallon.

Permanganate Crystals, \$1.10 per pound.

50 per cent. solution Chloride of Zinc, 25 cents per pound.

Solution of Chlorinated Soda (Labarraque's), 10 cents a pound.

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SANITARY APPLIANCES.

TRENTON, N. J., May, 1880.

In the practical applications of sanitary science, it has become necessary to use very many appliances, both for convenience and to guard against evils incident to household and city life. These inventions have become far more numerous and useful than is generally known. To afford the people a better opportunity to

become acquainted with their merits, both by personal examination and by the opinions of experts, the State Fair of New Jersey and the State Board of Health last year united in an exhibition of sanitary appliances. Although it was the first of the kind attempted in this country, it was so highly successful as to lead us to make it a permanent and prominent feature at this great annual gathering of our citizens. This fair is held for a week each year, only a few miles from New York City, near Newark, and on the direct route to Philadelphia and to the south and west. The attendance from this and other States is very large, and it affords the best opportunity for familiarizing the people with valuable improvements. It opens this year September 20.

Specimens, models or drawings may be sent either as competing for premiums or for exhibit. Every article should bear a descriptive label, containing detailed information respecting its construction, use, retail price, and the place at which it can be obtained. There is no charge for space. Facilities will be afforded for those who desire to show any apparatus in actual working. Articles must bear the name of the owner or agency exhibiting. The small cost of conveying goods to and from the fair must be borne by the exhibitors. Letters of inquiry may be addressed to E. A. Osborn, C. E., Middletown, N. J., or to State Board of Health, Trenton, N. J. Articles sent for exhibit in our care should be directed "New Jersey State Fair, Waverly. Care of New Jersey State Board of Health."

The State Board of Health has commenced at Trenton, the capital of the State, a museum of sanitary appliances, to which any owner or manufacturer may present the articles exhibited as the property of the State, for permanent examination and exhibit. Or they will, by us, be directed to the persons or agents with whom they are to be left.

#### ADDITIONAL FOREIGN CIRCULAR.

It is also our desire to secure from foreign inventors and dealers specimens of the most approved appliances. It is the best opportunity that can be afforded in this country for extending their sale. Already the foreign press has noticed some valuable features of our last exhibit. No pains will be spared to do full justice to each article sent. Any article donated will be placed in the Museum or disposed of as otherwise ordered. Persons wishing to establish agencies in this country will be directed to

responsible agents, who can furnish full reference. Any articles sent to our care, as herewith directed, may be consigned through Morris' express, 50 Broadway, New York, or through other agents. Expenses of transfer from the New York agency to the fair grounds will be paid for here. We can assure exhibitors of careful attention to the merits of each article.

By order of the State Board of Health.

EZRA M. HUNT, M. D., *Sec'y.*

 Note.—The N. J. Express Co. delivers goods on the grounds.

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OFFICE OF N. J. STATE AGRICULTURAL SOCIETY,

No. 764 BROAD STREET, NEWARK, N. J., May, 188 .

The Sanitary Exhibit of the New Jersey State Agricultural Society, which holds its Annual Fair at Waverly Park, on Pennsylvania Railroad, between Newark and Elizabeth, September will be under the superintendence of the New Jersey State Board of Health. In addition to the catalogue premiums in classes, we will also confer decorative medals for the best exhibit in each of the following groups:

- 1st. Ventilating and Smoke-consuming Appliances.
- 2d. Water-supply Apparatus, Filters, Sanitary Conveniences and Disinfectants.
- 3d. Sewage Conductors and Receptacles, Tanks, Cesspools, &c.
- 4th. Water-closet and Emptying Apparatus.
- 5th. Life and Labor-saving Apparatus.

A suitable building, supplied with water, is provided, and the actual working of ventilators and various other appliances can be shown.

It is intended to make this exhibit an attraction at our Annual Fairs, so that all may become acquainted with the best sanitary arrangements, and inventors and dealers have a good opportunity for comparing and testing apparatus. When necessary the Judges will order trial, and postpone award until satisfied.

WM. M. FORCE, Rec. Sec.	AMOS CLARK, JR., Pres't.
E. M. HUNT, M. D.	E. A. OSBORN, C. E.
A. D. NEWELL, M. D.	W. M. FORCE.
E. DUNN.	J. C. BAYLES.

PHINEAS JONES.

 Note—The N. J. Express Co. delivers goods on the grounds.

LAW AS TO BOARDS OF HEALTH, VITAL  
STATISTICS, &c.

An act entitled "An act concerning the protection of the public health and the record of vital facts and statistics relating thereto."

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That every city or borough or incorporated town, or any town governed by a commission, shall have a board of health of not less than five or more than seven members, of which the keeper or recorder of vital statistics, and also one city physician and city health inspector shall be members, if there be such officer or officers; and the said board of health shall be nominated by the mayor and approved by the common council or other governing board of the city, borough or town, to serve for not less than three years, but not more than three of the number shall go out of office at any one time, unless in case of removal by death or change of residence.

2. And be it enacted, That all cities of over ten thousand inhabitants shall have one or more city health inspectors, who hereafter in any new board, or in any case of vacancy, shall be appointed by the board of health.

3. And be it enacted, That in each township of the state outside of city limits, the township committee, together with the assessor and the township physician, if there be such an officer, shall constitute the board of health for all of said township outside of any city limits, and shall have the same powers as are possessed by any city board of health within the state, so far as they could relate to any unincorporated district.

4. And be it enacted, That every local board of health of any city, borough, town or township shall, on or about the first of October of each year, in addition to any other reports that the local authorities may require, prepare an annual report of the condition of the public health in their district, stating, also, any special causes of deterioration of health or hazard thereto, and shall therein answer any inquiries which have been addressed to them by the state board of health; in the case of cities the same shall be presented to the city authorities, and the board of health shall, on or before October fifteenth of each year, forward a copy

of the same to the address of the state board of health at Trenton; and in the case of townships, a similar report, signed by the chairman of the township committee, shall, by the same date, be sent as herein provided for city boards.

5. And be it enacted, That boards of health of cities or townships or any county health board shall, through the keeper or recorder of vital statistics, take cognizance of any neglect of returns on the part of any persons charged with this duty under the laws of this state, and are authorized to pass ordinances additional thereto, and not conflicting with the same; and they shall have the same powers of action for neglect as is given to the state board of health, and in addition, in the case of the failure of any city clerk, assessor or physician to make full returns as required by law, may bring action for the same and recover for the use of said city or township to the amount not exceeding fifty dollars; and in case of the death or removal of any assessor before the time for electing a successor, the township clerk shall take charge of and report such returns until the election of an assessor.

6. And be it enacted, That the state board of health, in making inquiries and investigations in regard to the causes of disease and mortality and the modes of their limitation, may aid any local board to the amount of twenty dollars in any one year, and that for this purpose, and also for extending its own inquiries into the sources of physical deterioration or local causes of disease, the board be authorized to expend two thousand dollars each year, in addition to the amount heretofore provided, said expenditure to be accounted for each year by itemized bills, audited by the president and secretary of the board of health and approved by the governor, and then shall be paid as other accounts of said board.

7. And be it enacted, that the board of health of any borough, incorporated town or township, shall examine into all nuisances, foul or noxious odors, gases or vapors, or causes of ill health or disease that may be known to them or certified to them by three or more freeholders or tenants, as in their opinion injurious to the health of the inhabitants within their township, or in any such vessel within any harbor or port of such city, borough, town or township, and shall deal with the same as in the manner herewith directed, to wit: whenever such nuisance or

source of noxious odors, or cause of ill health or disease, shall be found on public property or on the highway, the person or persons officially in charge thereof as overseers, civil officers, directors or trustees, shall be notified to cause the same to be removed as the case may require; and if failing so to do the procedure shall be the same as hereinafter provided in the case of private individuals.

8. And be it enacted, That whenever such nuisance, source of foulness or cause of sickness hazardous to the public health, shall be found on private property, that the board of health of the city, town or township in whose limits it may be, shall at once notify the owner at his own expense to remove the same within such time as said board shall deem the public health to require, a duplicate copy of the notification being also left with one or more of the tenants or occupants; if the owner resides out of the state and cannot be reached with notice speedily enough for the necessities of the public health, a notice left at the house with the tenant shall suffice; if the owner thus notified shall not comply with such notification or order of the local board of health within the time therein specified, said board shall proceed to remove said nuisance, source of foulness, or cause of sickness hazardous to the public health, and all expenses incurred thereby shall be a lien upon the property of the owner of the real estate or building on which the nuisance has occurred, for which he may have action against any person or persons who have caused or allowed said nuisance; and it is also provided that the property owner shall have the right under his notification, of speedy reference to the state or county board of health acting in a body or through its executive officer, within such time as the local board of health shall on his application direct, unless in its judgment the danger to the public health is too immediate to admit of delay; and in case any injunction or stay of proceedings in any form is applied for, such injunction or stay of proceedings shall not be issued until the local board and the state board have been notified to appear and be present at such hearing; but the failure of the owner to cause removal, or the refusal of the court applied to, to grant a stay of proceedings, shall not prevent the party or parties making the application from any suit at law and recovery of damages, if the alleged

nuisance be shown to have been in no way hazardous or prejudicial to the public health.

9. And be it enacted, That in order to secure the preparation of such tabular classification and deductions therefrom as bear upon political economy, population, the causes of disease and of epidemics at the time of indexing the records of marriages, births and deaths, there shall also be made a full transcription of such vital facts as are required for such purposes, and the allowance toward such transcription, and for the indexing of the records, shall be five cents for each return, payable in the same way as heretofore provided for the index record but the amount to be paid to the registrar or others for this clerical service, shall be determined by the state board of health, and the medical superintendent shall render to the secretary of state and to said board yearly an exact statement of the whole amount thus received and how expended, and the balance, if any remaining, shall be paid over to the state board of health and its expenditure accounted for through account audited by the president of said board and approved by the governor.

10. And be it enacted, That at the enrollment of the children each year by the clerks of district schools or by other proper officers in cities, inquiry shall be made as to how many of the children within the school age are unvaccinated, and the same shall be designated by a mark on said roll, and in the case of any found unvaccinated whose parents desire them to be protected from small-pox, but who, in the judgment of the board of education or the trustees of the school district, are not able to pay therefor, the school clerk or other authorized person may give to said child or children a permit to appear at the office of any regularly licensed physician of said school district or of said township to be vaccinated, and any such physician, on the presentation of such permit, with his certificate appended thereto that the said vaccination has been by him successfully performed, shall be entitled to receive from the township committee or city treasurer fifty cents for every such certified case.

11. And be it enacted, That in case of any county having a county board of health or vital statistics, nothing in this bill shall change or modify their former power or jurisdiction and they shall possess all the authority herein granted to city or township boards; and they shall yearly report to the state board

of health as to the cities and townships of the county, in the same way as is required in counties where there is no county board of health; they shall be the sole power to make ordinances in relation to the public health and to carry out the provisions of the laws of this state in reference to the registration and returns of vital statistics, in their respective counties nothing in this act shall relate to or effect any boards of health now organized in any of the cities of this state under the provisions of their respective charters.

12. And be it enacted, That this act shall take effect on the first day of April, one thousand eight hundred and eighty.

Approved March 11th, 1880.

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EXPLANATORY CIRCULAR TO CITIES AND TOWNSHIPS.

April 1st, 1880.

The recent Legislature passed some acts which have important bearing upon the care of the public health. We shall quote such parts and sections as require early attention on the part of communities.

I. "An act concerning the protection of the public health, and the record of vital facts and statistics relating thereto."

Sections one and two are as follows:

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That every city, or borough or incorporated town, or any town governed by a commission, shall have a board of health of not less than five or more than seven members, of which the keeper or recorder of vital statistics, and also one city physician and city health inspector shall be members, if there be such officers; and the said board of health shall be nominated by the mayor and approved by the common council or other governing board of the city, borough or town, to serve for not less than three years, but not more than three of the number shall go out of office at any one time, unless in case of removal by death or change of residence.

2. And be it enacted, That all cities of over ten thousand inhabitant shall have one or more city health inspectors, who

hereafter in any new board, or in any case of vacancy, shall be appointed by the board of health.

These two sections are afterwards limited so as not to compel any city that already has a Board of Health, organized according to a mode prescribed in its charter, to be changed. But it is mandatory as to all others, and also as to those cities which have nominal Boards of Health or Health Committees, whose mode of construction is not specified in their charters. An Inspector is required in all cities of over ten thousand inhabitants. It is also desirable that those cities which, by their charters, have the construction of their Boards of Health defined, should conform to the general method and spirit of this law as far as their charters permit.

Sections three and four are as follows:

3. And be it enacted, That in each township of the state outside the city limits, the township committee, together with the assessor and the township physician, if there be such an officer, shall constitute the board of health for all such townships outside of any city limits, and shall have the same powers as are possessed by any city board of health within the state, so far as the same could relate to any unincorporated district.

4 And be it enacted, That every local Board of health of any city, borough, town or township shall, on or about the first of October of each year, in addition to any other reports that the local authorities may require, prepare an annual report of the condition of the public health in their district, stating, also, any special causes of deterioration of health or hazard thereto, and shall therein answer any inquiries which have been addressed to them by the state board of health; in the case of cities the same shall be presented to the city authorities, and the board of health shall, on or before October fifteenth of each year, forward a copy of the same to the address of the State Board of Health at Trenton; and in the case of townships, a similar report signed by the chairman of the township committee, shall, by the same date, be sent as herein provided for city boards.

Under this law the township committee, the assessor, and the township physician, if there be one, are directed soon after April first, to organize as a Board of Health. They will then please notify this Board of the Post Office address of each member. In the meantime we shall send a Township Health Book to each

assessor for the use of such Township Board. Cities should have a similar Health Book. The general duties of the Board are to guard against preventable causes of disease, and to seek to prevent the spread of disease. The Town Health Book should be kept by one of the members. Generally either the assessor or township physician have most correspondence with the State Board and the Bureau of Vital Statistics.

On the first page of the Health Book give name of township, its number of square miles, its population by the census of 1880, white and colored, male and female, number under twenty-one, and number between school ages if possible. Repeat each year as far as necessary.

Any prevalent sickness, such as periodic or malarial fevers, whooping cough, etc., should be noted, even if few or no deaths have occurred therefrom. Also any prevalent diseases among animals and their fatality.

The condition of school-houses or other public buildings should be noted.

Where there are villages in the township, special note should be made of any insanitary conditions.

Any cases of complaints of nuisances or evils injurious to health should be recorded, together with the action of the Health Board thereupon.

A copy of the report made each year to the State Board of Health should be transcribed. As the State Record of Marriages, Births and Deaths extends from July first of each year, the yearly entry thereof should begin with that date. For convenience of comparison, some prefer to divide it into two periods of six months each.

The report sent yearly to the State Board of Health should also relate to the period from July to July, with an appended note at the close as to anything very special in the three months just preceding the report.

Food or fruit production may be briefly noted, as bearing on health condition. All such brief data are very valuable for after study as well as for present knowledge.

The following is a schedule of some of the subjects as to which reference and report are needed:

SCHEDULE.

- 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. Alms-house, hospitals and other charities.
- O. Police and prisons.
- P. Fire guards.
- Q. Cemeteries and burial.
- R. Public health laws and regulations.
- S. Registration and vital statistics.
- T. Quarantine or care over contagious diseases.
- U. Sanitary expenses.
- V. Heat and ventilation for dwellings.
- W. Diseases of the year.

It is well to keep a yearly record of temperature and rain and snow fall, such as this:

Table of Temperature and Rainfall at \_\_\_\_\_, from January 1, 18—, to December 31, 18—, by \_\_\_\_\_.

MONTHS.	Minimum Temperature.		Maximum Temperature.		Mean temperature of month.	Fair on days.	Snow on days.	Rain on days.	Total rain and melted snow. (Inches.)	Monthly mean of rain and melted snow in previous five years.
	Date.	Degree.	Date.	Degree.						
January.....	8	9.50	22	48.25	31.00	18	5	11	6.445	3.812
February.....	4	8.00	28	55.75	33.24	16	2	6	4.960	3.292
March.....	28	17.25	10	67.00	45.16	18	3	13	3.035	4.958
April.....	6	40.00	21	78.50	55.55	15	0	8	1.730	4.823
May.....	14	39.00	26	85.00	60.73	21	0	9	4.205	2.432
June.....	6	48.75	30	93.25	68.20	18	0	8	2.446	2.677
July.....	23	61.50	3	98.25	78.25	18	0	11	4.330	5.172
August.....	26	55.00	9	90.50	73.09	17	0	10	8.060	6.189
September.....	28	43.75	1-2	88.00	67.47	17	0	10	2.535	4.701
October.....	29	35.00	2	76.75	56.41	23	0	8	2.823	3.628
November.....	15	27.00	12	58.00	42.65	18	2	9	4.570	4.569
December.....	25	13.50	1	57.75	31.83	20	6	7	7.459	2.265
Means and Totals.....	Feb. 4.	8.00	July 3.	98.25	53.63	219	18	110	54.363	.....
Previous five years.....	Jan. 4, 1873.	12.00	July 26, 1877	99.00	50.48	227	30	97	48.499	.....

Thermometers in the shade, having a northern exposure, protected from reflection.

Thus the coldest and hottest days, and the mean temperature for the year and for a series of years is easily referred to.

The Board should meet in April and the last of September, and as much oftener as needed on the call of the chairman.

The first report to the State Board of Health, in October, should give items as to most of the schedule subjects, and a full idea of present conditions. Afterwards, from year to year, each subject may be presented in its due proportion of importance. Either the township physician or some other medical man will prepare or aid in the outline.

Section five is as follows:

5. And be it enacted, That boards of health of cities or townships or any county health board shall, through the keeper or recorder of vital statistics, take cognizance of any neglect of returns on the part of any persons charged with this duty under the laws of this State, and are authorized to pass ordinances additional thereto, and not conflicting with the same; and they shall have the same powers of action for neglect as is given to the state board of health, and in addition, in the case of the failure of any city clerk, assessor or physician to make full returns as required by law, may bring action for the same and recover for the use of said city or township to the amount not exceeding fifty dollars; and in case of the death or removal of any assessor before the time for electing a successor, the township clerk shall take charge of and report such returns until the election of an assessor.

Localities should not only secure general returns of vital statistics, but, from year to year, study deaths and the causes of deaths in certain localities, and obtain information as to healthy and unhealthy situations. When the figures are entered side by side for five years or more, they often guide in identifying local evils.

The Health Board must now see to it that ministers, physicians, etc., do not neglect a duty which is a part of their service. The law passed this year exempting physicians from jury duty more than compensates for the time and trouble.

Section six is as follows:

6. And be it enacted, That the state board of health, in making inquiries and investigations in regard to the causes of disease and mortality and the modes of their limitation, may aid any local board to the amount of twenty dollars in any one year, and that for this purpose, and also for extending its own inquiries

into the sources of physical deterioration or local causes of disease, the board be authorized to expend two thousand dollars each year, in addition to the amount heretofore provided, said expenditure to be accounted for each year by itemized bills, audited by the president and secretary of the board of health and approved by the governor, and then shall be paid as other accounts of said board.

This section appropriates two thousand dollars, part of which we may use in organizing these Boards. With this fact and the number of townships in view, we shall be able this year to pay to each Board such sum under ten dollars as is actually expended by them. The bill of expenditure must be certified by the assessor and the chairman of the township committee. It is believed that in each township the Board of Health thus constituted may meet at the time of the transaction of other business, and will need to expend but little, except where special cases recognized by the town committee, or complaints, may require attention. In such cases the public benefits far outweigh slight expense. The State Board of Health, as a body, has only its actual expenses paid, and these local Boards can do much on the same basis, with such special provision for any special service. The time has come when population must be cared for as a great material resource and as a part of our prosperity. Small villages and country districts often have their local nuisances or cases of spreading contagions, and there is need of some authority to which to appeal. It is as unprofitable as it is afflictive to have localities suffer from diseases or nuisances which are within the range and duty of local control. The Board hopes that careful attention will be given to concise yearly records in the Town Health Book, and will expect every three or five years by an examination of all these records, as well as from the annual reports transmitted, to secure valuable facts as to the care of health, the prevention of diseases and pauperism, and the promotion of public welfare.

Sections seven and eight are as follows:

7. And be it enacted, That the board of health of any city, borough, incorporated town or township, shall examine into all nuisances, foul or noxious odors, gases or vapors, or causes of ill health or disease that may be known to them or certified to them by three or more freeholders or tenants, as in their opinion

injurious to the health of the inhabitants within their township, or in any such vessel within any harbor or port of such city, borough, town or township, and shall deal with the same as in the manner herewith directed, to wit: whenever such nuisance or source of noxious odors, or cause of ill health or disease, shall be found on public property, or on the highway, the person or persons officially in charge thereof as overseers, civil officers, directors or trustees, shall be notified to cause the same to be removed as the case may require; and if failing so to do the procedure shall be the same as hereinafter provided in the case of private individuals.

8. And be it enacted, That whenever such nuisance, source of foulness or cause of sickness hazardous to the public health, shall be found on private property, that the board of health of the city, town or township in whose limits it may be, shall at once notify the owner at his own expense to remove the same within such time as said board shall deem the public health to require, a duplicate copy of the notification being also left with one or more of the tenants or occupants; if the owner resides out of the state and cannot be reached with notice speedily enough for the necessities of the public health, a notice left at the house with the tenant shall suffice; if the owner thus notified shall not comply with such notification or order of the local board of health within the time therein specified, said board shall proceed to remove said nuisance, source of foulness, or cause of sickness hazardous to the public health, and all expenses incurred thereby, shall be a lien upon the property of the owner of the real estate or building on which the nuisance has occurred, for which he may have action against any person or persons who have caused or allowed said nuisance; and it is also provided, that the property owner shall have the right under his notification, of speedy reference to the state or county board of health, acting in a body or through its executive officer, within such time as the local board of health shall on his application direct, unless in its judgment the danger to the public health is too immediate to admit of delay; and in case any injunction or stay of proceedings in any form is applied for, such injunction or stay of proceedings shall not be issued until the local board and the state board have been notified to appear and be present at such hearing; but the failure of the owner to cause removal,

or the refusal of the court applied to to grant a stay of proceedings, shall not prevent the party or parties making the application from any suit at law and recovery of damages, if the alleged nuisance be shown to have been in no way hazardous or prejudicial to the public health.

These sections are in accord with the highest legal advice as to methods, and can be carried out when the public safety demands. Some one member of the Township Board of Health may be recognized as its chief executive officer, to act for the Board by their authority. Those seeking the removal of nuisances will often aid in preventing unnecessary expense.

Section ten is as follows :

10. And be it enacted, That at the enrollment of the children each year by the clerk of district schools or by other proper officers in cities, inquiry shall be made as to how many of the children within the school age are unvaccinated, and the same shall be designated by a mark on said roll, and in the case of any found unvaccinated whose parents desire them to be protected from small-pox, but who, in the judgment of the board of education or the trustees of the school district, are not able to pay therefor, the school clerk or other authorized person may give to said child or children a permit to appear at the office of any regularly licensed physician of said school district, or of said township, to be vaccinated, and any such physician, on the presentation of such permit, with his certificate appended thereto that the said vaccination has been by him successfully performed, shall be entitled to receive from the township committee fifty cents for every such certified case.

This section extends to the poor the privilege of vaccination, and thus relieves them from an exposure which might not be culpable on their part. Incorporated cities are only exempted from these provisions if they have municipal charters which have similar and generally far more mandatory powers. These will also make yearly reports to the State Board of Health. Thus, being in possession of vital statistics, and of brief health reports from every part of the State, we shall be able to make such a summary as will exhibit the actual health condition of our population. Thus we may know how to deal with, and abate evils whether general or special, and to compare each part with the other. The general health condition of each township and city needs this supervision.

Besides these general health provisions, Hudson county and some of our cities have secured larger powers for abating localized evils. Authority to deal with epidemics as found among animals has been given to this Board. A law has also been passed, which, while not intended to endorse the medical diplomas of the many poor medical schools, will help to restrict the malpractice of those who are dealing with serious diseases, without the least evidence of any acquired skill and competency.

This Board now, more fully than ever before, invites the co-operation of every municipal and township Health Board. Believing in the local execution of sanitary laws by local authorities, it only insists upon such uniformity as is necessary for co-operative State interest, and such as has received the sanction of the best medico-legal sanitarians. The highest results of social life and health care can only be secured by a central bureau to collect, collate and advise, and by such strict and co-ordinate administration in each city and district as both general and local interests demand. The organization is now imperative, but ordinances and their execution depend on localities. We ask the mayors and city clerks of cities, and the assessor or township physician of each township, to at once call together the persons designated in this act, and communicate the names to us.

Each Health Board should carefully preserve the yearly reports of the New Jersey State Board of Health, which will be sent to the assessors and city clerks for this purpose. The three already published can be had of the assessors. The Third Report is especially needed, as containing the circulars thus far issued, and former laws that have been passed. So soon as three or four are obtained they should be bound, so as not to be mislaid.

All inquiries or communications should be addressed, State Board of Health, Trenton, N. J.

By order of the Board.

EZRA M. HUNT,

*Sec. of State Board of Health and Med. Sup't of State Vital Statistics.*

Note.—This circular was placed in each Township Book furnished. Any modifications in the law will be reported from time to time. It is requested that Boards of Health, in addition to securing accurate returns of vital statistics, shall in their annual reports, state the prevalence of any disease during the year—the number of cases as accurately as possible.

CIRCULAR TO LOCAL BOARDS OF HEALTH.

TRENTON, September 15th, 1880.

GENTLEMEN:—A report from your Board of Health to October 1st, will be expected to be sent to the office of the Board, State House, Trenton, if possible, by October 15th, and not later than November 1st.

Important facts and statements will be embodied in the State report, and the whole will be kept on file for future reference as to the conditions of public health in all localities of the State.

We have already become aware of important work done by many of these boards. Others, because of locality or tardiness in organization, or because members have failed in comprehending the work to be done, have merely organized.

The few that have failed to organize must immediately do so, and report to us the names and address of the members.

The period since the law went into operation is so brief, that this year we only seek correspondingly brief reports on such of the topics referred to on the printed page of the book that was sent, as may have come under the consideration of the Board. In cities and the more populous districts, it is well to follow the order of the book schedule, A, B, C, etc., in the order there presented.

The report of the State Board, for this year, will contain suggestions as to the work of local boards.

All inquiries should be addressed State Board of Health, Trenton, N. J.

ANNUAL REPORT

Of the Local Board of Health of (city or township).....  
county of.....for the year ending October  
1st, 188

NAMES AND POST OFFICE ADDRESS OF MEMBERS.

.....  
.....

## SCHEDULE OF SUBJECTS FOR REPORT.

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

Other subjects may be named under W, 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.

Under W, give all facts as to diseases which have occurred the past year.

A.

B.

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“ AN ACT TO REGULATE THE PRACTICE OF  
MEDICINE AND SURGERY.”

TRENTON, June 1, 1880.

Copy of a law passed by the Legislature of 1880, entitled “ An act to regulate the practice of Medicine and Surgery.”

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That every person practicing medicine or surgery in this state in any of their branches for gain, or who shall receive or accept for his or her services any fee or reward either directly or indirectly, shall be a graduate of some legally chartered medical college or university in good standing, or some medical society having power by law to grant diplomas; and such person before entering upon said practice shall deposit a copy of his or her diploma with the clerk of the county in which he or she may sojourn or reside, and shall pay said clerk ten cents for filing the same in his office; said copy to be a matter of record, and open to public inspection.

2. And be it enacted, That any person who shall practice med-

icine or surgery, without conforming to the requirements of the first section of this act, shall be deemed guilty of a misdemeanor, and on conviction, shall be punished by a fine of twenty-five dollars for each prescription made or operation performed, said fine to be sued for and recovered in an action of debt, by any person who will sue for the same, and in default of payment of said fine, the offender shall be imprisoned in the county jail for a period of not less than three, nor more than six months; *provided always*, that he or she may be liberated at any time by paying the amount of said fine and costs.

3. And be it enacted, That it shall be unlawful for any person not qualified according to the first section of this act, to collect any fees for medical or surgical services.

4. And be it enacted, That any person who shall offer for record a copy of any diploma which shall have been issued to any other person, or a diploma issued or obtained fraudulently, shall be deemed guilty of a high misdemeanor, and on conviction thereof, shall be punished by a fine of not less than three hundred dollars, nor more than five hundred dollars, or imprisonment at hard labor for not less than one nor more than three years, or both at the discretion of the court.

5. And be it enacted, That nothing in this act shall be so construed as to prevent any physician or surgeon in good standing, and legally qualified to practice medicine or surgery in the state in which he or she resides, from practicing in this state, but all persons opening any office, or appointing any place where he or she may meet patients, or receive calls, shall be deemed a sojourner in this state, and shall conform to the first section of this act.

6. And be it enacted, That this act shall take effect on the first day of June, one thousand eight hundred and eighty.

This law did not emanate from the State Board of Health, but its bearing on the public health is such that we send a copy to local boards and to physicians. It has been sought by the people and by practitioners of the different schools who concur in the view that no one should be allowed to announce himself or herself as a doctor of medicine, who can not show some evidence of such kind of instruction as is indispensable in the attempt to treat human diseases. While this does not assert the competency

of all having diplomas, since some of our medical colleges are not strict enough, it makes a good approach to protection and gives the best legal assurance now available. Under such a provision three thousand unauthorized practitioners in the State of Illinois have ceased to impose upon the public.

Every local board of health and every general or local medical society in the State should now see to it, that in such township and city the diploma or medical license of any person who claims to be a doctor in medicine and surgery is put on record. [The diploma is not required to be translated.] Unless local authorities attend to this the law might be neglected. If they do, it will soon appear who are authorized practitioners in this State. It will also assist to ascertain from whence come the purchased diplomas which are sometimes found in the hands of authorized practitioners.

Those who already have their diplomas or medical license on record in the county in which they reside, need only to look it up and re-enter it, as on file.

If any person claims to have lost his diploma or certificate of license, the law makes no provision therefor, but if such person will send a statement of the fact, and of the institution and date of graduation to the county clerk, it will, we believe, serve as protection from penalty for breach of the law, until the letter can be fulfilled, or provision made for such special cases. County clerks need to see the original diploma, and compare it with, the copy offered, and enter that fact on the back of the copy or else take the affidavit of the person offering it.

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#### CONTAGIOUS DISEASES OF ANIMALS.

A supplement to an act entitled "An act to establish a state board of health," approved March ninth, one thousand eight hundred and seventy-seven.

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That in addition to the powers conferred by the act to which this is a supplement, said board shall have full power and authority to examine and determine whether pleuropneumonia, rinderpest, or any other contagious or infectious disease exist among animals in any county in this state; and that

the sum of five hundred dollars is hereby appropriated to defray the actual necessary expenses of said board while making such examinations.

2. And be it enacted, That in the event of any contagious or infectious disease as aforesaid, breaking out or being suspected to exist in any locality in this state, it shall be the duty of all persons owning or having any interest whatever in said cattle, immediately to notify the said board of health, or any one of them, of the existence of such disease, and thereupon it shall be the duty of said board of health, or any member thereof, to immediately proceed to the place or places where said disease is reported to exist, and to quarantine said animal or animals, and take such precautionary measures as shall be deemed necessary; to prescribe such remedies as in their judgment will be conducive to the recovery of such animal or animals, and to enforce such regulations as may be adopted by said board of health.

3. And be it enacted, That the board of health aforesaid, and all such assistants as they may appoint, whenever in their judgment or discretion it shall appear in any case that the disease is not likely to yield to any remedial treatment, or whenever it shall seem that the cost or worth of any such remedial treatment shall be greater than the value of any animal or animals so afflicted, or whenever in any case such disease shall threaten its spread to other animals, to cause the same to be immediately slaughtered, and their remains to be buried not less than four feet under ground, and all places in which said animals shall have been kept to be cleansed and disinfected.

4. And be it enacted, That in all cases where animals afflicted with, or which shall have been exposed, shall have been slaughtered or killed by the order of the said board of health, or their assistants, it shall be the duty of said board to appoint three competent and disinterested freeholders to appraise the value of the animals so killed or slaughtered, at the time they were so killed; who shall be affirmed, or sworn before proceeding to act, to make a just and true valuation of said animals so killed, at the time of their slaughter, two-thirds of which valuation or appraisement shall be paid to the owner or owners by the state.

5. And be it enacted, That any person or persons refusing or neglecting to notify said board of health, or any of them, of the existence of pleuro-pneumonia, rinderpest, or any other contag-

ious or infectious disease among cattle, shall be deemed and adjudged guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than two hundred dollars, or by imprisonment not exceeding one year, or both, at the discretion of the court.

6. And be it enacted, That all bills for money expended under this act shall be audited by the comptroller of this state and then submitted to the governor for his approval and after being thus audited and approved by the governor, shall be paid by the state treasurer upon warrant of the comptroller.

7. And be it enacted, That said board shall keep a full record of their proceedings and shall publish the same in the annual report of the state board of agriculture, yearly, and every year during the existence of this law.

8. And be it enacted, That if any person or persons shall knowingly either buy or sell or cause to be bought or sold any animal or animals affected with pleuro-pneumonia, rinderpest or any other contagious or infectious disease, all such person or persons shall be deemed and adjudged guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not exceeding two hundred dollars or imprisonment not exceeding one year, or both, at the discretion of the court.

9. And be it enacted, That in case an emergency shall arise and a larger sum shall be deemed necessary, than the amount appropriated by the preceding sections of this act, said state board of health shall present the facts in evidence to the president of the state agricultural society, and the president and executive committee of the state board of agriculture, who shall authorize such additional expenditure as in their judgment they may deem the exigency of the occasion to demand; provided that in no case shall the amount of money thus authorized to be expended exceed the sum of five thousand dollars in any one year.

10. And be it enacted, That all acts and parts of acts inconsistent with this act be and the same are hereby repealed, and that this act take effect immediately.

Approved March 12, 1880.

## TO FARMERS AND DEALERS IN STOCK.

## CIRCULAR A.

The act of 1877, constituting a State Board of Health, made it the duty of this Board "to make inquiries and reports in reference to diseases affecting animals and the methods of prevention." An act of the present Legislature gives additional power in reference to pleuro-pneumonia or other contagious diseases affecting animals. The State Board of Health directs this circular to be distributed.

The legislation of this State as to the diseases of animals, only has reference to preventing the spread of infectious or contagious diseases. When animals are seriously sick from any cause, the owner should make his own arrangements for *skillful treatment*. But when any infectious or contagious disease so far prevails as to threaten to become epidemic, the results which may accrue to citizens at large are so serious, that all governments recognize the right to investigate for the prevention or limitation, and to enact such restrictions as those skilled in the management of epidemics may advise. This State has now placed this oversight within the jurisdiction of the State Board of Health, and thus imitates the custom of other countries.

## PLEURO-PNEUMONIA.

The chief infectious malady which has been considered as existing in this State is *Pleuro-Pneumonia*. It may be called lung-plague, but not cattle-plague, since the latter is the name for the very different disease, Rinderpest. That the disease is one which inclines to spread, is agreed by all authorities. Its very threatening justifies the expenditure of such an amount of money as may be necessary to determine its character and its extent. When discovered much depends on the severity of the type or the disposition it has shown to become epidemic.

It is not generally claimed that it ever occurs any more than small-pox, except as it is transported from some previous case. This Board will at first seek to determine where infectious pleuro-pneumonia now exists. With a rigid regard to the trouble of quarantine, it will only exercise the power when the rights of

the people require it. Such action, however annoying to the owner, is in his real interest. We propose not to give orders rashly; to enforce them when given.

Our trade, food supply and stock interests will be greatly aided when, as we trust will soon be the case, we can free each owner from any suspicion of the disease among his cattle.

General Le Duc, the Commissioner of Agriculture, responds at once to our request for an active co-operation with us in stamping out this disease where it exists, and in settling, by expert aid, the question of its extent. In this, too, we are to have the counsel and support of the Executive Committee of the Board of Agriculture. A rapid sanitary inspection will at once be instituted at all places where it has recently prevailed. It is the duty of any owner having cause to suspect such a disease to send us notice.

The attack usually begins with coldness, and dry, hacking cough, with symptoms of pain and uneasiness. The animal refuses food. Milch cows diminish in milk. Even an unskilled man knocking with the fingers against the opposite sides, back of the shoulders, will detect the difference in sound of the two sides.

Both the fever and heat are marked. Many of the symptoms correspond with pleurisy or pneumonia in man—with the same varied severity, and with either acute or chronic symptoms. If new cattle have come into the herd, or if the disease is prevalent near by, there is more ground for suspicion.

The owner must exercise close watch and honestly seek to know whether there is ground to suspect infection. In disputed cases the only way is to consent to submit it to skilled examination and inquiry, and not to make a positive diagnosis in matters in which the owner cannot expect himself to be fully competent.

On March 15th the Secretary of this Board made a visit to a farm on the Delaware, opposite the New Jersey border, in order to examine into the symptoms of the disease, and to compare it with other lung diseases in man or animals. The account of the farmer was that three months previous he bought a cow which, a few days after, sickened and died. He has since lost twelve. His own account, and that of adjoining farmers, would, we think, satisfy most that the disease is infectious pleuro-pneumonia. The United States Veterinary Surgeon, the State Inspec-

tor of Pennsylvania, and other recognized authorities were present, by appointment. Physical examination of four animals showed each with one lung consolidated; three had been sick less than one week and one four weeks. Post-mortem examinations fully verified the diagnosis. The lungs were found increased from about two and a half to twenty pounds, with such changes as are now being microscopically examined. A cow had died of the same disease three days before at Camden. There can be no doubt that it exists more or less in this State, and still more in Pennsylvania and Maryland, from which its ingress must be guarded.

It is strongly in the interest of the farmers and stock dealers of this State in every way to meet the facts and aid us in a speedy riddance of the malady. We propose to act in concert with them for the public welfare. There can be but one conclusion after due examination had—where the disease is found to exist, we must either isolate or quarantine, or give notice to others of the place where it exists, or notify the owner that he will be held accountable if any animal of others becomes infected by exposure to his herd. Where the veterinarians find the disease it is better to kill the animal.

The fact of pleuro-pneumonia in an animal does not decide that it is unfit for food use. This is determined chiefly by the severity of the sickness.

All farms or herds in the State which have been adjudged to have had infectious pleuro-pneumonia should, as a preventive, keep the cattle this spring and summer in temporary sheds, so that the others can be thoroughly cleansed of all moveable material and be well whitewashed. It is best to add four ounces of dry chloride of lime to a gallon of the whitewash. In any case the cattle will be benefited by this removal from the yards, and the farmer's interest be promoted by the removal of all suspicion of the disease. It is a short-sighted policy for any one for a little present saving to subject his cattle to continued suspicion, or to an actual and prolonged existence of the malady.

As it is believed that the chief contagion comes from the lungs it is best to sponge the mouth and nostrils of all well and exposed animals, twice each day, with a solution of chloride of zinc. The fifty per cent. solution (Squibb's) costs twenty-five cents per pound, and, diluted one-fourth, a tablespoonful of it

suffices each time. Or it can be purchased solid in ounce bottles for eight cents, and dissolved in a half gallon of hot water. A little tar rubbed in the mouth and nostrils also cleanses. Those about sick animals should wash their hands in the zinc solution. For various other disinfectants, see Third Report (or the last July circular) of the State Board of Health.

Every farmer who purchases new stock should, for a month, keep it apart from his herd while any infection is prevalent. No cattle should be allowed to pasture on commons, as this disease thus spreads in summer. Read the law and the penalties you may incur by spreading the contagion. It is to be remembered, that animals, in order to preserve health, need to be kept naturally; that they need right food, pure air, good water and exercise in order to be healthy. If well fed, and yet having neither rubbing nor exercise, the result must be to breed disease. It is profitable to change stabled cattle from their stalls from time to time. Some diseases are made malignant or contagious by closeness and filth. It is for the interest of all owners to adopt those precautions which, by the most successful dealers, are regarded advantageous. Milk is a great absorbent of contagion. It is very important that it should not be kept standing in or near the yards, but the cans to receive it should be outside the pens and yards, and removed as soon as the milking is over.

As the present law extends to the care of all infectious diseases of animals, and has not single reference to any one disease or any single year, we shall hope to aid and to be aided by all those who rightly estimate the great pecuniary profit and personal comfort of prevalent good health among the lower animals. Cows kept after the packed-herring system, or tied all winter in a stall, will not maintain good health, and will stand ready for any epizootic disease.

#### PNEUMO-ENTERITIS.—(HOG CHOLERA.)

There is evidence that this disease prevails considerably in some parts of the State. The loss to this country last year was about twenty millions of dollars from this disease.

It is actively contagious. The name cholera deceives as to it, for it is a fever in which not only the intestines, but the lungs and glandular system are usually affected.

It commences with loss of appetite and constipation; the skin becomes reddened and often pimpled. Cough and hurried respiration, as well as diarrhoea, are among the symptoms. About seventy per cent. of the pigs die in two weeks, while those surviving are of little value. The time of catching is generally from five to fifteen days. The only method of dealing with it is the same as with pleuro-pneumonia, viz: the killing of all sure cases, isolation of the sick, and an entire removal to another pen of all well ones.

The Board will be glad to receive information as to any prevalent disease of animals, and will give to the subject such attention as it may demand.

Whenever any contagious or infectious disease has caused the death of any animal, or is believed to exist in any neighborhood, any person may properly state the fact to us.

Copies of the law can be had on application.

Letters or postals should be addressed,

*State Board of Health, Trenton, N. J.*

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TO TOWNSHIP AND CITY BOARDS OF HEALTH  
IN REFERENCE TO INFECTIOUS DIS-  
EASES OF ANIMALS.

CIRCULAR B.

TRENTON, April 10th, 1880.

Both public health and financial interest require local attention to contagious diseases among animals.

Infectious pleuro-pneumonia and other diseases of cattle greatly concern milk and food supply.

Pneumo-enteritis, or hog cholera, and other diseases of swine affect human health.

Glanders, a disease of horses, is directly communicable and very fatal to individuals.

Just now there is need to guard our State against infectious pleuro-pneumonia and to rid us of suspicion of its prevalence, which is far beyond the actual facts. It is a disease which, where it exists, should not be concealed and should be isolated, and no

communication with suspected herds should be allowed until all risk is at an end.

It is to the interest of every city and township now to see to it that the disease is prevented in their respective districts. City stables are oftener centres of contagion than are the herds of farmers.

The formation, under a recent law, of boards of health in each township and city of the State, and the new powers of the County Board of Health in Hudson county, enable us to have local oversight of these and other diseases throughout the entire State.

Both city and township boards of health are enjoined carefully to guard against all contagious diseases.

Let all local boards of health inquire also into such diseases of animals as seem to be contagious and notify the Board of the same. We have full power to examine and determine whether any contagious or infectious diseases exist among animals in this State. It is a work incidental to your oversight of the general health.

The late act as to diseases of animals does not restrict this power of local boards or that of township committees under former laws.

The township board of health should enjoin the assessor in his visit to find out the existence of any such disease. In cities local inspectors may do the same. No city is alive to its own interests as to milk and food supply and as to health conditions that does not learn where and how animals are kept within its limits.

When any local animal disease is reported to us, and authenticated as possibly infectious, we shall at once make inquiry, and, if really necessary, at the expense of the State, send an inspector. If the disease is found we shall certify the same to the owner or person having interest therein. We shall not quarantine but by his consent, but if not, shall give notice to him and others that the disease exists in his herd, and warn him that the law requires that he should notify the Board, and also of the penalties of purchase or sale as contained in sections five and eight of the act of March 12, 1880. If by delay in separating or killing infected animals, or by exposing others to the

contagion, other animals are affected, the owners thereof, as well as this Board, will have action in law against him.

In case of the slaughter of animals under our direction, they will be paid for at two-thirds their full actual value.

There is now so little of the disease in the State that it is all the more practicable to secure its complete eradication.

We have had the 110 herds which were in quarantine at date of March 10th, under the former authority, examined, and find not over two that are now centres of contagion and one other that has shown the disease since March 10th. We shall secure the complete isolation of these animals and the herds to which they belong. We shall seek the modification of New York restriction as not now needed toward our whole State.

While by consultation with the authorities of Pennsylvania, and with farmers and stock-raisers in our own State, we are satisfied that methods of ferry inspection are not feasible or successful, we have arranged a system of notification and oversight which will be no less efficient than the former plan in preventing the ingress of the disease from other States. A milk inspector, employed by the State, will aid in inquiry as to the contagious diseases of animals. While local boards must feel charged with the duty of looking after their own districts, we shall thus be able in various ways to aid local efforts, as well as to seek information through individual sources and by our own special methods.

All communications should be addressed

*State Board of Health, Trenton, N. J.*

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## CONTAGIOUS DISEASES OF ANIMALS.

### CIRCULAR C.

TRENTON, August, 1880.

The State Board of Health has had oversight of the contagious diseases of animals since March 12th, 1880. Although cases of glanders and of pneumo-enteritis (hog cholera) have occurred, our chief attention has been called to the contagious diseases of neat cattle. Most of the herds in quarantine previous to March 12th, were so far recovered as not to need longer detention. We

have not been able to trace subsequent cases that have occurred in the State to these herds. Outbreaks which have occurred in some of the counties are now, we believe, under control.

In a township in Union county, where pleuro-pneumonia has long been troublesome, the township Board of Health has efficiently aided us. The most recent and troublesome cases are in Burlington county, where it has recently appeared in five herds, in which several cattle have been slaughtered. It is also under supervision in two other counties. We believe it is to be decided within the next year whether the pest shall be localized in our State. If any one doubts its devastating nature, its communicability or the calamity of its presence, we only ask that they will send to us for the names of farmers in our State who have recently suffered from it, and confer with them. The slaughter of all fresh cases and the separation of the exposed herds from all others is imperative. In every case we have had thus far, the disease is, we think, traceable to purchased cattle. Cows sold from infected herds or store calves, which have been taken from infected cows, often convey the disease.

No farmer or stock raiser should now make additions to his herd, unless he can trace the animal purchased and receive a warranty that there has been no exposure. Where cattle are bought it is well to keep them at least six weeks from mingling with the general herd.

Where the disease has manifested itself, we recommend the erection of temporary sheds until November and a thorough disinfection of all stables and sheds. Chloride of zinc is advised to be used for the sponging of the nostrils *both of the sick and well cattle*, where the disease has appeared.

An ounce bottle of the solid chloride, costing ten cents, can be dissolved in a half gallon of hot water, and from a half gill to a gill in all be given in the drinking water at different times each day. Common tar smeared in the nostrils is of service.

It is best to heap all manure outside of the buildings and to sprinkle hay or straw, which has been used, with some disinfecting solution, and remove it and whitewash the buildings.

Sulphate of iron (green vitriol or copperas) costs two cents per pound, and a pound to a gallon of water answers well for sprinkling over surfaces that have been exposed.

"Calx powder," made by powdering one bushel of dry char-

coal and two of stone lime and mixing them, is also a good corrective.

Sirel's compound consists of—

Sulphate of iron (green vitriol or copperas), 40 lbs.

Sulphate of lime (gypsum or plaster of Paris), 50 lbs.

Sulphate of zinc (white vitriol), 7 lbs.

Bone charcoal (ivory black), 2 lbs. (Or 6 lbs. of dry wood charcoal.)

This may be sprinkled dry over places exposed to moisture.

What is known as the "lime and salt mixture" is not only valuable agriculturally, as an addition to compost, but has valuable disinfecting and deodorant properties. It is prepared by adding one bushel of salt to three bushels of fresh slaked lime. Stir it frequently until the mixture becomes moist, and then add to it twice the amount of loose dry earth. This may be scattered freely over the ground where the cattle have been kept or have pastured.

During heavy winds or storms, all doors and windows of sheds should be fully opened, so that stalls and all parts may be flushed with air. There is much need of attention to the airing of stalls when the cattle are out of them.

There is reason to believe that many farms where pleuropneumonia has once occurred have had new outbreaks months after, in removing straw or hay, or by, in some way, stirring up infective particles which had been concealed. There is great encouragement to seek its prevention, since the disease is believed never to occur in this country, except as it is caught from some previous case or from exposure to the immediate grounds or buildings where the disease has before existed.

Farmers and dealers need to be watchful, and whenever any of their cattle seem ailing they should at once be separated from the rest. If they have good reasons to suspect it to be pleuropneumonia, or if the local veterinarian so pronounces it, there must be no delay in notification as required by the law.

Local boards of health and township committees may often be consulted with advantage. Where the disease prevails they are especially charged with the duty of preventing its spread.

They are the appointed guardians of the welfare of their respective towns and townships, and for mutual protection should aid in preventing the spread of so serious a disease.

Cattle must not run at large in townships in which it prevails. The milk from ailing cows should not be sold, although there is no record of the disease from this source. Yet common judgment teaches us that animals that are feverish and sick cannot furnish good milk. Cattle that recover from pleuro-pneumonia are generally left with one lung diseased, and they should be fattened. The disease thus far overcome does not effect the meat. As some believe that an animal once having had the disease may retain an infecting power or have an outbreak from the diseased lung, it is better to fatten any animal that has been known to have had pleuro-pneumonia and to have partially recovered.

If only for a year or two all will be diligent in preventing the outbreak and conveyance of this great pest, we shall get rid of it in this State.

Any inquiry may be directed

*State Board of Health, Trenton, N. J.*

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#### AN ACT TO REGULATE THE SALE OF MILK.

A supplement to "An act to regulate the sale of milk," approved April fifth, one thousand eight hundred and seventy-eight.

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That the third section of the act to which this is a supplement, which section reads as follows:

"3. And be it enacted, That all penalties imposed under the provisions of this act, may be sued for in any county of this state where the offence is committed, in any court having competent jurisdiction, one half of the fine to go to the person making the complaint, and the other half to be paid to the county collector for the benefit of the county," be amended to read as follows:

3. And be it enacted, That all penalties imposed by the provisions of this act, may be sued for in any county of this state where the offence is committed, in any court having competent jurisdiction; that the state board of health are hereby empowered and directed to appoint each year a competent person who shall act as inspector of milk, at a salary not exceeding six hundred dollars per annum, payable on the order of the president and

secretary of the state board of health, approved by the governor, in quarterly payments for the purposes of this act, and who shall act until removed by said board or until his successor is appointed; said inspector, having reason to believe the provisions of this act are being violated, shall have power to open any can, vessel or package containing milk and not stamped or marked as directed by the first section of the act to which this is a supplement, whether sealed or otherwise, or whether in transit or otherwise; and if upon inspection he shall find such can, vessel or package to contain any milk which has been adulterated or from which the cream or any part thereof has been removed, said inspector is empowered to pour the contents of such can, vessel or package upon the ground, and bring suit against the person or party so violating the law, and the penalty when so collected by such suit shall be paid into the treasury of this state; that when suit is brought under this act by any person other than such inspector, the penalty, when collected, shall one half go to the complainant and the other half to the county collector for the benefit of the county.

2. And be it enacted, That this act shall take effect immediately.

Approved March 12, 1880.

NOTE.—A more stringent act has just passed.

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## AS TO MILK SUPPLY.

### CIRCULAR A.

TRENTON, April 26, 1880.

The evils arising from the adulteration of milk are so serious that many of the larger cities, and many of the states, have found it necessary to enact laws or ordinances in reference thereto.

Not only is there an unfair and injurious competition when adulterated or inferior milk is sold, but great injury is done to the public health. Children are often compelled to rely upon purchased milk, and there is abundant evidence that much sickness and many deaths result from the impurity or bad quality of this food.

The unfairness of such traffic and the evil to consumers is such that the Legislature of this State, at its last session, directed the

State Board of Health to appoint a Milk Inspector. Applicants were subjected to a careful chemical examination as to their knowledge and general fitness for such an appointment. William K. Newton, M. D., was selected to fill the position. He will, with the aid and direction of this Board, seek to correct unfair dealing and to detect attempted frauds.

Milk may be defined as pure when it comes from a healthy cow, and when nothing is taken from or added to it.

The adulterations most common are as follows:

The dilution of milk by water.

The sale of skimmed milk as natural milk.

The separation of the strippings from the rest of the milk.

The removal of small quantities of cream, technically known as "topping."

The sale of milk from cows too soon after calving.

The sale of milk purposely impoverished by modes of feeding or keeping.

The addition of soda or other alkalies.

The use of materials to thicken or whiten the milk.

The addition of coloring or other matters to cover up some fraud.

The following is a synopsis of New Jersey State laws, bearing on the subject of our milk supply:

Act of April 7th, 1875. The sale or keeping of adulterated milk is a misdemeanor, punishable by a fine of \$50, and imprisonment for thirty days. To adulterate milk, or to keep cows for the production of marketable milk in an unhealthy condition, or to sell milk as pure milk from which the cream has been taken is also punishable as above. The addition of *water or any substance* is defined as an adulteration. Milk from cows fed on distillery waste (commonly called "swill") is declared impure, and contrary to this act.

Act of March 23d, 1865. To sell or bring to a cheese or butter factory adulterated or "skimmed" milk, or to keep back any "strippings," is punishable by a fine of \$15.

Act of April 5th, 1878. Every person who shall sell, or who shall offer or expose for sale, any milk from which the cream, or any part thereof, has been removed, shall distinctly and durably stamp or mark, in letters not less than two inches in length, in a conspicuous place, above the centre, upon the outside of every

can, vessel, or package containing such milk, the words "skimmed milk," and such milk shall only be sold or shipped in or retailed out of a can or other vessel so marked.

Violations of this act are punishable by a fine of \$50. The sale or exposure for sale of milk contrary to this act is presumptive evidence. The non-payment of the fine is punishable by imprisonment.

Act of March 12th, 1880,—supplementary to the above act. The State Milk Inspector is appointed and empowered to open any can, vessel or package containing milk, whether sealed or otherwise, or whether in transit or otherwise; and if upon inspection he shall find such can to contain milk which has been adulterated, or from which the cream, or any part thereof, has been removed, the inspector is empowered to pour the contents of the can upon the ground, and bring suit against the person violating the law. (See new law of 1881.)

Any citizen may act as complainant under these acts.

We ask the assistance and co-operation of all local boards of health, local inspectors, city and county physicians, and people interested in the supply of pure milk.

The State Inspector will visit in turn the various parts of the State, unknown to dealers, in order to check the sale of adulterated and impure milk. He will be provided with all the approved instruments for testing milk, and will, when necessary, make analyses to determine adulteration, etc.

It will be his aim to prevent dishonest dealing, so far as it affects the common interest of the milk trade and the health of our citizens. He is also to investigate evils to the milk supply that may arise from improper feeding, improper housing, or from existing diseases among milch cows.

Action at law will be had when required, or his services be available in evidence.

Communications may be addressed to William K. Newton, M. D., Paterson, or to the State Board of Health, Trenton, N. J., which intends to fully sustain the efforts of the Inspector in preventing a fraud so detrimental to the public health.

## CIRCULAR TO LOCAL BOARDS OF HEALTH

*And to those whose duty it is to make returns of Marriages, Births and Deaths.*

The Index for the statistical year just ended, indicates an increase in the returns of marriages and births for the State, and a decrease of over one thousand in the returns of deaths. We have reason to believe that all returns have been more faithfully made than in any previous year, and the diminution in death certificates has been owing to a decrease of the rate of mortality.

By a comparison of our returns from different city clerks and assessors, we are more and more seeing how much of the perfection of the record depends upon careful attention and supervision of these officers. Carelessness or want of judgment on their part soon begets carelessness or neglect in those who by law are required to make the returns to them. Local boards of health are now so organized under the law that their influence can be brought to aid, where there is negligence, or they or the assessors can send direct notice to any who overlook their duty. It is enough here to say that accurate vital returns, by all States and countries are recognized as the "account of stock," without which a State or district cannot know its health condition, or provide therefor, any better than a merchant can reckon, without knowing the material on hand and the influences that are reducing its value or destroying it. Already in comparison of returns we are able to trace and compare localities of disease, which means abatement thereof, under the use of proper methods. Many of our cities are needing to study streets and blocks as related to disease. Townships may learn much by finding out through series of years what parts are most affected. Where ministers are dilatory as to marriage certificates, where physicians neglect to make returns of births, or where undertakers neglect to secure the burial certificates until after burial, and continue to neglect after being cautioned, it is the duty of the assessor and of the Local Board of Health to report the fact to the Bureau of Vital Statistics, which is under the Department of the Secretary of State. If any person hereafter fails to find the record of his or her marriage, or if the birth of a child, or if the death of a relative is not filed in this office, it may involve losses and embarrassment

for which the party neglecting is culpable under the law. Recently most important recourse has been had to these records, in testing the claims of life insurance, in legal proof of property rights, and in comparisons for the coming National Census; at the same time there is increasing evidence that physicians are appreciating these returns, as a part of their professional relation to their patients, and a duty the same as that which has so long been acquiesced in by those who have official charge at marriages, and by undertakers. The licensed medical profession is receiving recognition which is more than a pecuniary pittance, and more of the people are appreciating the great interests of public health thus promoted. We, therefore, ask as the part of all officers a vigilant and systematic attention to the reception and transmittal of the returns.

Blanks may always be had of the city clerks and assessors, or by application through postals directed to this office. A paper-bound book of blanks will be sent to such as require fifty returns of either kind each year. Physicians who may fail to receive the Annual Report will please notify us, and any clergyman may have it on application.

By order of the Bureau of Vital Statistics.

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CIRCULAR AS TO SMALL-POX.

TRENTON, February, 1881.

The State Board of Health has evidence of the existence of *small-pox* in scattered localities in this State, as well in the cities of New York and Philadelphia. The epidemic, as existing in Camden long since, upon the invitation of the local authorities, received our attention, and vigorous measures were instituted by them. But now, from other sources, scattered cases have occurred in other towns and in rural districts, until it may easily become a wide-spread epidemic. Four or five cases, occurring in Trenton, have already disbanded the Normal School.

The right of school trustees to require vaccination in order to secure attendance at school in times of epidemic, or else to prohibit attendance is not questioned. By the terms of the health laws of March 11th, 1880, all school boards are authorized to vacci-

nate, at public expense, any pupils attending school who are unable to procure vaccination.

All local health boards need to see to it that vaccination is recommended, as well as rapid isolation of cases secured, if any occur. The cost of local epidemics of small-pox is very great, besides the risks to life and public health. The prevention of the disease is within the range and duty of your control. All our local health boards and school boards should co-operate in influence and provision for more general vaccination, and for re-vaccination of persons who have not been vaccinated since full growth. The heads of large manufacturing establishments need to attend to it, both in the interest of capital and labor. Trenton has set a good example in making the means therefore accessible.

Most of our physicians have full confidence in humanized vaccine virus, which is easily secured. *Vaccine virus directly from the animal* is preferred by those who have any fear of communication of other diseases through humanized lymph—a fear that is greatly magnified in the popular mind. It is, nevertheless, due that all have their preference, and that where vaccination is insisted upon as a condition of school attendance, bovine virus be used if desired. Many physicians prefer to use this. The New York City Board of Health, 301 Mott street, New York, furnishes it daily by mail. H. A. Martin & Son send it direct from their herd, Roxbury Station, Boston, Mass. Dr. E. L. Griffin, Fond du Lac, Wis., is prompt in remittal from his vaccine farm. Ready supplies can also be had from Philadelphia and other cities. The price per point is about twenty cents, and less in larger quantities. It can often be had from local druggists. There is reason to believe that much is sold for bovine virus which is not such, and that there is a failure in effect because of age and imperfect keeping.

We urge upon all physicians great exactness in selecting virus, and upon the people protection from the disease. Its outbreak every few years is not a proof of epidemic tendency. The periodicity rather occurs because that, after an epidemic, as soon as years enough have passed for a younger product of children to be out in public child-life, this susceptible material becomes so abundant as to insure extension if a single case is introduced from another section. Then there is an outbreak of

small-pox and of vaccination. Would it not be better if, somehow, the young population could be systematically protected? Let our various communities and the local boards now secure this, not only under present threatenings, but also as a wise preventive measure.

Copies of this circular will be sent more fully on application by postal to State Board of Health, Trenton, and any inquiries be promptly answered.

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IMPORTANT LAWS BEARING ON PUBLIC HEALTH,

PASSED BY THE LEGISLATURE WHICH ADJOURNED MARCH 25, 1881.

I. An act relating to Local Boards of Health.

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That all township or local boards of health in this state, organized under the provisions of an act passed March eleventh, one thousand eight hundred and eighty, entitled "An act concerning the protection of the public health, and the record of vital facts and statistics relating thereto," may expend, for the purposes for which said boards are authorized, to the amount of fifty dollars as actual expenditure, not including any payment to members for attendance at the meetings of said boards, and the same shall be payable in the same manner as other bills presented to the collector, treasurer or other disbursing officer of the township, town or precinct; and in case any additional sum is, in the judgment of such board, needed to be expended in any township, town or precinct, the need thereof shall be presented to the township committee, common council or other governing board, and they shall have authority to appropriate such an amount, or pay such bills, as they may deem necessary for the purposes indicated in the act aforesaid.

2. And be it enacted, That any boards of health now organized in any of the cities of this state, under the provisions of their respective charters, as well as those which are only health committees, may, by the order and direction of the mayor and common council of said cities, organize their boards in accord with the provisions of the act aforesaid, and shall, in common with the boards of health of the several townships, towns or boroughs

of this state, have power to make and enforce such ordinances as the care of the public health demands.

Approved March 22, 1881.

II. An act entitled "An act to provide for drainage where the same is necessary to the public health."

This act gives well defined powers, and with judicious application can do very much to rid the State of malarial localities.

III. An act to prevent the adulteration of milk and to regulate the sale of milk.

Its terms are definite. The Milk Inspector must be a public analyst, to make "analyses, investigations of foods, drugs and other substances, as he may be directed so to do by the State Board of Health."

IV. Supplement to an act to regulate the practice of medicine and surgery. Approved March 22, 1881.

It adds the words "professional service," and increases the power of the law.

V. An act to authorize cities to construct sewers and drains and to provide for the payment of the cost thereof.

Approved March 22, 1881.

VI. A supplement to "An act for incorporation of companies for draining and improving meadows and lands overflowed by tide-water.

VII. An act to prevent the adulteration of food or drugs.

VIII. A further supplement to an act entitled "An act to establish a State Board of Health," etc.

This act relates to the "Contagious Diseases of Animals," and gives to the State Board full power and control as to them, recognizing also the co-operation of local boards.

Other acts do not reach us in time for report.

SPECIMEN SCHEDULE OF SANITARY INQUIRY,  
(INSTITUTIONAL) BY THE NEW JERSEY  
STATE BOARD OF HEALTH.

- Name and post-office address of institution.  
Name and post-office address of physician.  
Name and post-office address of chief officer.  
Location.  
Are buildings owned by township or county?  
Area of ground and altitude above sea level.  
Character of soil.  
How are grounds improved?  
General character of buildings and material of construction,  
Date of erection and cost. .  
Average yearly cost of repairs.  
Is there an accurate geological map and description?  
Are there contour maps, topographical maps, and a plan and  
schedule of all underground apparatus or appliance?  
Have natural water-courses been disturbed?  
Is there any damming up of water for ponds?  
Give place, size, depth, character and locality of any springs  
and wells.  
Are they opened or closed, and what is the mode of getting  
water therefrom?  
Is there any artificial drainage?  
Size of rooms for bed or sitting rooms on first floor.  
Size of rooms for bed or ward rooms on second floor.  
Size of rooms for bed or ward rooms on third floor.  
What is the finish of walls?  
Are the rooms wainscotted?  
How near to ceilings are windows?

Are there windows, shutters or blinds?

How is admission of sunlight regulated?

Is there shade?

Does sunlight enter all the rooms?

Have you had any accident?

Are all children vaccinated?

Have all adults been vaccinated within ten years?

What facilities have you, besides ordinary house cleaning, for cleansing and varnishing of furniture and bedsteads, mattresses, &c.?

Do you have wood or iron bedsteads?

Is there any system by which new suits of outside clothing are furnished to inmates and by which clothing long worn is cleansed by airing or heating?

What are the facilities for bathing and washing for inmates?

How is laundry work conducted?

Are the inmates fed in their rooms, or when able, do they come to a common table?

What is the arrangement for drainage?

What is the size, shape, thickness, construction and preparation of pipes? How joined?

Is there a basement or cellar? Is there an unoccupied attic?

How are these ventilated?

How much below ground level, and how occupied?

Does water ever stand in it?

Are walls and floors concrete?

Are sewers connected with drains?

How?

Give the exact fall per foot, and any variations.

How are sewers ventilated?

Are there grease traps?

What is the indoor water-closet arrangement?

- Are water-closets in projections, or separated by corridors?
- If there are any sewers or pipes leading from the house, give their size and construction and fall and outlet.
- Give modes of ventilation, kinds of traps and just where located.
- What is the out-door arrangement?
- How often is the material removed, and by what method?
- Do fecal and slop material mingle?
- If separate, are urine and waste water separate?
- How is slop-water disposed of?
- What is the system of flushing or disinfection?
- If to a cesspool, describe it and where it empties, and how it is cleansed and how often?
- Is there open ventilation between the cesspool or sewer and the house?
- If so give full plan.
- What is the water supply?
- Is it brought on all the floors, and how?
- How is the water stored?
- Is there an overflow pipe? If so how trapped and joined to what outlet?
- If in cisterns, how often cleaned?
- What their locality?
- Is provision made for the "washings" of the roof to be carried off first?
- Of what material is the roof?
- If no cisterns, how is the roof water disposed of?
- If water is got from wells, what are the chances for contamination with sewage or surface drainage?
- Is there any reason to suspect impure water?
- What is the system of ventilation?
- Give full plan.
- Have there been anemometer or other tests?

Is there any provision for changing the air of rooms during cold weather?

Have the heating and ventilating appliances been tested in varying conditions of atmosphere?

What is the method of heating?

Give plan.

How many wards or bedrooms have fire places?

What was the average number in the house last year?

What was the expense for maintenance last year?

What is the plan of outdoor relief?

What was the cost last year.

Have you a regular dietary each day?

If so, give the dietary each day.

Have you any insane paupers?

How many are demented or foolish?

How many are harmless?

Are they, or should they, be separately kept?

What are the arrangements for separation of males and females?

What are the nursing arrangements?

What is the medical attendance?

How is it arranged for?

How much is paid therefor?

How are medicines furnished?

Are any disinfectants kept on hand?

If so, how used?

Inform us what changes are needed in all present arrangements.

Physicians will state any facts of interest regarding sickness during past year, or sanitary defects existing.

What was the number of deaths, and their causes, last year?

Have you any system of employment for inmates?

- What is the discipline and oversight of attendants ?
- Is any special industry followed ?
- If so, give particulars.
- Is it profitable, or merely for occupation ?
- How many inmates have tobacco furnished them ?
- How many have opium furnished them ?
- What was the tobacco bill last year ?
- What was the liquor bill ?
- What was the quinine bill ?
- What are the arrangements for schooling children ?
- Are any apprenticed out, and at what age ?
- Are places sought for any not yet apprenticed ?
- What visitation have you that looks into the moral and physical welfare of the inmates ? What provision therefor ?
- What provisions are there for amusements or for reading matter for inmates ?
- How many of the inmates were born in dependency ?
- What provision in case of fire ?
- What is the method of lighting ?
- Is any register kept of inmates as to habits, cause of dependence, mental condition, &c. ?
- What is the cubic space per inmate ?
- What are the hospital arrangements ?
- Is there any oversight of or inquiry into the physical condition of inmates ?

## SPECIALLY FOR JAILS.

- Have any been detained as witnesses in cells during the past year, and how long ?
- What system have you for receiving excretions of the body during the night ?
- What in cases of sickness ?

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What are the chances for sunlight to enter cells and corridors?  
Are prisoners allowed to smoke and make ablutions in the  
cells?

Cubic space of each cell.

What chance for change of air in cells?

If prisoners are suddenly taken ill in the night, how may they  
summon assistance?

Size of windows in cells.

Size of doors.

Amount of sickness and number of deaths yearly.

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REPORT  
OF THE  
BUREAU OF VITAL STATISTICS.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

BY EZRA M. HUNT, M. D.,

Medical Superintendent of State Vital Statistics.

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# THE CENSUS,

AS BEARING UPON QUESTIONS OF POPULATION.

The great design of vital statistics is to furnish an estimate of some of the most important conditions of population, and to aid in those objects for which an enumeration of inhabitants is instituted. Statistical inquiry has now come to be such a science and such a practical art of political economy, that the mere record of numbers is only one of the incidental purposes of statistics. Yet this must be accurately had in order to estimate the relative conditions and the ebb and flow of population.

The census of 1880 has been taken with more regard to extended studies of social, and race, and economical conditions than any that has preceded it. The large number of schedules furnished shows the range of inquiry. It still remains to be shown how the facts and figures obtained are to be most successfully applied to the study of the various branches of social study. Still more importance attaches to the census from the fact that the general government has also made provision to aid in the semi-decennial census, and thus prepared the way for a closer study of the people.

An effort was made to obtain returns in this regard from each State. While the plan showed the broad and just conceptions of the superintendent and his advisers, it also demonstrated that for vital returns its chief reliance must be upon statistics obtained near the time of the occurrence of the events. So the State bureaus will need to secure the most of this kind of information.

In the study of population in the States, an early question to be decided is, what shall constitute the sanitary unit of inquiry. Shall the vital conditions and the health of the people be compared by counties, or by townships, or by cities, towns, villages and rural districts. Shall there be comparisons with reference

to the geological basis, since, as in our State for instance, definite lines in this respect can be drawn? Or shall areas be taken with reference to special water-sheds, with comparisons of highland and lowland, mountains and of valleys with extended river relations. Or shall the comparison be made between dwellings upon the sea-shore districts, and those amid hill and mountain ranges. Or shall climate come into consideration, in a State so diversified as ours? These, and such like questions, naturally suggest themselves. Each in their turn, and when enough facts are gathered, will be worthy of thought and comparison.

But with present facts and present methods of obtaining a census, our first natural enumeration for comparison is by townships. In each township the area is sufficiently narrow to present the people as subjected to much of the same general kind of local influences. A variation, however, needs to be made in reference to the larger cities and towns. The smaller villages differ but little from the rural parts of the townships.

But so soon as population is aggregated in cities, it has its own consequent complications or changed conditions. So the larger cities need also to be compared among themselves. City Boards will need to compare parts of the same city with each other by wards or districts. Our State law provides that the vital facts as to cities of over 5,000 inhabitants shall be tabulated separately in order to facilitate comparisons. We, for the present, shall here give only two comparative tables, viz: one presenting the Census of 1880 in order to show actual present population and relative growth, and second, the same as to all cities now of over 5,000 inhabitants.

We also add as an item for information without distinct classification, the size of other towns and boroughs of this State so far as they can be separated from the township precincts with which they are enumerated, so as to aid in local comparisons, although there is great variety of incorporation, so much so that a commission not long since reported it impossible to enumerate the towns of the State. Yet the approximate statement is valuable for reference and to aid in future adjustments as to local boards of health. In a few cases comparisons of smaller localities cannot be accurately made without remembering that new townships have been formed on the area changed; where this is the case the fact must be borne in mind.

We give the census record in order to facilitate comparisons and for future study of the vital conditions and variations of the population. There may be some small corrections to be made in the last census, but these can be noted hereafter.

Entire population of the State 1870.....	907,144.
“ “ “ 1875.....	1,019,413
“ “ “ 1880.....	1,130,892

The present total of 1,130,892 presents for the State a population 75,698 less than the total of New York City.

It is made up as follows:

Males.....	559,803
Females.....	571,089
Native.....	909,309
Foreign.....	221,583
White.....	1,091,856
Colored.....	38,796
Chinese.....	176
Japanese.....	2
Indians.....	58
East Indians.....	2
Albinos.....	2

These figures, as those following, are still subject to possible corrections from the census office.

LIST OF CITIES, TOWNS, VILLAGES, ETC., OF THE STATE, SO FAR  
AS THESE CAN BE GIVEN, WITH THEIR POPULATIONS.

NOTE.—Some towns have not been enumerated or reported in the census distinctly from the townships in which they are included. We give the list of every precinct, which differs in any wise from a township method of oversight, and the forms of its government so far as possible. There is great need in this State of some general law as to these organizations, and such uniformity as will admit of comparative study. As far as possible the mode of government will be indicated and the population, as distinct from the township, given so as to aid in future vital statistics. Where the town population is not given distinct from the township, the population will be marked *Twp.* The populations will be given as far as possible as by the census of 1880.

ATLANTIC COUNTY.

Absecon, town, in Egg Harbor township.....	507
Atlantic City, city.....	5,477
Egg Harbor City, city, in Galloway township.....	1,232
Hammonton, town.....	1,776 Twp.

BERGEN COUNTY.

Hackensack, in New Barbadoes, township.....	4,250 Twp.
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BURLINGTON COUNTY.

Beverly, city, in Beverly township.....	1,759
Bordentown, city, in Bordentown township.....	5,334 Twp.
Burlington, city, in Burlington township.....	7,237 Twp.
Pemberton, borough, in Pemberton township.....	799
Mount Holly.....	4,630 Twp.
Fieldsborough.....	

CAMDEN COUNTY.

Camden, city.....	41,658
Gloucester, city.....	5,347
Haddonfield, borough, in Haddon township.....	1,480
Merchantville, borough, in Stockton township.....	3,093

CAPE MAY COUNTY.

Cape May, city.....	1,699
Cape May Point, borough, in Lower township.....	198

CUMBERLAND COUNTY.

Bridgeton, city.....	8,729
Millville, city.....	7,660
Vineland, in Landis township.....	6,005 Twp.

ESSEX COUNTY.

Belleville.....	3,004 Twp.
Bloomfield.....	5,748 Twp.
East Orange, city.....	8,349 Twp.
Irvington, village, Clinton township.....	2,742 Twp.
Montclair.....	5,146 Twp.
Newark, city.....	136,400
Orange, city.....	13,206

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South Orange, village.....	3,911 Twp.
Clinton, town.....	2,742

GLoucester County.

Woodbury, city, in Deptford township .....	2,298
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HUDSON COUNTY.

Bayonne, city.....	9,372
Guttenburgh, town.....	1,206
Harrison, city.....	5,510
Hoboken, city.....	30,999
Jersey City, city.....	120,728
Union, town.....	5,849

HUNTERDON COUNTY.

Clinton, borough.....	842
Frenchtown, borough.....	1,039
Lambertville, city.....	4,183

MERCER COUNTY.

Chambersburg, borough.....	5,437
Hightstown, borough, West Windsor township ...	1,336 Twp.
Princeton, borough.....	4,348 Twp.
Trenton, city.....	29,910

MIDDLESEX COUNTY.

New Brunswick, city .....	17,167
Perth Amboy, city.....	4,808

MONMOUTH COUNTY.

Asbury Park, borough, Neptune township.....	4,187 Twp.
Freehold, town.....	4,302
Ocean Grove, Neptune township.....	4,187
Red Bank, Shrewsbury township.....	5,059 Twp.
Long Branch, Ocean township.....	6,027 Twp.
Keyport, Raritan township.....	3,891 Twp.
Matawan .....	2,699

MORRIS COUNTY.

Boonton.....	2,685 Twp.
Dover, Randolph township.....	7,701 Twp.
Morristown, town .....	6,838 Twp.

OCEAN COUNTY.

Only Townships.

PASSAIC COUNTY.

Passaic, city.....	6,532
Paterson, city.....	50,887

SALEM COUNTY.

Salem, city.....	5,057
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SOMERSET COUNTY.

Somerville, town, Bridgewater township.....	7,997 Twp.
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SUSSEX COUNTY.

Newton, town.....	2,513
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UNION COUNTY.

Elizabeth, city.....	28,229
Rahway, " .....	6,454
Plainfield, " .....	8,126

WARREN COUNTY.

Belvidere, town.....	1,773
Hackettstown, town.....	2,502
Phillipsburg, city.....	7,180
Washington, borough.....	2,142

According to this we find that of the 1,130,892 of the inhabitants of New Jersey about 690,000 live in cities, or some form of incorporated towns. When our vital statistics reach over a greater number of years, there will be still more opportunity to study the effects of locality and of different density of population upon life and health—as also upon local prosperity.

From these we at present select out and associate cities and towns according to their population.

OVER ONE HUNDRED THOUSAND.

Newark, Essex county.....	136,400
Jersey City, Hudson county.....	120,728

Note.—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.

BETWEEN SEVENTY-FIVE AND ONE HUNDRED THOUSAND.

No city.

BETWEEN FIFTY AND SEVENTY-FIVE THOUSAND.

Paterson, Passaic county..... 50,887

BETWEEN TWENTY-FIVE AND FIFTY THOUSAND.

Camden, Camden county..... 41,658  
 Hoboken, Hudson county..... 30,999  
 Trenton, Mercer county..... .. 29,910  
 Elizabeth, city, Union county..... 28,229

In reference to Trenton, it is also to be remembered that Chambersburg joins it closely with 5,437 inhabitants.

FROM FIFTEEN TO TWENTY-FIVE THOUSAND.

New Brunswick, Middlesex county..... 17,167

FROM TEN TO FIFTEEN THOUSAND.

Orange, Essex county..... 13,206

FROM FIVE TO TEN THOUSAND.

Bayonne..... 9,372  
 Bridgeton..... 8,729  
 Plainfield..... 8,126  
 (North Plainfield, 3,217 additional.)  
 Dover..... 7,701 Twp.  
 Millville, Cumberland county..... 7,660  
 Phillipsburg..... 7,180  
 Burlington, township..... 7,237 Twp.  
 Montclair, township..... 5,146  
 Union, Hudson county..... 5,849  
 Harrison, Hudson county..... 5,510  
 Atlantic City, Atlantic county..... 5,477  
 Chambersburg, Mercer county..... 5,437  
 Gloucester City, Camden county..... 5,347  
 Bordentown, Burlington county..... 5,334 Twp.  
 Salem, Salem county..... 5,057  
 Morristown, Morris county..... 6,838 Twp.

Passaic City, Passaic county.....	6,532
Rahway.....	6,454

We have placed in this list those cities of over 5,000 in which, although the township population is included, it is so inconsiderable as not to affect the general estimate.

We now name others in which the city population, as distinct from that of the township, is unknown, but in which the township forms a considerable per cent.

Somerville, Somerset county.....	7,997
Bloomfield, Essex county.....	5,748
Red Bank, Monmouth county.....	5,059

CITIES, TOWNS, ETC., BETWEEN TWO AND FIVE THOUSAND.

Mt. Holly, Burlington county.....	4,630 Twp.
Princeton.....	4,348 Twp.
Lambertville .....	4,183
Asbury Park.....	4,187 Twp.
Boonton, Morris county.....	2,685 Twp.
Newton, Sussex county.....	2,513
Hackettstown, Warren county.....	2,502
Washington, Warren county .....	2,142

The death rates of these thus admit of comparison, although a period of about five years of observation is necessary, unless the indications of local disease are very apparent. These facts are thus put on record in order to aid the Central Bureau and all Local Boards in their study and tabulation of Vital Statistics.

The census of 1880 will be found for each township in the death rate tables, and need not be repeated here.

## YEARLY OUTLINE AND SUMMARY.

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In dealing with vital statistics, we need at the start to have clear views as to the intent of the record. One part is purely for legal use; another only for vital study. A third part has a mixed value. The relative proportion to be determined by the bearing of the information given.

Thus the name of a deceased person is secured for legal identification; the *cause of death* for its bearing on the vital concerns of community, while the place and time of marriage, birth or death have value in their relation to questions both of legal and vital import.

While the importance of such a registry has long been recognized, and a method of securing it has long been in exercise, its inadequacy, its incompleteness, and the absence of any system of indexing, has made it unsatisfactory both to those who have gathered the facts and to those who have had occasion to make search of the record. The laws of inheritance, the requirements of pension laws, of life insurance, and the official seal so often required to authenticate dates of marriage, birth or death, have made it now most essential. Hereafter the Marriage, Birth and Death Records of the State will be of far greater service in establishing rights of property. It will only be culpable negligence on the part of those who are to make returns that will omit the record of any marriage birth, or death occurring in the State. References which it formerly sometimes took hours to verify, can now be made in a few minutes.

It is easy to see that every State should be able to certify those events which have to do with the rights of the individual. The importance of these as a portion of the statistics which all governments are now securing, and their vital bearing on the laws of health, life and population, adds to the necessity and has fully justified the additional care with which such records are now sought and tabulated. Statistics mean the account of how things

stand. This bureau is a central audit of one of the great concerns and resources of the State. It attempts to estimate those vital facts which have so much to do with real prosperity, and to get such information as shall point out how and where our people are suffering from physical disabilities which can be mitigated or avoided.

No sooner had the work of receiving and studying the vital returns been started than it became apparent that the preliminary study must be to prepare a plan of index which should admit of ready reference, for all purposes, whether legal or medical, for which such records are kept. For the first year, under a change in the law, it unavoidably fell to the lot of the medical superintendent to initiate and give direction to this work, and to aid in and provide for the clerical labor needed. A thorough system was adopted, and such full transcription is now made as fully commends itself to the State Board of Health and to all those who have occasion to consult the records.

#### SECUREMENT OF RETURNS.

The first effort is to secure completeness and accuracy of returns. While we have no reason to complain of any indisposition to fulfill the conditions of the law, any system that looks to the careful collection of vital facts, requires constant vigilance to prevent neglects or oversights. City clerks and assessors, as a rule, have performed their duties with faithfulness and made their returns with commendable promptness. They are sometimes annoyed by delays or neglects on the part of those whose duty it is to send certificates to them. The legal right which the parties have to a record of marriage as well as the requirements of the law, are fully recognized by those who officiate. The former law not only did not pay for a certificate, but practically made it the duty of the person officiating to record the marriage at a county clerk's office, and pay one shilling therefor. This law is much simpler in its process and entails no expense. We only need to urge upon all parties that they see to it that this record is secured and sent promptly to the city clerk or assessor. A neglect may at any time subject to a penalty at law from the parties concerned as well as from the State authorities. A comparison of the returns for the last two years under the former

law as to marriages, and for the first two years under the new law, shows a satisfactory gain as follows :

Year 1877, Marriages.....	6,022
“ 1878, “ .....	5,375
Total.....	11,397
Year 1879, Marriages.....	7,096
“ 1880, “ .....	7,935
Total.....	15,031

Although some of the increase may be attributed to a better financial condition, the increase is mostly in record and due to the greater facility of the present law.

The returns of death, we believe, are very complete under the present methods. When the alteration was made for townships, by which the certificate of death, in case of death or burial outside of city limits, would serve as a permit, if returned within five days, it was feared that this might lead to carelessness on the part of undertakers in making their returns. A few cases have been reported to us in which the undertaker has not procured the certificate until after the burial. The law, with its present wording, gives no unnecessary trouble, and undertakers need to know that the intention to procure a certificate very soon is not enough. All sextons and keepers of cemeteries must see either the permit or certificate of death before the burial. For any neglect or delay the full responsibility rests with those in charge of the funeral.

Boards of Health should furnish us with the names of any undertakers who are careless in this regard, or should draw their attention to the remissness.

It is satisfactory to find in a study of the certificates of death, that care is taken in stating the causes of disease. It is unavoidable that in rare cases there is doubt, or that some practitioners betray a tendency to indefiniteness, which is a defect of education or experience, rather than of intent. But no one can handle 20,000 of these certificates without seeing that these sources of error are largely overcome by the general reliability and exactness of return. Where there has been reason to object

to vagueness of return in causes of death, they have been chiefly such as these.

Congestive chill and congestive fever are not good terms, unless under the secondary heading there is some reference to the supposed cause. General debility for a child, over one month of age, or for a person under the age of sixty, is also too vague. Fever alone is too indefinite.

Teething should have added thereto, the prominent symptom, as diarrhœa, convulsions, etc. Marasmus often needs a secondary noting. A return of septicaemia or pyaemia should state the organ involved, if there is a local abscess or other organic lesion.

#### NOMENCLATURE.

It is a question which must early have the attention of our medical men and of vital statisticians, whether some change is not desirable in the accepted nomenclature of disease. When the English classification was adopted, it was not without careful study and examination by committees which represented the best talent of the nation. While, therefore, no abrupt changes should be made, it is admitted that new diseases, or new types of old diseases, or new knowledge as to diagnosis, should introduce some changes. Our own country adopted this nomenclature because we had none of our own. There are diseases special to our own continent and others, greatly modified by locality, and such as need more careful noting.

An important conference of vital statisticians from many of the States was held in May last at Washington, under the auspices of the National Board of Health. Under its order correspondence is now being had on this subject. It is probable that some changes will be made, or that there will be some adaptation to our changed American conditions. As it is also very desirable to have that uniformity by which the States can be compared with each other, an effort is being made to unify the systems now used and thus make the whole available for the general government.

It is now evident that medical science is gaining aid from numerical methods of study; that sanitary science is largely guided by such data, and that both are giving prominence and success to medical art. It is now scarcely necessary to show to

the physician that benefits accrue to himself and to his profession as well as to society at large, from a close study and classification of disease.

*In reference to the returns of births*, it will ever be the case that there are some neglects. Those who are in the habit of carrying a few blank forms in the pocket, and who make the record at the time of attendance, find it little trouble, while those who leave cases to collect, and then have not the data at command, may easily make a burden of what would otherwise be too trivial to mention. Yet it is a pleasure to say that the evidences of co-operation and of increasing interest are manifested both in the increase of returns and in the active efforts of local practitioners. Where there is imperfection of returns we already have enough localities in which there is greater completeness to serve as a standard of comparison. For instance, Paterson shows a birth rate so much larger in proportion than Camden, and is so much more approximately correct, that with it and four or five other cities to guide, it is not difficult to arrive at what the birth rate of the latter should be. Especially as now a quinquennial census and local enrollments are likely to aid us in the correction. These cannot take the place of the record of an event at the time either as a legal or vital fact, but greatly aid in arriving at correctness of conclusion. Also the deaths under one year, added to the living in any one year, enable us still more closely to reckon the birth rate.

The importance of having the birth rate in order to know the significance of the death rate, is apparent from the fact that we must know the age of the material with which death is dealing. A mortality of 30 to 1,000 among adults is quite different in significance from what it is among children.

A very large infant mortality, especially in the summer, is one of the greatest indices of the prevalence of avoidable causes of disease. Mr. Edmunds, in his article in the *Lancet*, has also shown how mortality bears a certain relation to sickness at each age. In the English computation it is found that "for every annual death, two persons are suffering from sickness of a severity that disables laboring men from work." Mr. Neison for friendly societies, which exclude children, computed 2.5 constantly sick to one death under 60. Taking into consideration the number of sick that recover if every death stands for over 600 days of sick-

ness, it is easy to see how avoidable sickness is a heavy tax on all industrial and social interests.

STATISTICAL INQUIRIES OF THE GENERAL GOVERNMENT.

It is encouraging to all State and Local Boards of Health that the General Government is, in connection with the late Census, giving such attention to these vital returns. The regional and mortality maps of the last Census were published with an announcement of their incompleteness, but were of very great value as showing the outreach and feasibility of effort to study the zones and habitats of disease. Gen. Walker, under the direction of Congress, made elaborate arrangements to collect more accurate data for the tenth Census. He has so far recognized the value of the methods and returns of this State, that it is one of the two or three he has called upon to aid in furnishing standards of comparison by which to rate sectional defects. It only needs that the plans now adopted be followed out by us, with such additions as experience may suggest in order, in due time, to secure an amount of reliable statistical data that can be made available in many directions. It is probable that some changes will be agreed upon and therefore we can await these.

USES MADE OF STATISTICS.

The Registrar-General of England says, that such a system has enabled the government to acquire a general knowledge of the state of the population of the kingdom. Studying thus the causes that influence the health of the people, we are able to point out local defects and to guard against the evils which cause unnecessary sickness and untimely death.

Parkes, the leading sanitary author of England, shows that "the attention now paid to public health is in a large degree owing to the collection of the statistics of births and deaths, and the causes of death which have been collected in England for the last thirty-eight years. It may truly be said, indeed, that not only all Europe, but gradually the entire world has been influenced by the work."

Its direct practical bearing becomes at once apparent when, as Dr. Elisha Harris expresses it, we note of "the fact that the death rate of living people fluctuates from eleven to forty, fifty,

sixty and eighty per thousand each year in different places, the fluctuations being directly chargeable to the locality, the domestic, the personal and certain avoidable vital conditions of the population which present these variations in excess of a minimum rate of mortality."

It is also to be borne in mind that the discovery by Dr. Snow, of London, as to the relation of water-supply to cholera and those as to the dependency of typhoid fever on fecal contaminations were directly the result of the statistical method of inquiry. The consequence has been, as to the more general diseases, that, "in many cases, those districts which the statistical returns showed to be in the worst conditions have come to be the best," just because the exhibit of figures and facts aroused the local authorities to action.

In our own country, Massachusetts and Michigan, as well as some of our most populous cities, have much profited by these returns. Many of the zymotic diseases have had the line of their incidence traced, although so much remains to be discovered. "It is not too much to say that modern sanitary science owes its existence to the registration of deaths and the localization thereby of insanitary conditions"—Mass. Rep., 1877. Dr. Bowditch, in an analysis of 45,000 cases of consumption, has been able to show a very close connection between soil dampness and the prevalence of that malady. These are but illustrations of series of facts which are being tabulated and arranged by close observers as carefully as are the statistics which aid in the study. Political economy and industrial interests no longer need to be persuaded that such studies are within the range and the duty of statesmen. The Austrian Minister of Commerce has well stated it: "Statistics is no longer to be viewed as a mere theoretical science for the gratification of the learned, since, on the contrary, it subserves the practical ends of political society and lends its service to administration, as well in determining the lines of existing institutions and laws, as in weighing measures not yet carried out."

In the early collection of statistics for any State where there are no previous records as to vital facts which can be satisfactorily used, the first point is to collect as far as possible all facts which, in the judgment of statisticians, are likely to be useful in future inquiries. From many of these it would be futile to

attempt to make deductions until enough had been gathered through series of years and in different localities for legitimate comparisons. It is important on the one hand not to multiply items, and on the other not to omit such as are likely to be of service. There is much therefore to be transcribed which does not become immediately available. Yet that especially which relates to disease and death has easy and important lessons.

As comparisons need to be made with the tables of other cities, states and countries, some uniformity of method is to be sought. It was for this that at the late Statistical Conference a committee was appointed to review all forms and adjust them so as to make them comparable.

One of the effects of a central bureau should be to stimulate our larger cities to a close local study of their vital returns. It would require but little additional appropriation to that now required by State law, and would enable them to know the ward and street localities of disease, in such a way as to be of great practical service. The weekly rate of mortality is too often a mere item of news. But if the city board of health is studying it, and inquiring as to causes, experience fully shows that the result is the controlling of epidemics and the abatement of disease. Such large cities as Newark, Paterson, Trenton, Camden, etc., should certainly add to their health force, a method by which the weekly and ward returns can be studied, with the view of localizing the sources of disease, and so remedying existing evils.

#### METEOROLOGY.

The records of meteorology are imparted in the study of disease. For this, and other reasons, the State Board of Health endeavors to secure weather records at a few stations, which it is hoped may yet be studied in their bearings upon the health and diseases of the people. For the last two years our closest observers have seen much reason to connect prevalent epidemics with climatic conditions. The intensity of yellow fever seemed to have much to do with the notable atmospheric and telluric conditions of 1878-9. The great mildness of the last winter, followed by the almost summer heat of April and May, and the great drought which even interfered with corn-planting, seems to have had considerable relation to the prevalence of fevers,

especially of a periodic type. While we cannot vacate climate or control the seasons, such facts warn us that it is not safe to keep in store the materials for fermentive and putrefactive decay, either animal or vegetable. We should interrupt the results by seeing to that part which falls under our jurisdiction. Or if we have neglected so as to have the accumulations in such seasons, our only relief is to betake us to the mountains or the sea. Unfortunately, large portions of our population cannot do this, and are therefore interested in having healthy homes for all the year.

#### METHODS OF STUDYING STATISTICS.

While the English and Continental methods of dealing with statistics are valuable as guides, it is evident there needs some modification, when we come to deal with our changed populations. The tides of emigration and the migrations from State to State need to be taken into consideration.

Occupations, which in the technic methods of foreign trades give reliable data, are so often changed by our people that conclusions therefrom need to be studied in classes, rather than from general returns alone. The record of occupation at marriage is more reliable than to take the given occupation in the death certificate, since it is more likely to give the trade or chosen calling.

In the study of the effect of occupations on disease, we believe it will be found more practicable to follow out the history of named employes in specified industries for long periods, than to rely wholly on the death record.

In the study of nationality we have not only to do with the effects of heredity and race, but with the results always incident to emigration, both in the exposures of change and in the risks of acclimatization. Emigrants, for instance, fare badly who arrive in summer and fall and at once resort to crowded cities or to marshy districts. Even changes from one climate of our own country to another are not so desirable at such seasons.

In the study of the causes of pauperism, crime or dependency it would be valuable to know how many children are left in partial or complete orphanage under twelve. Some of these points have to be omitted lest the certificates become too prolix. Suggestions occasionally come to us as to additions to record, which

show an interest in the subject. The index is now in such a form as to be available to local health officers and statisticians who may need to study local questions.

#### STILL-BIRTH RETURNS.

The record of still-births, for obvious reasons, can never be entirely complete. But the value of the record, and the benefit to society, of the attempt to obtain the record, is already apparent. It is well known that many children perish not by evil intent, but by want of skilled attendance at the time of birth. Sometimes the mother, too, falls a victim, and living children are made orphans.

While we cannot advocate too stringent legislation, it is well when there is some restraint on carelessness, unskillfulness and neglect. We are already made aware by physicians that their aid is sooner sought in perilous cases, and that the general effect of the law is salutary. The highest interests of the people require that the sacredness of child-life should be felt, and that all criminal interference or all neglect at time of birth should be prevented, both by public sentiment and by proper enactment. As attempts at concealment rarely succeed, a record is but the authentication of orderly attendance. The neglect of it is the only ground of suspicion, except in the instances where the frequency of the misfortune in the hands of midwives gives rise to the fear that so-called experience, without educated skill is now and then a peril both to mother and child.

#### RELATIONS OF LOCAL BOARDS OF HEALTH TO VITAL STATISTICS.

Section five of the law of March 11, 1880, concerning the protection of the public health, directs local boards of health to take cognizance of any neglect to make vital returns on the part of those upon whom this duty devolves. When there is such neglect, the city clerk or assessor may at his discretion see the person or address the bureau of vital statistics, or make complaint to the local board of health. The local board may then insist upon the returns being made, or bring action for the neglect. While cases may occur in which either the local or the State authorities may need to appeal to the law, we do not believe there is any deliberate intent to neglect on the part of the negligent

Yet it is very important that full returns be secured. The local boards should therefore not fail, both by the weight of their influence, and by special committee, if need be, to secure this object. The importance of these returns in the study of local health conditions, and of the state of the population through series of years, has certainly not been over-estimated, and has been fully tested in many nations. These local boards should therefore insist upon the legal right which every one has to this record, as also upon the need of it for local health-information. A case has recently come to our notice in which the parents of a child had serious ground of complaint because the medical attendant had omitted the record. With our foreign population, especially, it may at any time cause such embarrassment as to cause both parents and attendant equally to regret the oversight.

The whole number of deaths reported from July 1, 1879, to July 1, 1880, is 18,967, against 20,440 for the previous year, being a record of deaths of 1,473 less than for the year ending July 1, 1874.

A general comparison shows that while there has been some diminution in the class generally known as zymotic, it has not been quite in proportion to the aggregate decrease. We shall briefly notice those diseases which appear in the special schedule.

#### REMITTENT FEVER.

This has a record of 293 against 268 cases of last year. The death record of this fever is generally accurate, with the exception that there is some doubt as to the placing of fevers returned as typho-malarial. These are usually placed with typhoid fevers, since it is the predominance of this element that usually leads to this nomenclature. It is well, however, in comparison, to pay some attention to the comparative record of typhoid fever. The greater prevalence of malarial disease commenced in the summer of 1878 and was intensified in 1879 and still worse in the summer and fall of 1880. In 1860 and 1861 the State Medical Society made a careful inquiry into the division of miasmatic diseases, now generally called malarial. They were found, at that time, not to be generally prevalent in the State. The years 1855 to 1858 had shown a large prevalence of this class of fevers. Since then no record of the disease has been so extended as for the past two years.

One cannot study the mortality record, and especially by the light of the reports of local boards of health, without perceiving that this period has been characterized to an unusual degree by these periodic fevers. The increased number of remittent and typho-malarial fevers proving fatal, stands for a large number of cases in such a class of disease. Other evidence also shows itself in certificates or reports, even where the record of death does not reveal the great disturbing element; while in such periods the influence of malaria is more extended, yet its points of concentrated powers are not less readily distinguishable. The borders of sluggish, impeded streams, where there is much waste material accumulated, stagnant or artificial lakes and ponds and marshy districts are the breeding places and the haunts of this prolific poison. The finding of a mosquito, or a swarm of them, on the mountain top does not deceive us as to its habitat. As little doubt is there as to the homes and resorts of what has so long been called paludal or marsh fever. Until we shall have secured some general law for drainage, and guard against the collection of great deposits of vegetable matter where moisture, heat and varying exposure ferment and putrefy it, we may expect a malarial influence which will make its mark on the general health of our population and upon family thrift, more than is merely tabulated in one of the varied forms of the disease. Many a constitution is so impaired as to find record afterward in untimely death by other diseases.

#### TYPHOID FEVER.

This numbers 373 cases, or an excess of 49 cases over the previous year. It is more identified with houses in close vicinage, and results largely from sewers, impure water and human excreta. Just as this report is being printed, a series of cases are occurring in an alms-house in Camden county, where typhus, as a well declared disease, is to be found. A fuller account will appear in the next report. It cannot be concealed, that malarial fevers are more frequent in some cities than formerly, and that we need closely to study the relations of the remittent and typhoid poisons with a view to their diminution, as also to determine the results of their united action on the same individual, or their possible combinations of influence upon the

atmosphere. We shall, ere long, be able to compare cities among themselves and rural and city districts, to see if a more accurate law as to prevalence can be substantiated.

## SMALL-POX.

Last year we had not occasion to record a single death, although a very few cases occurred. This year we have also record of sporadic cases in localities where no death has occurred. There were several cases and some deaths in Salem city.

The chief epidemic has been in Camden city. As but few of the deaths occurred before July, the chief record will be in the next report. The authorities were tardy in dealing with the first cases of the disease and in securing general vaccination. When preventive measures were entered upon with vigor the cases and the mortality were diminished. Many of our cities still choose to repeat the experiment of waiting for an epidemic in order to secure general vaccination. The consequence is, that just as fast as a new crop of children can be found between five and ten years of age, the small-pox is sure to find material enough upon which to flourish. Some false conclusions are thus drawn as to the tendency of epidemics to occur at stated intervals of about seven years. We need much a public opinion which will consider neglect of vaccination a wrong, and which will at least compel it in the case of all identified with public schools. Because education is free that ought not to give the right to parents to make small-pox a free gift also. They are under obligations not thus to expose the children of others, while availing themselves of an educational gift, intended to be for all. The use of bovine virus removes the fear or prejudice as to human vaccine, but there is need that its source be assured, lest dishonest dealers substitute the human for the bovine lymph. We are at present making some inquiries into the reliability of supply and the care taken by those who advertise to furnish it fresh and pure each week.

## SCARLET FEVER

has not been so prevalent as the former year, registering 573 instead of 627 deaths. Some of these latter must be associated with the epidemic of the former year. While no antidote exists

to the poison, isolation, avoidance of close rooms, proper airing and disinfection do much to limit the disease. Where a case occurs in a family, many now adopt a prophylactic treatment for other members of the household.

Cleansing gargles and washes have their sphere of use upon individuals, as well as upon surroundings of the patient, and internal remedies seem often to avail. No disease needs more careful and skillful care on part of the attendants, and there is no good reason why so many cases should occur.

#### MEASLES.

This ranks next to small-pox as the most contagious of the exanthems or skin zymotics. Although it is sometimes attended with a large rate of mortality, only 87 deaths from it are recorded this year, as against 77 of last year. It now seems strange to us that scarlet fever could ever have been classified with it. It is not strange that r othlen, or the so-called German measles, is sometimes taken for it, and so two attacks credited oftener than should be. It is a disease whose study is most important both in itself and in its bearing on acute and chronic lung affections.

#### WHOOPING COUGH,

has a mortality of 277, or 140 more than the previous year. In England it has, within the last three years, registered a much larger death rate than usual. It is one of those diseases which is probably often conveyed by the spittle or mouth secretions, which should not be concealed in handkerchief but find their place in some vessel having a disinfectant solution in it. It is largely under the control of medicine, and often neglected by parents with the idea that it is not dangerous. Even in recovery the lungs are often impaired by the dilatation which the air tubes or cells have suffered.

#### CROUP AND DIPHTHERIA,

the last year numbered 873 instead of 1,100 deaths; but the total is distressingly high. The observations of Wood and others seem to show that it is peculiarly a septic disease and depends much for its mortality, as well as, perhaps, for its inception,

upon abnormal and specific decomposition. Heat, moisture and filth fructify many kinds of disease and have very marked influence on the disease.

It is probable we shall yet find that sewer gas is not the chief factor, as it is a disease of the country as well as of cities, and that spores or animalculæ which flourish out of sunlight and in damp houses and amid peculiar atmospheric conditions, have much to do with the frequency and violence of the malady.

We think it is becoming more and more evident that croup and diphtheria do not differ in their pathological results, although difference arises from the seat and degree of exudation, and as to the local and constitutional character of certain epidemics.

#### DIARRHOEAL DISEASE,

showed an increase of three hundred and seventeen over the previous year. Both summers have been remarkable for high temperature and for certain conditions of humidity. There are so many factors that enter into the causation of diarrhoeal disease as to render it necessary to study cities and country, and different cities, in comparison, with the inferences for a State aggregate.

#### CONSUMPTION.

The record of last year was 1,849 deaths; of this year, 2,166. It is high time that this disease took a more conspicuous place in the study of preventible diseases. The number of its victims is far greater than the usual feared diseases of children, while it generally removes those further advanced to adult life. The cure of the disease solely by medical treatment has not made great progress of late. But it is quite different as to our knowledge of causes and our powers of limiting the tendencies thereto. Damp soils and sudden changes of temperature are known as exciting causes. Acute and chronic pneumonia not infrequently start the tubercular deposit or prepare the system for its activity.

The law of heredity is better understood, so that by proper dealing with the child the tendency is overcome.

Air fouled either by gases or organic particles, or laden with fine dust of any kind, when breathed into the lungs is more or less an irritant. Where there is in it nothing to induce specific disease, both by lowering the tone of the system and by its local

irritation amid the delicate structures of the lungs, it gives rise to conditions favorable either to tubercular deposit or to the development of disease, of which the initial plasm is already deposited. Hence, there is no disease more worthy of the close study of the sanitarian, and of every one who would remove more fully from the risks of life one of its greatest perils, both from their own relation and from their own excessive mortality.

#### ACUTE LUNG DISEASE

also needs the sure, close study and observation. The record is 1,988, or 172 less than the former year. Adding these to the deaths by consumption, we have for lung disease an aggregate of 4,154, making over one-fourth of all of the diseases of special classes and over one-fifth of all the fatal diseases of the State. Surely in a State of such large industrial and factory development, political and social economy require us to look well to this deterioration of stock and vigor, as well as to the actual number of deaths. The deaths from the

#### BRAIN AND NERVOUS DISEASES

of children numbered 1,638, or 9 more than the previous year. This includes the large number of which convulsions form a frequent symptom. Adding to these 1,347 of adult brain diseases, an increase of 33 over the former year, and forming an aggregate of 2,985, it is well worthy of study how far the immense tax of this active age is increasing the liability to shock upon that high nervous organization with which mankind is endowed.

#### THE HEART AND CIRCULATION,

numbering 982, or an increase of 10 over the previous year, is also worthy of study in the same direction.

It is well known to physicians that rheumatism is often the excitant of heart disease, by the changes produced in the valves of the heart during its attack. Of this 66 deaths were recorded this year and 76 the previous year. From the fact that few die from acute rheumatism directly, the mortality it causes through heart disease is overlooked. It is now believed that the early and free use of salicylic acid in the beginning of the acute stage,

will often prevent those structural charges on the heart, which in later life produce death. If so we should ere long find a diminution of heart disease from this cause.

## URINARY DISEASE.

These are marked by us in the office schedules so as to distinguish between those of the kidney and the bladder. Most of those tabulated come under disease of the kidney, and is generally returned as Nephritis or Bright's Disease. The studies of this disease have not merely reference to this one organ, for the lesion is often only secondary to disease of the brain, or nervous system, to failure in the digestive efforts, and to the use of intense irritants, of which alcohol and the various highly seasoned sauces are the representatives.

## CANCER.

The gradual increase of cancer, as a constitutional and distinctive disease, has been noted in the English returns and seems repeated in our own experience. Four hundred and twenty-five cases of the disease may seem small when compared with some of the other diseases; but it is believed to be more uniformly transmitted to offspring than almost any other malady and has an intricacy of history, as to causation and extension, that render it a subject for close study. We are watching, with interest, some returns that seem to indicate its more frequent occurrence in some sections than others, but it is too soon to even speak of probabilities.

## PUERPERAL FEVER

claimed about sixty more victims this year than the last. The loss of a mother too often means a bereft household of little ones, whose orphanage is an affliction not only to the father but to society. The undoubted evidence we have of the communicability or portability of this disease, and its relations to erysipelas, call for its closest study in the interests of State hygiene.

We desire to direct the attention of all those interested in Vital Statistics, to the importance of comparisons of cities and the country as to these various diseases, and also to comparison of various other districts with each other as preparatory to that

more extended study which will be desirable, when the number of data will exclude those sources of error which are not eliminated in small comparisons. Many of our physicians, as well as other citizens, are already seeing how important are the records thus secured. While there will be some crude deductions and inferences even on the part of those who lay claim to something of expert skill, yet it is enough that where the study has been most profound and the criticism the most searching, there the results have been most satisfactory. The social statist, no less than the physician looks to such records, as the mariner looks to his chart. With all the possibilities of error he knows that experience verifies the credibility of this great numerical map of population, and with graphic outlines works out the destinies of families, of races, and of nations. The true student is led less and less to doubt the claim which it has to a place among determinable sciences and positive arts, while he may well question his own ability to grapple with the solution of the great life problems which are involved. The best encouragement of present progress in all directions is that material is being collected which will be of indispensable importance to great social, industrial and life studies, of which more than a preface is already at hand.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS BY TOWNSHIPS.

*Atlantic County.*

	M.	B.	D.
Absecon.....	8	18	7
Atlantic City.....	33	120	93
Buena Vista.....	4	13	9
Egg Harbor City.....	20	44	28
Egg Harbor Township.....	15	52	72
Galloway.....	12	50	37
Hamilton.....	7	35	28
Hammonton.....	14	41	17
Mullica.....	2	12	12
Weymouth.....	0	16	11
	115	401	314

*Bergen County.*

	M.	B.	D.
Engleswood.....	15	53	73
Franklin.....	12	28	20
Harrington.....	9	59	14
Hobokus.....	24	56	27
Lodi.....	20	101	63
Midland.....	5	34	25
New Barbadoes.....	46	137	79
Palisade.....	8	42	32
Ridgefield.....	15	53	41
Ridgewood.....	14	41	24
Saddle River.....	2	14	21
Union.....	8	68	50
Washington.....	15	62	41
	193	748	510

*Burlington County.*

	M.	B.	D.
Bass River.....	10	23	15
Beverly.....	26	82	54
Bordentownd.....	47	124	90
Burlington.....	57	135	113
Chester.....	27	72	38
Chesterfield.....	3	27	24
Cinnaminson.....	13	66	41
Delran.....	5	12	12
Evesham.....	7	36	17
Eastampton.....	3	2	0
Florence.....	9	43	33
Little Egg Harbor.....	18	44	16
Lumberton.....	7	27	20
Mansfield.....	10	35	30
Medford.....	13	55	29
Mt. Laurel.....	1	23	17
New Hanover.....	14	45	23
Northampton.....	50	96	78
Pemberton.....	22	74	62
Randolph.....	1	13	5
Shamong.....	2	11	11
Southampton.....	21	38	24
Springfield.....	6	33	13
Washington.....	1	15	7
Westampton.....	1	27	14
Willingboro.....	2	13	10
Woodland.....	2	3	3
	378	1174	799

*Camden County.*

	M.	B.	D.
Camden City.....	424	716	803
Centre.....	12	63	41
Delaware.....	3	21	13
Gloucester.....	20	61	72
Gloucester City.....	41	140	84
Haddon.....	22	55	47
Stockton.....	29	52	62
Waterford.....	21	40	25
Winslow.....	6	56	37
	578	1204	1184

*Cape May County.*

	M.	B.	D.
Cape May City.....	22	57	24
Dennis.....	7	18	11
Lower.....	13	64	27
Middle.....	14	63	37
Upper.....	17	30	27
	73	232	126

*Cumberland County.*

	M.	B.	D.
Bridgeton.....	129	205	155
Commercial.....	9	13	31
Deerfield.....	10	31	16
Downe.....	11	23	18
Fairfield.....	25	77	34
Greenwich.....	7	17	19
Hopewell.....	13	31	23
Landis.....	55	112	93
Maurice River.....	10	49	36
Millville.....	90	201	174
Stoe Creek.....	0	24	12
	359	783	611

*Essex County.*

	M.	B.	D.
Bellville.....	16	54	45
Bloomfield.....	28	117	81
Caldwell.....	15	42	36
Clinton.....	22	46	38
East Orange.....	34	164	101
Franklin.....	11	32	21
Livingston.....	2	19	13
Millburn.....	13	30	20
Montclair.....	40	120	81
Newark.....	1141	3518	2553
Orange.....	108	429	216
South Orange.....	20	86	49
West Orange.....	12	42	41
	1462	4699	3295

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*Gloucester County.*

	M.	B.	D.
Clayton.....	23	57	34
Deptford.....	4	40	22
Franklin.....	13	60	34
Glassboro.....	15	70	30
Greenwich.....	16	70	52
Harrison.....	14	75	27
Logan.....	6	20	19
Mantua.....	7	40	23
Monroe.....	5	35	35
Washington.....	14	44	18
West Deptford.....	4	30	26
Woodbury.....	28	52	27
Woolwich.....	16	45	28
	165	638	375

*Hudson County.*

	M.	B.	D.
Bayonne.....	32	190	141
Guttenberg.....	10	11	27
Harrison.....	6	132	129
Hoboken.....	193	784	734
Jersey City.....	705	1523	2533
Kearney.....	3	35	24
North Bergen.....	9	34	164
Town of Union.....	45	142	121
Union.....	3	15	29
Weehawken.....	3	15	35
West Hoboken.....	14	143	88
	1023	3024	4025

*Hunterdon County.*

	M.	B.	D.
Alexaudria.....	8	30	17
Bethlehem.....	10	37	45
Clinton.....	7	38	11
Delaware.....	24	58	31
East Amwell.....	12	35	24
Franklin.....	12	28	17
Frenchtown.....	13	19	10
High Bridge.....	14	50	21
Holland.....	8	45	28
Kingwood.....	1	44	15
Lambertville.....	42	79	78
Lebanon.....	33	52	36
Raritan.....	30	64	43
Readington.....	21	72	40
Tewksbury.....	23	40	19
Town of Clinton.....	9	11	12
Union.....	7	17	10
West Amwell.....	2	20	18
	276	739	475

*Mercer County.*

	M.	B.	D.
Chambersburg.....	39	98	109
East Windsor.....	17	43	35
Ewing.....	6	23	30
Hamilton.....	20	61	54
Hopewell.....	33	88	41
Lawrence.....	14	59	47
Princeton.....	24	105	81
Trenton.....	326	563	618
Washington.....	6	15	18
West Windsor.....	6	16	15
	491	1071	1048

*Middlesex County.*

	M.	B.	D.
Cranberry.....	20	33	28
East Brunswick.....	17	92	48
Madison.....	4	17	22
Monroe.....	27	50	44
New Brunswick.....	116	453	269
North Brunswick.....	11	27	20
Perth Amboy.....	22	204	83
Piscataway.....	26	70	46
Raritan.....	19	50	46
Sayreville.....	1	17	26
South Amboy.....	15	61	52
South Brunswick.....	13	56	49
Woodbridge.....	10	80	44
	301	1210	777

*Monmouth County.*

	M.	B.	D.
Atlantic.....	9	24	6
Eatontown.....	28	52	41
Freehold.....	54	77	67
Holmdel.....	7	21	13
Howell.....	29	74	44
Manalapan.....	12	38	34
Marlboro.....	10	38	27
Matawan.....	18	62	48
Middletown.....	24	93	62
Millstone.....	24	43	34
Neptune.....	38	88	63
Ocean.....	46	156	83
Raritan.....	42	87	61
Shrewsbury.....	52	139	73
Upper Freehold.....	19	56	49
Wall.....	48	121	47
	460	1169	752

*Morris County.*

	M.	B.	D.
Boonton .....	28	38	43
Chatham.....	14	69	74
Chester.....	15	64	23
Hanover.....	14	54	41
Jefferson.....	6	41	27
Mendham.....	11	28	21
Montville.....	6	23	10
Morris.....	39	130	128
Mount Olive.....	22	55	26
Passaic.....	5	32	16
Pequannock.....	18	47	27
Randolph.....	61	140	108
Rockaway.....	47	168	90
Roxbury.....	13	47	33
Washington.....	11	76	18
	310	1012	685

*Ocean County.*

	M.	B.	D.
Berkeley.....	3	15	12
Brick.....	21	56	42
Dover.....	17	49	24
Eagleswood.....	5	15	7
Jackson.....	14	36	19
Lacey.....	12	19	7
Manchester.....	7	29	11
Ocean.....	2	8	3
Plumsted.....	9	49	16
Stafford.....	9	25	8
Union.....	4	18	13
	103	319	162

*Passaic County.*

	M.	B.	D.
Acquackanonk.....	4	35	28
Little Falls.....	9	17	31
Manchester.....	2	13	13
Passaic.....	49	216	142
Paterson.....	431	1322	1174
Pompton.....	34	40	21
Wayne.....	6	23	22
West Milford.....	31	75	37
	566	1741	1468

*Salem County.*

	M.	B.	D.
Elsinboro.....	0	12	11
Lower Alloways Creek.....	15	11	17
Lower Penn's Neck.....	20	25	29
Mannington.....	2	58	49
Pilesgrove.....	26	62	48
Pittsgrove.....	11	67	16
Quinton.....	2	46	20
Salem.....	33	83	76
Upper Alloways Creek.....	15	44	23
Upper Penns' Neck.....	24	97	52
Upper Pittsgrove.....	8	20	21
	156	525	362

*Somerset County.*

	M.	B.	D.
Bodminster .....	18	44	22
Bernards.....	14	59	35
Branehburg.....	5	27	19
Bridgewater.....	66	170	104
Franklin.....	17	60	55
Hillsborough.....	11	63	44
Montgomery.....	16	51	18
North Plainfield .....	7	71	36
Warren.....	8	19	10
	162	564	343

*Sussex County.*

	M.	B.	D.
Andover .....	7	21	8
Byram.....	20	30	17
Frankford .....	15	26	25
Greene .....	1	8	8
Hardyston.....	14	21	39
Hampton.....	2	15	9
Lafayette .....	19	8	8
Montague.....	5	21	16
Newton.....	25	53	30
Sandyston.....	9	24	16
Sparta.....	13	27	28
Stillwater.....	17	21	19
Vernon.....	9	4	14
Walpack.....	5	17	5
Wantage .....	16	25	42
	177	321	284

*Union County.*

	M.	B.	D.
Clark.....	2		2
Cranford.....	3	10	11
Elizabeth.....	158	679	440
Fanwood.....	6	20	16
Linden.....	5	45	28
New Providence.....	6	9	11
Plainfield.....	57	166	98
Rahway.....	59	132	116
Springfield.....	6	19	23
Summit.....	8	40	27
Union.....	4	48	28
Westfield.....	14	48	40
	328	1216	840

*Warren County.*

	M.	B.	D.
Allamuchy.....	1	4	6
Belvidere.....	26	41	31
Blairstown.....	6	42	12
Franklin.....	21	35	20
Frelinghuysen.....	11	20	14
Greenwich.....	18	66	52
Hackettstown.....	15	46	29
Hardwick.....	2	12	7
Harmony.....	4	31	12
Hope.....	9	31	20
Independence.....	12	20	12
Knowlton.....	7	41	19
Lapatcong.....	4	43	22
Mansfield.....	9	35	29
Oxford.....	28	130	78
Pahaquarry.....	0	10	4
Phillipsburg.....	58	208	126
Town of Washington.....	24	55	28
Washington.....	5	20	11
	260	890	532

*Totals of Marriages, Births and Deaths for all the Counties.*

	M.	B.	D.
Atlantic .....	115	401	314
Bergen.....	198	748	510
Burlington.....	378	1174	799
Camden.....	578	1204	1184
Cape May.....	73	232	126
Cumberland.....	359	783	611
Essex.....	1462	4699	3295
Gloucester.....	165	638	375
Hudson.....	1023	3024	4025
Hunterdon.....	276	739	475
Mercer.....	491	1071	1048
Middlesex.....	301	1210	777
Monmouth.....	460	1169	752
Morris.....	310	1012	685
Ocean.....	103	319	162
Passaic.....	566	1741	1468
Salem.....	156	525	362
Somerset.....	162	564	343
Sussex.....	177	321	284
Union.....	328	1216	840
Warren.....	260	890	532
<b>Total for the State.</b>	<b>7936</b>	<b>23680</b>	<b>18967</b>

*Summary of Totals for whole State for the past three years.*

	M.	B.	D.
1878*.....	5375	19427	14085
1879.....	7096	23116	20440
1880.....	7936	23680	18967

\*Under former law.





*Death Rate per 1000 of Counties, Based on Census of 1880, for period from June 30th, 1878 to June 30th, 1879.*

(As the present census affords the most correct estimate of population for the previous year, we give a re-calculation of the death rate for the year ending July 1st, 1879, on this basis, in order to aid in future comparisons.)

COUNTIES.	Deaths.	Population.	Death rate, per 1000.
Atlantic.....	302	18,706	16.14
Bergen.....	636	36,790	17.28
Burlington.....	989	55,403	17.85
Camden.....	1,059	62,941	16.82
Cape May.....	120	9,765	12.28
Cumberland.....	628	37,694	16.66
Essex.....	3,947	189,819	20.79
Gloucester.....	431	25,886	16.64
Hudson.....	3,957	187,950	21.05
Hunterdon.....	527	38,568	13.66
Mercer.....	1,109	58,058	19.10
Middlesex.....	837	52,286	16.00
Monmouth.....	926	55,535	16.67
Morris.....	829	50,867	16.29
Ocean.....	217	14,455	15.01
Passaic.....	1,287	68,716	18.72
Salem.....	392	24,580	15.94
Somerset.....	429	27,161	15.79
Sussex.....	330	23,553	14.01
Union.....	966	55,571	17.38
Warren.....	522	36,588	14.26
Death rate per 1000 of whole State.....			18.07
Death rate per 1000 of specified diseases.....			13.96

*Death Rate per 1000 of Cities, Based on Census of 1880, for period from July 1st, 1878 to July 1st 1879.*

CITIES.	Deaths.	Population.	Death rate, per 1000.
<b>Burlington county.</b>			
Bordentown.....	80	5,334	16.12
Burlington.....	134	7,237	21.27
<b>Camden county.</b>			
Camden.....	673	41,658	16.15
Gloucester City.....	72	5,347	13.46
<b>Cumberland county.</b>			
Bridgeton.....	133	8,729	15.23
Millville.....	137	7,660	17.88
<b>Essex county.</b>			
East Orange.....	126	8,349	15.09
Newark.....	3,116	136,400	22.84
Orange.....	215	13,206	16.28
<b>Hudson county.</b>			
Bayonne.....	156	9,372	16.64
Hoboken.....	669	30,990	21.58
Jersey City.....	2,517	120,728	20.84
West Hoboken.....	95	5,441	17.46
<b>Mercer county.</b>			
Trenton.....	653	29,910	21.83
<b>Middlesex county.</b>			
New Brunswick.....	325	17,167	18.93
<b>Morris county.</b>			
Morristown.....	114	6,838	16.67
<b>Passaic county.</b>			
Paterson.....	994	50,877	19.53
<b>Union county.</b>			
Elizabeth.....	472	28,229	16.72
Plainfield.....	130	8,126	15.99
Rahway.....	169	6,454	26.18
<b>Warren county.</b>			
Phillipsburg.....	102	7,180	14.20



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, 1880.

County of BERGEN. Population.....36,790 Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrheal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	
Englewood.....	16	16	7	21	12	1	73	4,076		2	1		2		1		12	9	12	7	5	1	2	3		4	1		3
Franklin.....	3	3	4	5	4	1	20	2,306									1	3	3								1		
Harrington.....	2			1	5	4	14	2,550									1	7	2										
Hohokus.....	7	12	12	26	7	1	27	2,920									1	6	2								1		
Lodi.....	18	23	26	18	13		63	4,071		2	2						9	6	2								4		
Midland.....	4	12	2	13	4		25	1,591		1							2	6	1	1									
New Barbadoes.....	20	11	10	24	14		79	4,250									16	11	8	3	5						1		
Palisade.....	4	2	5	12	9		32	2,303		3				1			5	3	1	3	1					3			2
Ridgefield.....	2	5	3	16	9		41	3,953		2							7	8	5	3	1					1			
Ridgewood.....	12	4	6	7	5		24	1,478		2	1			1	1		6	3	3	1	1	1				1			
Saddle River.....	3	2	2	4	3		21	1,355									2	4	2	2	2						1		
Union.....	17	3	3	14	13		50	3,184		6	2						7	2	2	1	2						1		
Washington.....	6	2		23	9	1	41	2,853		3	1						12	5	2	1						1			1
Death rate per 1000 of county.....	110	67	50	172	107	4	510		13.86								94	58	38	25	18	40	5	31	14				6



*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, 1880.*

County of CAMDEN. Population.....62,941. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Venereal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Camden .....	226	131	85	246	106	9	803	41.658	10.27	6	25	10	9	1	7	37	120	115	71	66	37	17	51	25	24	1	6	
Centre .....	14	5	5	8	8	1	41	1,538		1	4																	
Delaware .....	12	2	1	5	3		13	1,481																				
Gloucester Township.....	12	1	5	24	30		72	2,527			4																	
Gloucester City.....	28	14	6	22	14		84	5,347	15.70																			
Haddon .....	12	4	4	13	14		47	2,551																				
Merchantville Borough.....								13,093																				
Stockton .....	24	7	4	16	11		62	439		3	1																	
Waterford .....	8	2		6	7		25	2,077																				
Winslow .....	12	2		7	13		37	2,330																				
Death rate per 1000 of county.....									18.81																			
Death rate per 1000 of county, exclusive of cities over 5000.....									18.63																			
	338	168	115	347	206	10	1,184			11	35	10	13	1	9	45	185	168	108	87	61	24	80	2	53	30	1	11

†To be included in Stockton township.

*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, 1880.*

County of CAPE MAY. Population.....9,765. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung disease.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.
Cape May City .....	6	5	5	5	3	.....	24	1,699	1	1	4	.....	1	3	.....	1	1	3	.....	1	2	1	.....	.....	.....	.....	.....
Dennis.....	4	1	.....	3	3	.....	11	1,812	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lower.....	13	6	3	3	.....	.....	25	1,977	.....	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middle.....	8	5	.....	.....	13	.....	.....	1,575	.....	.....	1	.....	.....	6	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Upper.....	6	.....	.....	9	.....	.....	.....	1,702	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cape May Point.....	.....	.....	.....	.....	.....	.....	.....	1198	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1000 for county.....	.....	.....	.....	.....	.....	.....	.....	.....	12.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	37	19	17	22	29	2	126	.....	.....	1	4	8	3	7	21	12	5	13	1	3	11	1	10	7	1	.....	.....

†Included in population of Lower township.

*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, 1880.*

County of CUMBERLAND. Population.....37,694. Statistical Divisions.	DEATHS AT ALL AGES.							Population, census of 1880.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.		Death rate per 1000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bridgeton.....	48	15	11	43	38	.....	155	8,729	17.75	.....	2	.....	4	.....	3	9	21	28	14	9	6	4	10	12	6	3	1	4
Commercial.....	11	1	6	6	7	.....	31	2,265	.....	.....	.....	.....	.....	.....	4	1	6	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deerfield.....	5	1	.....	.....	1	.....	16	1,643	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Downs.....	5	.....	.....	6	.....	.....	18	1,687	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fairfield.....	7	3	1	10	12	1	34	3,215	.....	1	4	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenwich.....	1	4	1	6	.....	.....	19	1,245	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hopewell.....	4	.....	.....	6	13	.....	23	1,764	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Landis.....	18	8	5	29	32	.....	93	5,005	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maurice River.....	8	2	.....	11	13	.....	36	2,374	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Milville.....	39	55	15	38	24	3	174	7,660	22.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stoe Creek.....	2	1	1	3	5	.....	12	1,107	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1000 of county.....									16.20																			
Death rate per 1000 of county, exclusive of cities of over 5000.....									13.23																			
	148	90	43	160	165	5	611			2	13		18		5	36	65	108	71	37	28	9	45	2	38	17	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, 1880.*

County of HUNTERDON. Population.....38,568 Statistical Divisions.	DEATHS AT ALL AGES.						Population, census, of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Alexandria.....	2		1	4	9		17	1,324		2		1				1	1	2		2		4		1				
Bethlehem.....	4	6	8	15	12		45	2,830		2		1				7	2	1		2		5		1				
Clinton Township.....	2	1		2	5		11	2,133								1	1	1		2				1				
Clinton Borough.....	2			4	5		12	842								4	1	1		1				1				
Delaware.....	3	3	2	10	12		31	3,092	1	2					12	12	12	1	1	1	4		3	1	1	1	1	
East Amwell.....	1	1	2	3	10	1	24	1,696							3	2	1	1	2	2		4		1	1	1	1	
Franklin.....	3	1	2	5	6		17	1,338							2	3	2	1	1	1		4		1				
Frenchtown.....	1	1		3	5		10	1,039								3	3	1		1		4		1				
High Bridge.....	4	2		10	5		21	2,209								4	2	1	3	1		1		1				
Holland.....	2	9	5	5	6		28	1,886								1	4	1	4	4		2		1				
Kingwood.....	2	2		3	8		15	1,694		2					2	1	4	1	2	1		1		1				
Lambertville.....	13	12	18	17	18		78	4,183							10	6	11	5	3	4		3		2				
Lebanon.....	8	3	2	13	8	2	36	2,699	1	3					9	5	5	1	1	1		3		2				
Raritan.....	6	1	4	17	15		43	4,186		1						8	4	6	3	6		1		1				
Readington.....	5	3	1	13	18		40	3,103							1	3	4	1	4	3		5		2	1			
Tewksbury.....	5	1	3	3	7		19	2,108								5	4	1	1	3		1		1				
Union.....	1			4	5		10	1,167		1	1					4	1	1	1	1		1		1				
West Amwell.....	3	5	3	3	4		18	1,039							4	1	1	6		2			1					
Death rate per 1000 for county.....	75	52	51	134	158	5	475		12.31						67	43	11	43	8	54		2	28	13	3	3		





*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, 1880.*

County of MONMOUTH. Population.....55,535 Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	
Atlantic.....	3			1	2		6	1,743		1																			
Eatontown.....	10	3	3	10	15		41	2,637																					
Freehold.....	7	9	5	17	22	7	67	4,302			1			1	5	11	3	3	3	3	3	3	3	3	3	3	3	3	3
Holmdell.....	2	1	2	3	5		13	1,575																					
Howell.....	14	4	2	14	9	1	44	3,374		1				1	2	6	6	3	1	1	2	2	2	2	2	2	2	2	2
Manahapan.....	7	4	1	9	13		34	2,117		1																			
Marlboro.....	11		1	6	9		27	2,193																					
Matawan.....	13	5	2	10	14	1	48	2,699		1	1																		
Middletown.....	17	1	10	13	21		62	5,059																					
Millstone.....	10	3	2	8	11		34	2,059																					
Neptune.....	18	19	4	15	5	2	63	4,187			2																		
Ocean.....	24	6	7	28	17	1	83	6,027		1				1	1	8	3	3	4	4	4	4	4	4	4	4	4	4	4
Raritan.....	19	9	3	16	13	1	61	3,891		2	1																		
Shrewsbury.....	20	10	5	14	24		73	6,526						1	1	9	8	5	6	5	5	5	5	5	5	5	5	5	5
Upper Freehold.....	3	3	4	20	17	2	49	3,236		1	1																		
Wall.....	17	7	5	9	9		47	3,829																					
Death rate per 1000 of county.....	195	87	56	193	206	15	752		18.34	1	8	6	5	22	102	128	44	57	42	24	58	2	56	15	2	15			

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, 1880.

County of MORRIS. Population.....50,867. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	
Boonton.....	5	6	4	13	14	1	43	2,685	1																				
Chatham.....	19	8	5	19	23		74	4,277	1	3																			
Chester.....	3	1	1	13	4		23	2,337	1	1																			
Hanover.....	10	1	5	21	3		41	4,138					1																
Jefferson.....	4	1	6	9	5	2	27	1,792																					
Mendham.....	1	3		5	12		21	1,526																					
Montville.....	3			3	4		10	1,570																					
Morristown.....	22	11	6	32	36	1	128	6,838	18.71																				
Mount Olive.....	6	3		11	5	1	26	1,982		1																			
Passaic.....	5	1	1	2	7		16	1,795																					
Pequannock.....	5	6	3	6	6	1	27	2,339			1																		
Randolph.....	22	22	8	34	16		108	7,701			2																		
Rockaway.....	22	16	9	23	19	1	90	7,366			3	3																	
Roxbury.....	6	5	6	11	5		33	2,139			1																		
Washington.....	4		2	4	8		18	2,681																					
Death rate per 1000 of county.....									13.26																				
Death rate per 1000 of county exclusive of cities over 5000.....									12.65																				
	143	86	52	210	185	9	685			20	10		10	10	7	18	60	87	91										

† Eight at asylum of adult brain disease.

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, 1880.

County of O C E A N. Population.....14,453. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.			Total.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarthral diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Berkley.....	4	1		3	4		12	683								1	1	1										
Birck.....	6	5	4	14	13		42	2,990						2		1	1	5	1	1	1							
Dover.....	1	3	5	8	7		24	439	1	1				1				1										
Egglewood.....	1			3	3		7	592																				
Jackson.....	7	1	1	5	5		19	1,803																				
Lacey.....	2			1	3	1	7	814						1														
Manchester.....	4	1	1	2	3		11	1,057																				
Ocean.....	1			2	3		3	484			1					1												
Plumsted.....	1	2	1	8	4		16	1,561					1			4		1	1	1								
Stafford.....	2	1		1	4		8	1,008						2		1	1	1	1									
Union.....	4	2	2	3	2		13	1,024							1	3	2	1	1					1				
Death rate per 1000 of county.....	33	16	14	50	48	1	162	11.20		1	4	1		4	6	12	28	11	6	6	1	17	2	18	5	2	2	

County of  
P A S S A I C.  
Population.....68,716.  
Statistical Divisions.

Statistical Divisions	DEATHS AT ALL AGES.						PRINCIPAL CAUSES OF DEATH.																						
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	
Acquacknock.....	1	1	3	7	6	8	28	1,781	15.72	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Little Falls.....	6	1	1	4	5	8	31	1,404	22.08	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manchester.....	2	1	4	14	14	1	46	1,513	30.40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Passaic City.....	43	26	13	44	14	1	142	6,532	21.73	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Paterson.....	305	247	152	296	170	4	1,174	50,887	23.07	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pompton.....	7	3	2	4	5	5	21	2,251	9.33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wayne.....	4	3	2	4	6	11	30	1,737	17.28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
West Milford.....	9	6	2	9	9	11	57	2,681	21.26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Death rate per 1000 of County.....	377	288	182	395	290	6	1,468	13.44	13.44	12	22	53	22	11	70	238	180	146	137	64	32	72	11	56	28	3	19	1	

County of S A L E M. Statistical Divisions.	DEATHS AT ALL AGES.						PRINCIPAL CAUSES OF DEATH.																						
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	Remittent fever.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	
Population.....	24,680.																												
Elishboro.....	4	2	2	4	5	7	11	570	14.72	1	2	3	1	1	3	1	1	1	2	1	1	1	1	1	1	1	1	1	
Lower Alloways Creek.....	5	3	3	9	0	0	17	1,323	12.84	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Lower Penn's Neck.....	11	5	5	12	14	14	49	1,324	36.98	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Mannington.....	7	6	2	16	18	18	48	3,497	13.72	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Pilesgrove.....	4	1	1	10	4	7	26	1,778	14.62	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Quinton.....	4	1	1	10	10	10	26	1,390	18.02	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sidon.....	23	3	10	16	16	16	55	5,081	10.82	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Upper Alloways Creek.....	11	3	8	16	10	7	27	1,917	14.09	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Upper Penn's Neck.....	3	3	1	7	7	7	21	2,078	10.10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Death rate per 1000 of county, exclusive of cities over 5000.....	76	33	39	98	110	6	362	14.64	2	7	3	2	2	2	15	29	45	46	16	11	8	38	7	24	12	2	6		

County of SOMERSET.	DEATHS AT ALL AGES.					PRINCIPAL CAUSES OF DEATH.																								
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.		
Population.....	27,161.																													
Statistical Divisions.																														
Beckminster.....	4	1	1	7	9	2	22	1,812	12.02																					
Bridgewater.....	4	3	1	15	9	1	32	2,812	11.39																					
Brilstone.....	2	1	1	6	9	1	10	7,316	1.36																					
Buttton.....	22	10	10	30	30	1	104	7,997	13.00																					
Parish.....	11	9	3	13	18	1	52	3,818	13.62																					
Hillsdon.....	7	2	1	9	23	1	44	3,248	13.54																					
Montgomery.....	5	1	2	4	6	1	18	1,928	9.33																					
North Petherton.....	7	3	2	13	6	1	30	3,217	9.32																					
Warren.....	4	1	1	2	11	2	10	1,203	8.31																					
Death rate per 1000 of county.....	71	31	22	99	118	2	343			5	2	2	2	1	4	4	28	44	39	21	21	15	34	5	28	11	5	4		

County of S U S S E X. Statistical Divisions.	DEATHS AT ALL AGES.					PRINCIPAL CAUSES OF DEATH.																							
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	Remittent feves, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	cuté Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	
Andover	1	3	1	4	2	8	1,150	7	1	1	3	1	1	1	1	1	1	3	2	2	1	1	1	1	1	1	1	1	1
Byram	2	5	2	3	4	17	1,406	12	2	1	1	3	1	1	1	1	1	3	2	2	1	1	1	1	1	1	1	1	1
Frankford	2	1	3	11	8	25	1,680	15	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1
Greene	7	1	2	2	5	8	727	11	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hardyston	1	1	2	14	13	39	2,645	14	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hampden	2	1	2	1	5	9	895	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lanycette	2	3	2	2	4	13	780	17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maryskate	2	3	2	1	6	8	1,022	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Newton	3	3	2	11	9	36	1,012	36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sandyston	3	4	4	4	2	20	1,113	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sparta	3	4	4	4	10	28	1,413	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stillwater	3	4	4	6	6	27	1,562	17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Vernon	3	2	4	3	5	19	1,828	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Walpole	2	2	2	3	5	14	575	24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wentape	4	4	10	11	13	42	3,381	12	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Death rate per 1000 of county	39	30	39	81	92	3	294	12.05	7	13	15	15	8	11	11	8	11	38	37	21	15	5	35	1	12	8	2	5	





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